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NOTICES NECROLOGIQUES

La Communauté Gravimétrique a la grande tristesse de vous faire part des décès de :

Louis JONES, Ing. Géographe en Chef (Belgique)
le 19 Septembre 1975

Tauno HONKASALO, Prof. Dr. (Finlande)
le 4 Octobre 1975

Leur disparition brutale, quelques jours seulement après l'Assemblée Générale de l'U.G.G.I. à laquelle ils avaient participé, fait ressortir davantage le vide sensible qu'ils laissent parmi tous ceux qui les ont connus et estimés.

L. JONES

Ingénieur Géographe en Chef
de l'Institut Géographique Militaire de Belgique

Né en 1914, L. JONES entra en 1932 à l'Ecole Royale Militaire. Il en sortit sous-lieutenant en 1934 et quitta en 1937 l'Ecole d'Application comme officier d'artillerie.

Sa carrière de géodésien commence effectivement en 1945 lorsqu'il entre au bureau de calcul de l'Institut Cartographique Militaire. Familiarisé là avec toutes les arcanes de la Géodésie, il passera lors de la transformation de l'établissement en Institut Géographique Militaire dans le cadre scientifique permanent dont il devait franchir tous les échelons : Ingénieur principal en 1950, Géographe en 1951, mis en fonction de Directeur de la Géodésie en 1968, il sera nommé Géographe en chef en 1973.

Il quittera très vite le centre de calcul pour reprendre la direction du service de nivellation, lequel sous son impulsion allait bientôt s'adjointre une section de Gravimétrie.

On lui doit en effet la réalisation en 1947-48 du premier réseau gravimétrique de base de la Belgique, réseau qu'il s'efforcera de compléter au cours de toute sa carrière.

Le deuxième nivellation général ne comprenait guère qu'un réseau de premier ordre lorsque L. JONES reprit le service du nivellation. Il laisse à sa mort un réseau pratiquement terminé.

Ces deux œuvres ne l'empêchent cependant pas d'effectuer deux missions gravimétriques au Congo Belge en 1952 et 1954 pour le compte du syndicat pour l'étude géologique et minière de la cuvette congolaise.

Dans le domaine de l'étude et de la recherche, L. JONES devait s'orienter plus particulièrement vers la liaison entre les techniques de mesures géodésiques et des disciplines voisines : apports de la gravimétrie à la géologie, mesure des mouvements récents de l'écorce terrestre, volcanologie, recherche de cavités souterraines, déformation des ouvrages d'art, étude des surfaces de référence, micro-géodésie appliquée à la construction, etc... .

Membre associé puis titulaire du Comité National de Géodésie et de Géophysique, secrétaire du centre de volcanologie, collaborateur à l'Institut pour la Recherche Scientifique en Afrique Centrale, Directeur de la Classe des Sciences Techniques à l'Académie Royale des Sciences d'Outre-mer, Louis JONES ne limitait pas ses activités au seul territoire national.

En effet, ayant représenté la Belgique dans plusieurs congrès scientifiques, nous ne citerons ici que ses étapes les plus marquantes dans la Géodésie internationale : Membre depuis 1961 de l'AIG, il sera secrétaire de la section II (nivellation et mouvements du sol) de 1963 à 1971. Président du R.E.U.N. depuis 1971, participant du N.W.E.L.L. et président de la sous-commission pour l'Europe de l'Ouest de la "Commission for Recent Crustal Movements".

Son activité à la Commission Gravimétrique Internationale est également bien connue.

Nous rappelerons ci-après ses principaux travaux dans le domaine gravimétrique.

- Le levé gravimétrique de la Belgique (1947-1948).
Bruxelles, IGM, 1948, 64 p, 2 cartes.
- Gravimétrie - Les anomalies isostatiques en Belgique.
Bruxelles, IGM, 1951, 6 p, 3 dépl. h.t.
- Une mission de reconnaissance gravimétrique au Riva.
ICRB, Bull. des séances, 24 (1953) (4) 1563-1571.
- Note introductory sur les levés gravimétriques au Congo belge et au Ruanda-Urundi.
ARGC, Bull. des séances, n.s., t.2 (1956) (3) 420, 429-461.
- Catalogue des stations gravimétriques et magnétiques. Définitions et résultats des mesures. Fasc. 1 : degrés carrés Nord 2° à Sud 1°. *
AMRAC 26 (1959) ("Synd."). VIII + 5 p, 80 tabl., 2 cartes.
- (En collaboration avec P. EVRARD et P.L.MATHIEU) - Etude gravimétrique préliminaire du graben de l'Afrique centrale. Etablissement d'un réseau de base. ARSOM, mém. in -8°, cl. sc. tech., n.s., t.13 (1960) (2), 50 p, 1 fig., 2 cartes h.t.
- Catalogue des stations gravimétriques et magnétiques. Définitions et résultats des mesures. Fasc. 2 : degrés carrés Sud 2° à Sud 4°. *
AMRAC 31 (1960) ("Synd."). VII + 5 p., 92 tabl., 2 cartes.
- Gravimétrie. AMRAC 36 (1960) ("Synd.") 34 p, 8 fig. 1 carte h.t.
- Notice de la carte gravimétrique. In : Atlas général du Congo.
ARSOM, index 372 (1962) 12 p, 1 carte. Trad. en néerl. par J. KLERKX : nota bij de gravimetrische kaart.
- Catalogue des stations gravimétriques et magnétiques. Définitions et résultats des mesures. Fasc. 3 : degrés carrés Sud 5°. *
AMRAC 40 (1962) ("Synd.") X + 5 p, 68 tabl., 2 cartes h.t.
- Catalogue des stations gravimétriques et magnétiques. Définitions et résultats des mesures. Fasc. 4 : degrés carrés Sud 6° et Sud 7°. *
AMRAC 42 (1962) ("Synd.") 5 p, 70 tabl., 2 cartes.
- Etude gravimétrique du graben de l'Afrique centrale. La région des volcans Nyiragongo et Nyamuragira. (En collaboration avec P. EVRARD).
ARSOM, mém. in-8°, cl. des sc. techn., n.s., 15 (1963) (5), 71 p, 3 doc.

* En collaboration avec P.L. MATHIEU et H. STRENGER.

Prof. Dr. T. HONKASALO
 Institut Géodésique Finlandais

Le Prof. T. HONKASALO est mort brusquement d'une crise cardiaque le 4 Octobre.

Il a eu une grande activité dans le domaine de la Gravimétrie. Spécialiste des mesures de pesanteur, il a contribué en majeure partie à la réalisation du réseau finlandais, participant lui-même aux campagnes sur le terrain de 1946 à 1957 (a). Il a étendu la couverture gravimétrique aux mers Baltique et de Barents (b).

De plus, il a contribué à l'établissement du Réseau Gravimétrique Mondial de Référence (IGSN), d'une part en effectuant des observations avec l'appareil pendulaire "de Cambridge", complétant le travail du Prof. B.C. BROWNE, d'autre part en améliorant les observations antérieures grâce à une nouvelle correction de température (c).

Il s'est aussi penché sur les problèmes de "l'interprétation géophysique des anomalies de pesanteur" et a dirigé pendant plusieurs années ce groupe spécial d'études, au sein de l'A.I.G. (Rapports Symposium Prague 1969, U.G.G.I., Moscou 1971).

Par ailleurs T. HONKASALO avait pris depuis ces dernières années une place importante dans le domaine international.

Après avoir été secrétaire de la section "Gravimétrie" de l'A.I.G. de 1967 à 1975, il venait d'en être nommé Président (U.G.G.I., Grenoble, Septembre 1975).

Son souci de l'exactitude et de la précision l'avait fait désigner aussi pour être le Président du groupe spécial d'études "Techniques Spéciales des Mesures Gravimétriques" (Rapports U.G.G.I., Moscou 1971, Grenoble 1975).

a)-Gravity survey of Finland in the years 1945-1960.

Suom. Geod. Lait. Julk., n°55, 35 p, Helsinki, 1962.

-Gravity measurements, in : "Geodeettinen laitos 1918-1968".

Suom. Geod. Lait. Julk., n°65, p.97-113, Helsinki, 1969.

b)-Gravity survey of the Baltic and the Barents sea.

7 p, presented at the I.G.C. meeting in 1959 at Paris and published in Nordiska Kommissionen för geodesi, in May 1959, Copenhagen.

c)-Report on the gravity measurements in the F.O.W.G.N. with Cambridge Pendulum Apparatus in 1963-64. I.A.G., S.S.G. 5, Report, I.U.G.G., Zurich, 1967. (En collaboration avec JACKSON, GOUGH & BROWNE).

-Recomputation of the temperature correction for previous Cambridge pendulum measurements, 1968.

-An analysis of scale differences of pendulum and absolute measurements used for the IGSN 71. Appendix V : "The IGSN 71", Pub. Sp. N° 4, A.I.G., 1974.

- II -

IUGG Meeting - Grenoble - (25 August - 5 September 1975)

PROCEEDINGS of the MEETING of the SECTION III of the I.A.G. :

G R A V I M E T R Y

At the opening session of the General Assembly of the IAG in Grenoble on 18 August 1975 at 14.30, Professor C. MORELLI, President of the section, presented a summary report of activities during the period 1971-1974.

The section held three independent meetings and several joint meetings with other sections.

The chairman of all the meetings was Professor C. MORELLI and the secretary Professor T. HONKASALO.

The first meeting on WORLD GRAVITY. 19 August at 14.30-15.50.

The report of the Special Study Group 3.18, Absolute Gravity Measurements, was presented by Dr. A. SAKUMA. The observations at the BIPM have been continued and further improved. An accuracy of $\pm 1 \mu\text{Gal}$ or better has been achieved with this stationary apparatus.

Transportable apparatus of considerable importance for the world gravity net have been developed. The Italian (Sakuma type) instrument reaches a precision of $\pm 3.5 \mu\text{Gal}$. The American instrument (Faller-Hammond type) is under reconstruction to reach a precision of $10 \mu\text{Gal}$. The Soviet instrument is expected to have a precision of $\pm 20 \mu\text{Gal}$.

Professor C. GERSTENECKER reported on the new measurements of the Technical University in Darmstadt at stations of the IGSN 71 in Europe and Africa.

Dr. W.E. STRANGE reported on reobservations over the U.S. Gravity Base Network. The results agree surprisingly well with the values of the IGSN 71.

Dr. H. SUZUKI delivered the paper of T. SETO and M. TAZIMA on the gravity ties between Japan and Europe. The results agree to an accuracy of $\pm 0.02 \text{ mGal}$ with the values of IGSN 71. He also presented the new gravimetric network in Japan.

Dr. L.P. PELLINEN read the paper of Dr. KHEIFFETS, GUSEV and LOKHOV on Some Results of International Pendulum Ties worked out by the Central Scientific Research Institute of Geodesy, Areal Survey and Cartography (TsNIIGAIK, USSR). The relative pendulum apparatus have reached an accuracy of $\pm 0.05 \text{ mGal}$.

Professor W. TORGE reported on the establishment of a high precision gravity network in the eastern Mediterranean. From the free net adjustment gravity values referring to a mean sea level have been determined with an accuracy of $\pm 0.02 \text{ mGal}$ or better.

The second meeting on SPECIAL GRAVITY MEASUREMENTS AND REDUCTIONS,
20 August at 16.15-17.30.

The President of the Special Study Group 3.37, Special Techniques of Gravity Measurements, Professor T. HONKASALO, presented a summary of the Study Group's report. The most important problems studied were :

1. The planning and monumentation of stations,
2. Observation methods,
3. Corrections from ambient to standard conditions,
4. Investigation of characteristics of the gravimeters.

In the discussion which followed, Dr. SAKUMA pointed out that weather effects necessitate complicated corrections.

Dr. I. NAKAGAWA reported on investigations of LCR gravimeters carried out in Japan.

Professor W. TORGE presented studies by Dr. WENZELL on the stability of a transformed Askania gravimeter. The inner temperature of the gravimeter can be stabilized. This is necessary since a change in inner temperature of 0.003°C causes an error of $10 \mu\text{Gal}$.

Dr. A. GERARD described the gravity anomaly maps of France.

Professor W. TORGE reported on the studies of precise gravity measurements in northern Iceland. The modern high precision measurements cannot fully be compared with the older ones since the old monumentation was too weak. However, changes of $6-9 \mu\text{Gal}/\text{year}$ have been observed by double measurements at 5 year intervals.

Dr. I. NAKAGAWA reported the high precision gravity measurements at stations with small gravity differences in Japan.

Dr. W.E. STRANGE presented an extensive study on secular changes of gravity at areas with rapid elevation changes in California.

The third meeting on GRAVIMETRIC CONTROLS, REPORTS, 21 August at 14.30-15.35.

As Dr. WORZELL, President of the Special Study Group 3.20, Gravity measurements at sea, was not present, Professor MORELLI described the new sea gravimeter constructions and the main work done in the field of this SSG on the basis of the section report. He mentioned that Dr. WORZELL considers that the tasks of this SSG have been performed and proposes that the study group be disbanded.

Dr. H.G. KAHLE presented an analysis of the sea gravity measurements in the Indian Ocean. According to this analysis, the moving continents are surrounded by areas of large gravity anomalies and stable continents have an even anomaly field in their surroundings. This can be understood geologically.

In the discussions, no proposal was made to continue the work of the SSG 3.20. Thus, this question was given over to the Executive Committee of the IAG.

Professor Yu.D. BOULANGER reported on the work started by the new Special Study Group 3.40, Changing of Gravity with Time. A line longer than 10 000 km from Potsdam to Kamchatka has already been measured two times. All changes of gravity are smaller than 10 $\mu\text{Gal}/\text{year}$, and these are of the order of measuring errors. He proposed a resolution for measurements of accurate gravity lines in equator areas across the fields of large gravity anomalies e.g. from Ceylon to Australia.

Professor HONKASALO proposed another resolution to study the practical and economical possibilities of measuring small gravity difference lines with gravimeters around the world. In the discussion (LEVALLOIS, MORELLI, BENDER, STRANGE, TENGSTRÖM, TERRIEN) many proposals were made for studying the secular gravity variations. The proposed resolutions were approved for presentation to the resolution committee.

Professor C. MORELLI reported on plans to use the Italian absolute gravity instrument in Europe first in Italy and France, next year in Germany and in the northern European countries to confirm the Euro-African calibration line.

The President of the IGC, Professor MORELLI, reported on the IGC meeting in Paris in September 1974, and Dr. S. CORON on the situation in the IGB. In the discussion of the accepted terms of reference of the IGB, Mr LEVALLOIS proposed a change, i.e. that the Director of the IGB can participate in the meetings of the Directing Board but without the right to vote. This change was accepted.

The joint meeting of Section III and Section IV on PROCESSING, REPRESENTATION and INTERPRETATION of GRAVITY DATA, 22 August at 16.15-17.15, chairman Professor MORELLI.

Dr. E. GRAFARENDS lecture on Representation of the Standard Gravity Field was followed by a lively discussion (WEIGHTMAN, MORITZ, DUFOUR).

Dr. M.K. PAUL described the prediction of point and mean gravity anomalies using local bivariate covariance function.

Dr. O.W. WILLIAMS described the status of airborne gravity measurements and developing gradiometers in the USA. The final accuracy of mean gravity anomalies for $10^\circ \times 10^\circ$ square is now $\pm 5-9 \text{ mGal}$. Within a year's time a decision will be made on what system of the three different principles will finally be chosen for the gradiometer. The airborne gravity measurements will not be continued before the gradiometers can be tested at the same time. The absolute gravity instrument of Faller and Hammond is now under reconstruction for an accuracy of $\pm 10 \mu\text{Gal}$. It is estimated that this work will be ready next spring.

The fourth meeting on STUDIES of SPECIAL STUDY GROUPS, 26 August at 14.30-17.30.

As a member of the resolution committee of the IAG, the section secretary presented the proposed six resolutions of section III.
No comments.

Professor MORELLI described the working groups formed by the IGC to intensify and further the work of the IGB. (See p.I-14).

The president of the SSG 3.05 World Gravity Net, Professor MORELLI, proposed that this special study group be disbanded. He considered that its work has been performed. The maintenance of the net belongs to the IGC, which is permanent. No objections.

The work of the SSG 3.18, Absolute Gravity Measurement, was considered to have concentrated on three absolute apparatus the Sakuma, Faller-Hammond and USSR apparatus, using similar principles. There is no need to continue the work of this SSG.

Professor MORELLI described the plans to use the Italian portable absolute gravity instrument in Europe and Africa.

It had already been proposed that the SSG 3.18, Gravity at Sea, be disbanded. Dr. COLLETTE and Professor BOULANGER considered the work of this study group to be incomplete. There are areas with great discrepancies between different expeditions.

The work was left to the new working groups of the IGC.

Professor BOULANGER described the plans for studying secular gravity variation in the USSR. In addition to the accurate long gravity line from Potsdam to Kamchatka, there are two other lines, a parallel line, south from this long line, and a querline from Tallinn to Sofia. The stations have been surrounded with a net of satellite stations to eliminate any local effects.

The discussion on observed changes in gravity was followed. Professor HONKASALO described the studies in Fennoscandia, Dr. STRANGE in California, Dr. NAKAGAWA near Lake Biwa-ko in Japan, and Professor TORGE in Iceland.

For joint meetings :

9.30-10.45 }
14.30-15.45 } Earth parameters and Reference systems
see other sections, too.

C. MORELLI - T. HONKASALO

Papers read or distributed at the General Assembly of
INTERNATIONAL ASSOCIATION of GEODESY - Section III -

- C. MORELLI, T. HONKASALO - Summary report on the activity 1971-1974 of Section III (Gravimetry), 35 p.
- A. SAKUMA - Report of Special Study Group 3.18 on Absolute Measurements of Gravity, 5 p., B.I.P.M., Sèvres.
- T. HONKASALO - Report of Special Study Group 3.37 on Special Techniques of Gravity Measurements, 11 p.
- S. CORON - The International Gravity Bureau - International Gravity Commission, 33 p.
 - Note on the International Gravity Bureau and Annex.
- M. BARLIK - Problem of gravity reduction for examination of real vertical deflections in mountain areas, 7 p., Pol. Acad. Sci., Comm. Geod., Warszawa.
- R. BOLLO, A. GERARD, C. WEBER - La carte gravimétrique de la France à l'échelle de 1/1.000.000., 8 p., B.R.G.M., Paris.
- K. COLIĆ - The Terrain Subdivision for the Computation of the Topographic Gravity-Correction by the Method of Weight-factors, 5 p., Zagreb
- K. COLIĆ - About the Method of Weight-factors with one treatment of the Near Zone, 9 p., Zagreb.
- V. DIMITRIJEVICH - Harmograv a spherical harmonic function to represent the Earth's gravitational potential.
- E.D. HEIDENREICH, E.W. GRAFARENDS, B. SCHAFFRIN - A representation of the gravity field, 38 p., Inst. Theor. Geod. ., Univ. Bonn.
- H.G. KAHLER, D. WERNER - Gravity and temperature anomalies in the wake of drifting continents.
- M. JE KHEIFETS, N.A. GUSEV, V.V. LOKHOV - Some results of international pendulum ties worked out by the central scientific research institute of geodesy, aerial survey and cartography, (TsNIIGAiK, URSS), 7 p., Moscow.
- I. NAKAGAWA - On characteristics of LaCoste & Romberg gravimeters (Model G), 8 p., Geophys. Inst., Kyoto Univ.
- I. NAKAGAWA, M. SATOMURA - On precise gravity measurement at stations of small gravity difference, 4 p., Geophys. Inst., Kyoto Univ.
- S. RIAD - Shear Zones in North Egypt Interpreted from Gravity Data.

- T. SETO, M. TAZIMA - Gravity Tie between Japan and Europe. 3 p, Geogr. Surv. Inst., Tokyo.
- W.E. STRANGE - Monitoring of secular changes of gravity in the United States, 14 p, U.S. Dept. Commerce, Rockville, Maryland.
- W.E. STRANGE - Reobservations over the U.S. National Gravity Base Network, 10 p. U.S. Dept. Commerce, Rockville, Maryland.
- H. SUZUKI - Gravimetric Network and New Gravity Values in Japan, 3 p, Geogr. Surv. Inst., Tokyo.
- W. TORGE, L.N. MAVRIDIS, H. DREWES, D. ARABELOS - Establishment of a high precision gravity network in the Eastern Mediterranean, 10 p.
- H.G. WENZEL - Stability of temperature in a transformed Askania gravimeter, 11 p, Tech. Univ. Hannover.

Some other papers distributed at the General Assembly of I.A.G.

- R.S. MATHER - Secretary's Report of the Section V : Physical Interpretation, 22 p, Sydney.
- T.I. KUKKAMAKI - Report 1971-1975 of the Fennoscandian Sub-Commission of the Commission on Recent Crustal Movements, 21 p.
- Commission on Recent Crustal Movements - Circular n° 10 and problems of recent crustal movements, 51 p, Prague.
- S. SAXOV - Report of Special Study Group n°5.11 : Geophysical Interpretation of Gravity Anomalies 1971 - 1975
- R.H. RAPP - Report of Special Study Group n°5.36 : Earth Models, 9 p.
- R.H. RAPP - The Gravitational Potential of the Earth to Degree 36 from Terrestrial Gravity Data, 12 p, Ohio State Univ.
- H. MORITZ - Report of Special Study Group n°5.39 of IAG : Fundamental Geodetic Constants, 17 p.
- S.R. HOLDAHL - Report of the Working Group on Recent Crustal Movements in North America, 12 p, U.S. Dept. Commerce, Rockville, Maryland.
- E.G. ANDERSON, C. RIZOS, R.S. MATHER - Atmospheric effects in physical geodesy, 19 p, Sydney.
- P. BIRO - Vertical crustal movements and time changes of the gravity field, 8 p, Tech. Univ. Budapest.

- Yu.D. BOULANGER, A.K. PEVNEV - Movements of the Earth's crust in seismic regions, 9 p.
 - H. DREWES - A method of direct gravimetric determination of differences of geoid undulations, 11 p.
 - T. HONKASALO - Finnish observations and research on earth tides in 1971 - 1974, 7 p.
 - G. LACHAPELLE - Geodetic Survey of Canada, Ottawa - Prediction of deviations of the vertical using heterogenous data, 18 p. Graz.
 - K. LEPPERT, B.V. HAMON, R.S. MATHER - A status report on investigations of sea surface slope along the eastern coast of Australia, 9 p.
 - J.J. LEVALLOIS - Construction du Géoïde par utilisation du gradient de la pesanteur, 13 p. Assoc. Int. Geod., Paris.
 - J.J. LEVALLOIS, H. MONGE - Le Géoïde Européen, version 1975, 15 p. Assoc. Int. Geod., Paris.
 - R.S. MATHER - Mean sea level and the definition of the Geoid, 12 p. Sydney.
 - I. NAKAGAWA, M. SATOMURA, M. OZEKI, H. TSUKAMOTO - Tidal change of gravity by means of an Askania gravimeter at Kyoto, Japan, 10 p. Geophys. Inst., Kyoto Univ.
 - L.P. PELLINEN - Studies in geodynamics area, 50 p.
 - W. TORGE, H.G. WENZEL - Comparison of earth tide observations with seven different gravimeters at Hannover, 9 p.
 - W. TORGE, G. BOEDECKER, H.G. WENZEL - Astrogeodetic geoid determination in the western Harz, 18 p.
 - Indonesian Institute of Sciences - Symposium on recent crustal movements and associated seismic and volcanic activity, Bandung 10 - 18 Nov. 1973, 23 p. Jakarta.
 - Swiss Committee for the International Geodynamics Project - Recent crustal movements in Switzerland, 14 p. Zurich.
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National Reports presented to the XVIth General Assembly

- Argentina (Nat. Comm.)
 - Australia (P. WELLMAN)
 - Belgium (Inst. Géogr. Militaire)
 - Canada (Nat. Comm. - H.D. VALLIANT)
 - Czechoslovakia (Acad. Sci.)
 - Cuba (Comité Cubano)
 - Denmark,
 - France
 - German Democratic Republic (Nat. Comm. Geod. Geophys.)
 - German Federal Republic (R. SIGL)
 - Greece (Nat. Comm. Geod. Geophys.)
 - Finland
 - Hungary (Acad. Sci.)
 - India (Survey of India)
 - Italy (A. MARUSSI)
 - Japan (Nat. Comm. Geod. Geophys.)
 - Lebanon
 - Madagascar (Inst. Cartogr.)
 - Netherlands (Geod. Commiss.)
 - Nigeria
 - Norway (Geogr. Survey)
 - Poland (Acad. Sci.)
 - Rhodesia (Dept. Surveyor Gal)
 - Spain
 - Sudan
 - Sweden (Nat. Land Survey)
 - Switzerland (Commiss. Géod. - Serv. Topogr. Fédéral)
 - Thailand (Royal Thai Survey Dept.)
 - Turkey (Nat. Comm. Geod. Geophys.)
 - United Kingdom (Nat. Comm. Geod. Geophys.)
 - United States
 - U.S.S.R.
 - Yugoslavia (Nat. Comm. Geod. Geophys.)
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RESOLUTIONS (Section III)

Resolution N° 14

The International Association of Geodesy,

Recognizing the fundamental role of the International Gravimetric Bureau which serves within the framework of FAGS, as the central agency of the international scientific community, and in particular of the International Gravimetric Commission, to collect and distribute gravity data and to provide advice, guidance and standards for the acquisition and use of these data, and

recognizing the generous support given previously by the French organizations in the financing and operations of the IGB,

but also, recognizing the urgent necessity of improving the services of the Bureau for the benefit of the scientific community,

welcomes the new proposals by the French National Committee for Geodesy and Geophysics which largely fulfils the requirement outlined in the 1974 IGC Resolution N° 1, by providing the computer facilities and the manpower to create and operate the IGB data bank and by providing assistance in the compilation of maps, to be put into operation as soon as possible,

recommends

- that the remaining requirement for scientific input to the IGB data management operation be fulfilled through the appointment, by the Directing Board of the IGB, of three working groups as follows :

- | | |
|--------------------------------------|-----------------------|
| I - Data Processing and Evaluation ; | { See details p.I-14. |
| II - World Gravity Standards ; | |
| III - Presentation of Gravity Data ; | |

- that the efforts of the above mentioned groups and the IGB be coordinated by one working group member appointed for a period of four years by the Directing Board in consultation with the French National Committee ;

- that the Directing Board of the IGB meet as required to resolve questions concerning the scientific policy and funding of the IGB as outlined in the Terms of References adopted by the IGC at the September 1974 meeting,

and expresses the wishes

- that support be given to the members of the Directing Board of IGB and of the Working Groups by the corresponding National Agencies or Committees to participate fully in the recommended activities and to support these activities through the use of national facilities,

- that the financial support of FAGS to the IGB be increased to a reasonable level .

WORKING GROUPS (details)I. Data Processing and Evaluation

The purpose of this group is to provide the IGB with standards, procedures and software for data editing, assessment and quality control. The principal tasks of this Group are to ensure :

1. that all gravity anomaly data in the IGB data bank is referred to an uniform standard (IGSN 71, GRS 67),
2. that the quality of all data entering the bank is known,
3. that techniques are implemented for adjusting and melding marine gravity data,
4. that data editing software is made available to detect and reject gross errors,
5. that standard data formats are reviewed and updated periodically in response to changing technology and user requirements.

II. Gravity standards

The purpose of this group is to maintain the IGSN as an international gravity reference standard and to provide advice and assistance to the IGB in problems relating to gravity standards. The principal tasks of this group will be :

1. collection of new measurements suitable for incorporation into future revisions of IGSN,
2. the distribution of IGSN station descriptions and principal facts,
3. the updating of IGSN station descriptions and principal facts based on reports from users,
4. the readjustment of excentre networks or local portions of IGSN where errors have been detected by users or where significant numbers of new observations have become available,
5. the identification of areas of IGSN where additional measurements are required to improve structure and proposing measurements programs for these areas to the appropriate national agency,
6. the publication at least once yearly of revisions to IGSN g values, station descriptions and principal facts,
7. the assessment of the current accuracy requirements for international gravity standards and the proposal of new measurements programs to meet these requirements,
8. the complete readjustments of IGSN when warranted by the availability of sufficient new measurements and the demands for increased accuracy.

III. Presentation of Gravity Data

The purpose of this group is to provide advice and assistance to the IGB in the computation and presentation of gravity data, e.g., maps, charts of mean anomalies, etc...

Resolution N° 15

The International Association of Geodesy,

Recognizing that the International Gravity Commission has adopted guidelines for its operation as well as terms of references for the International Gravity Bureau,

approves both of these in the form published in Bulletin Géodésique N° 115 with the modification that the Director of the International Gravity Bureau does not have voting rights in the Directing Board.

Resolution N° 16

The International Association of Geodesy,

Recognizing that in the near future absolute type gravity meters of microgal accuracy will be available for use at fixed sites while there will be portable instruments of ten or even one microgal accuracy, and considering that these should be used efficiently as possible for fundamental research in the Geosciences ;

1. Recommends that absolute gravity measurements should be made both in stable regions and in regions where secular or long period gravity variations are expected and should be repeated after sufficiently long intervals.

To this end :

a) About 10 permanent stations (or observatories) should be established where absolute gravity can be observed with microgal accuracy, to investigate possible global variations and correlations in these long term changes of g.

These stations should be sited in stable regions and well distributed across the world so that, with those observatories existing and at present under construction, there should preferably be more than one on each continent.

The maintenance of the stations should be coordinated by an international permanent service. This service should encourage cooperation between scientists working in the field with the aim of full joint publication, without undue delay of the observations and of the initial analysis of the results.

Member countries (where the stations are sited) are asked to participate in establishing and maintaining this permanent service.

b) The transportable absolute gravity meters should carry out these observations in stable regions where there is as yet no permanent stations (see 2c below) and in unstable regions as described above.

2. also recommends further uses as follows for the transportable absolute gravity meters :

a) to make observations along at least one gravity calibration line of the IGSN 71 network (such as the Euro-African Line) chosen so as to cover the full gravity range and made up of individual gravity steps of some one hundred milligals, in order to test the linearity of IGSN 71 and improve the usefulness of the calibration line.

.../...

b) to corroborate the accuracy of the permanent stations, as well as checking the accuracy of the portable devices by direct comparisons at the same place between instruments of different types.

c) to extend the number and improve the distribution of absolute stations over the world so as better to control IGSN 71 and improve its accuracy. Each such absolute station should be surrounded with a net of additional stations, measured with high precision gravimeters, to eliminate local effects.

Member Countries are strongly urged to promote and support all these activities.

Resolution N° 17

The International Association of Geodesy,

Considering the importance to the geosciences of investigations of secular and long period gravity variations with time,

recommends the continuation of present projects and the beginning of new investigations of this type in areas of interest, using absolute and relative type gravity meters.

Resolution N° 18

The International Association of Geodesy,

Recognizing the importance of studying non-tidal gravity variations for the determination of mass dislocation in the interior of the Earth, and noting that this is of great significance for global geodetic constructions and for solving fundamental problem of geophysics,

recommends that systematically repeated gravity observations be carried out in those equatorial regions having great gravity anomalies, both by relative methods and absolute methods, and

requests appropriate organizations of countries in which such measurements would be carried out to facilitate these measurements.

Resolution N° 19

The International Association of Geodesy,

Recognizing that an accuracy of a few microgals is now achievable in the observation of small gravity differences for study of secular changes in gravity,

and noting the significance of similar observations to the studies of possible mass movements within the Earth,

requests the members of the S.S.G. 3.40 to investigate the technical and economic possibility of carrying out similar measurements on a global scale repeated at intervals of several years.

V O E U X - (Section III) -Voeu N° 14

L'Association Internationale de Géodésie,

Reconnaissant le rôle fondamental du Bureau Gravimétrique International dans le sein de la F.A.G.S., comme organe central de la communauté scientifique internationale, et en particulier de la Commission Gravimétrique Internationale, pour rassembler et distribuer les données gravimétriques, ainsi que pour fournir des renseignements, des recommandations et des normes concernant l'obtention et l'usage de ces données, et

reconnaissant l'aide généreuse fournie précédemment par des organismes français pour le financement et le fonctionnement du Bureau Gravimétrique International,

mais reconnaissant aussi l'urgente nécessité d'améliorer les services du Bureau pour le bénéfice de la communauté scientifique,

enregistre avec satisfaction les nouvelles propositions du Comité Français de Géodésie et de Géophysique, qui satisfont largement les conditions précisées dans la résolution N° 1 prise en 1974 par la Commission Gravimétrique Internationale, en fournissant l'ordinateur, les services et le personnel nécessaires à la création et au fonctionnement de la banque de données du Bureau Gravimétrique International, ainsi que l'aide nécessaire à l'établissement de cartes, de manière que la mise en service puisse être réalisée aussitôt que possible,

recommande :

- que les autres conditions requises pour l'alimentation du Bureau Gravimétrique International en données scientifiques soient réalisées, à l'intervention du Comité directeur du Bureau, par la création de trois groupes de travail ayant pour tâches respectivement :

I - Le traitement et l'évaluation des données ; *

II - Les normes mondiales en matière de pesanteur ; *

III - La présentation des données gravimétriques ; *

- que le Comité directeur du Bureau Gravimétrique International se réunisse pour résoudre les questions de politique scientifique et celles concernant le financement du Bureau, comme il est indiqué dans les "Termes de références" adoptés par la Commission Gravimétrique Internationale lors de sa réunion de septembre 1974,

et exprime le voeu :

- qu'une aide soit consentie aux membres du Comité directeur du Bureau Gravimétrique International et aux membres des groupes de travail par les organismes et comités nationaux afin qu'ils participent pleinement aux activités proposées, et que des facilités soient données, aux niveaux nationaux, pour le développement de ces activités ;

- que l'aide financière accordée par la F.A.G.S. au Bureau Gravimétrique International soit augmentée pour atteindre un niveau raisonnable.

* Voir détails p.I-18.

I. Traitement des Données et Evaluation

Le but de ce Groupe est de fournir au B.G.I. les normes, les méthodes et le logiciel pour le relevé des données, leur estimation et le contrôle de leur qualité.

Ce Groupe doit assurer les principales tâches suivantes :

1. que toutes les données des anomalies gravimétriques dans la banque de données du B.G.I. se réfèrent à la norme uniforme (IGSN 71, GRS 67),
2. que la qualité de toutes les données mises en banque soit connue,
3. que des techniques soient appliquées pour la compensation et la recherche des données marines de pesanteur,
4. que le logiciel du relevé des données permette de détecter et de rejeter les erreurs importantes,
5. que les formats standards des données soient revus et mis à jour périodiquement suivant les changements de la technologie et les demandes des utilisateurs.

II. Normes Gravimétriques

Le but de ce Groupe est de maintenir l'"IGSN" comme une norme de référence gravimétrique internationale et de fournir conseil et assistance au B.G.I. pour les problèmes relatifs aux normes de pesanteur. Les principaux travaux de ce groupe sont :

1. la collecte de nouvelles mesures propres à être incorporées dans les révisions futures de l'"IGSN",
2. la distribution des descriptions des stations "IGSN" et de leurs principales caractéristiques,
3. la mise à jour des descriptions des stations "IGSN" et de leurs principales caractéristiques basée sur les rapports des utilisateurs,
4. le réajustement de réseaux secondaires ou de parties locales de l'"IGSN" lorsque des erreurs ont été détectées par les utilisateurs ou lorsque des chiffres significatifs de nouvelles observations sont devenus valables,
5. l'identification des régions de l'"IGSN" où il serait nécessaire d'effectuer des mesures complémentaires pour en améliorer la structure et la proposition au Service National concerné de programmes de mesures dans ces régions,
6. la publication au moins une fois par an des révisions des valeurs de l'"IGSN", de la description des stations et leurs principales caractéristiques,
7. l'estimation des demandes de précision pour les normes gravimétriques internationales et la proposition de programmes de nouvelles mesures afin de satisfaire ces demandes,
8. le réajustement total de l'"IGSN" lorsque l'on disposera d'un nombre suffisant de nouvelles mesures et qu'une précision meilleure sera demandée.

III. Présentation des données gravimétriques

Le but de ce Groupe est de fournir conseil et assistance au B.G.I. pour le calcul et la présentation des données de pesanteur, c'est-à-dire, cartes d'isanomales, cartes d'anomalies moyennes...

Voeu N° 15

L'Association Internationale de Géodésie,

Reconnaissant que la Commission Gravimétrique Internationale a adopté "les Règles" pour son fonctionnement ainsi que des "Termes de références" pour le Bureau Gravimétrique International,

approuve ces dispositions dans la forme publiée dans le Bulletin Géodésique N° 115, sauf que le directeur du Bureau Gravimétrique International n'a pas le droit de vote au Comité directeur.

Voeu N° 16

L'Association Internationale de Géodésie,

Reconnaissant que, dans un futur proche, on pourra utiliser des gravimètres absous d'une précision égale au microgal dans des stations fixes, et des instruments portatifs d'une précision de 10 ou même 1 microgal,

et considérant que ces appareils doivent être employés le plus efficacement possible pour la recherche fondamentale dans les Sciences de la Terre,

1. recommande de faire des mesures absolues de pesanteur, aussi bien dans des régions stables que dans des régions où des variations de pesanteur séculaires ou de longue période sont prévues, et de répéter les observations à des intervalles suffisamment longs.

Dans ce but :

a) On établirait environ 10 stations permanentes (ou observatoires) où la valeur absolue de la pesanteur peut être observée à la précision du microgal afin de rechercher les variations globales possibles et les corrélations dans les changements de g, à long terme.

Ces stations seraient localisées dans des régions stables et bien réparties à travers le monde, de sorte qu'avec les observatoires déjà existants et ceux en cours d'installation, il y ait de préférence plus d'une station sur chaque continent.

Le maintien de ces stations serait coordonné par un Service permanent international. Ce Service encouragerait la coopération entre les scientifiques travaillant dans ce domaine, ayant comme objectif d'établir sans retard une publication commune, relative aux observations et à l'analyse initiale des résultats.

On demande aux pays membres (où sont situées les stations) de participer à l'installation et au maintien de ce Service permanent.

b) Avec les gravimètres absous portatifs, on effectuerait des observations dans des régions stables où il n'y a pas encore de stations permanentes (voir 2 c ci-dessous) et dans des régions instables comme il est indiqué précédemment,

2. et recommande d'utiliser les gravimètres absous portatifs comme suit :

a) faire des observations sur au moins une ligne d'étalonnage gravimétrique du réseau IGSN 71 (telle que la ligne Europe - Afrique) ; ces observations seraient choisies de façon à couvrir toute l'échelle de pesanteur et seraient faites à des intervalles de pesanteur de 100 milligals, de manière à vérifier la linéarité du système IGSN 71 et augmenter l'utilité de la ligne d'étalonnage;

b) corroborer la précision des stations permanentes, et vérifier la précision des dispositifs portatifs, par des comparaisons directes à la même place entre des instruments de types différents ;

c) étendre le nombre et améliorer la répartition des stations absolues sur le globe de manière à mieux contrôler le système IGSN 71 et améliorer sa précision. Chacune de ces stations absolues devrait être entourée d'un réseau de stations complémentaires observées avec des gravimètres de haute précision, pour éliminer les effets locaux.

On demande avec insistance aux pays membres de promouvoir et soutenir toutes ces activités.

Voeu N° 17

L'Association Internationale de Géodésie,

Considérant l'importance pour les Sciences de la Terre, de rechercher les variations de pesanteur séculaire et de longue période, en fonction du temps,

recommande de poursuivre les projets en cours et d'entreprendre de nouvelles recherches du même genre dans les régions particulièrement intéressantes, en utilisant des appareils de mesure absolue et relative de la pesanteur.

Voeu N° 18

L'Association Internationale de Géodésie,

Reconnaissant l'importance de l'étude des variations de la pesanteur non périodiques pour la détermination des mouvements de masses à l'intérieur de la Terre, et notant qu'elle peut être significative pour des constructions géodésiques globales et pour la résolution de problèmes géophysiques fondamentaux,

recommande que des observations de pesanteur systématiquement répétées soient réalisées dans les régions équatoriales où existent de fortes anomalies, à la fois par des méthodes relatives et absolues,

demande aux organismes concernés dans les divers pays où ces mesures seraient à exécuter de faciliter leur réalisation.

Voeu N° 19

L'Association Internationale de Géodésie,

Reconnaissant que des observations à la précision de quelques microgals sont actuellement réalisables pour déceler de petites différences de pesanteur nécessaires à l'étude des changements séculaires,
notant que ces observations constituent un apport significatif à l'étude de mouvements possibles des masses à l'intérieur de la Terre,
demande aux membres du groupe spécial d'études 3.40 d'étudier les possibilités techniques et économiques de réaliser des mesures similaires à l'échelle du globe, répétées à intervalles de plusieurs années.

BUREAU GRAVIMÉTRIQUE INTERNATIONAL

Compte tenu du rapport présenté par le Professeur C. MORELLI, Président de la Commission Gravimétrique Internationale, le Conseil décide à l'unanimité le maintien du Bureau Gravimétrique International en France et nomme :

M. J.J. LEVALLOIS Directeur,
Melle S. CORON Vice-Directeur.

Extrait du Procès-Verbal de la réunion
du Conseil de l'A.I.G. à Grenoble
le 29 Août 1975.

LISTE des PUBLICATIONS
reçues au
BUREAU GRAVIMETRIQUE INTERNATIONAL
(Juillet à Décembre 1974)

CONCERNANT LES QUESTIONS DE PESANTEUR

LISTE des PUBLICATIONS

- * 332 - GONET O. - "Etude gravimétrique de la plaine du Rhône, région St-Maurice, Lac Léman".
 Matériaux pour la Géologie de la Suisse, Géophys., n°6, 50 p, Berne, 1965.
 Etude de détail.
- 335 - GONET O. - "Etude gravimétrique du Lac Léman à bord du mésoscaphe "Auguste Picard".
 Matériaux pour la Géologie de la Suisse, Géophys. n°8, 20 p, Berne, 1969.
 70 mesures supplémentaires ont été faites sur la terre ferme et 10 mesures sous-lacustres. Une carte d'anomalie résiduelle est présentée et une interprétation est donnée.
- 336 - WAGNER J.J.U. - "Elaboration d'une carte d'anomalie de Bouguer, Etude de la vallée du Rhône de St-Maurice à Saxon (Suisse)".
 Matériaux pour la Géologie de la Suisse, Géophys., n°9, 91 p, Berne, 1970.
 Liste des 490 stations gravimétriques couvrant un territoire de 150 km².
 Etude des anomalies résiduelles et interprétation géologique.
- 337 - LAZREG H. - "Etude géophysique, géologique et hydrogéologique de La région de Concise à Pompaples (Pied du Jura Vaudois)".
 Matériaux pour la Géologie de la Suisse, Géophys., n°10, 48 p, Berne, 1971.
 La région est délimitée à une surface d'environ 102 km². Le chapitre 2 (p. 24-30) est consacré à l'étude gravimétrique ; des cartes d'anomalies de Bouguer sont données hors texte (planche V et VI)...
- 338 - CORNICHE P. - "Application des méthodes géophysiques à la recherche hydrogéologique".
 Matériaux pour la Géologie de la Suisse, Géophys., n°13, 65 p, Berne, 1973.
 L'étude s'étend sur une superficie d'environ 250 km², délimitée par les frontières naturelles de la Venoge à l'Est, du Lac Léman au Sud, de l'Aubonne à l'Ouest et du pied du Jura au Nord.
 Liste de 350 stations gravimétriques. Différentes cartes d'anomalies de Bouguer. Interprétation des résultats en comparaison avec les méthodes électriques.

* Les numéros font suite à ceux indiqués dans le Bull. Inf. N° 36, Mars 1975.

- 339 - KRIVOY H.L. & T.E. PYLE - "Anomalous crust beneath West Florida shelf".
The American Association of Petroleum Geologists Bulletin, v.56,
n°1, p.107-113, 1972.

A new Bouguer gravity anomaly map of the west Florida continental margin reveals a landward salient of high positive values in the vicinity of St-Petersburg. A 20.000 sq km area of the shelf characterized by anomalies greater than + 30 mGal is thought to be underlain by a crust having a thickness intermediate between that of continents and that of oceans. A transition from oceanic toward continental crust in this area may have been accomplished by reef progradation across an ancient oceanic embayment. Alternatively, a transition from continental toward oceanic crust may have been produced by rotation of Florida and consequent rifting. The reef-progradation hypothesis is most consistent with what is known of the deep structure and tectonic setting of the Florida platform.

- 340 CENTRE NATIONAL pour l'EXPLOITATION des OCEANS - Bulletins
à - d'Information : N° 55-56, Juillet - Août 1973 à
344 N° 60, Décembre 1973, Paris.

- 347 - WOODWARD D.J. - "Gravity and magnetic anomalies over the Macquarie Ridge".

Oceanography of the South Pacific 1972, New Zealand National Commission for UNESCO, p.325-331, Wellington, 1973.

Bouguer gravity anomalies in the vicinity of the Macquarie Ridge show that in the north the ridge crosses the continental margin towards Fiordland, New Zealand. Between this margin and Macquarie Island, the ridge and the Puysegur and Macquarie Trenches are not reflected in the crust-mantle boundary, but south of Macquarie Island there is considerable crustal thickening under the ridge.

The Macquarie Ridge is not uniformly magnetised by the magnetic anomalies over the ridge can be explained by a sequence of normally and reversely magnetised blocks. The solution of the magnetic configuration in such cases is not unique.

- 348 - LUMB J.T., M.P. HOCHSTEIN & D.J. WOODWARD - "Interpretation of magnetic measurements in the Cook Islands, South-West Pacific Ocean".
The Western Pacific, Island Arcs, Marginal Seas, Geochemistry, p.79-101, Wellington, 1973.

Total force magnetic anomalies around several of the Cook Islands are fairly simple and bi-polar in form. A group of islands situated on a NW-SE trending ridge exhibit a more complex anomaly pattern which, in part, must have its source beneath the ridge. The virtual palaeomagnetic poles of islands belonging to the first group, and which were calculated from the best fit magnetization, show a large scatter. It is shown that this scatter is most likely to be caused by an inhomogeneous magnetization of the islands brought about by a sequence of normally and reversely magnetized layers. In this case the direction of the best fit magnetization is not representative of that of the mean remanent magnetization and the interpretation of the position of the virtual palaeomagnetic pole in terms of the palaeomagnetic history of a volcanic island is not justified.

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- 349 - BOTT M.H.P. & A.B. WATTS - "Deep structure of the continental margin adjacent to the British Isles".
 ICSU/SGOR Working Party 31 Symposium Cambridge 1970 : The geology of the East Atlantic Continental Margin, IGS Rep. n°70/14, p.89-109. Pub. n°378, Dept. Geol., Sci. Lab., The University of Durham, 1971.
 This paper summarises published information on the deep structure of the continental margin adjacent to the British Isles, as determined by seismic refraction, gravity and magnetic measurements. Some new gravity evidence bearing on the structure of the margins between the north British shelf and the Iceland-Faeroe Rise is also presented.
- 350 - TOMODA Y. - "Gravity anomalies in the Pacific Ocean".
 The Western Pacific : Island Arcs, Marginal Seas, Geochemistry, p.5-20, 1973.
 Geophysical implications of free-air gravity anomalies in the Pacific Ocean are discussed based on a number of typical gravimetric results obtained over island arcs, trenches, marginal basins, active ridges, inactive ridges and seamounts.
 A free-air gravity anomaly is a first approximation to an isostatic anomaly which indicates mass excess or mass deficiency beneath the surface. By the use of free-air anomalies it is speculated how present mass distributions are formed in the process of ocean-floor spreading.
 It is proposed that the Western Pacific is a kind of marginal basin (or basins), in which island arcs have migrated oceanwards as a result of the mass transported beneath the incipient and then developing marginal basin between the continent and island arc.
- 351 - PODMORE F. - "The shape of the Great Dyke of Rhodesia as revealed by gravity surveying".
 from : The Geol. Soc. of South Africa, Sp. Pub. n°1, p.610-620, 1970. Pub. n°47, University of Rhodesia, Physics Department.
 A gravity survey covering the central strip of Rhodesia has resulted in the first gravity map of this country, with gravity stations approximately five miles apart along the main roads in the region Salisbury-Sinoia-Hartley-Gwelo-Bulawayo-Beit Bridge-Fort Victoria-Salisbury. This provides a framework for detailed gravity traverses across the Great Dyke. Twelve of these, distributed along its length, have been completed and show very large anomalies.
 An iterative computer program has been written to generate a subsurface structure to account for the observed gravity anomaly. The derived Dyke cross-sections are presented and compared with the structure proposed by Worst (1960).
- 353 - DEFENSE MAPPING AGENCY, AEROSPACE CENTER - "Quarterly accession list, 1 July - 30 Sept. 1973".
 DoD Gravity Library, 2 p, St-Louis, 1973.
 Effective 1 July 1973 all gravity data held by the DoD Gravity Library is referenced to the International Gravity Standardization Net 1971 (IGSN 71). Anomalies are computed using the following theoretical gravity formula :

$$\gamma = 978031.85(1+0.005278895 \sin^2 \phi + 0.000023462 \sin^4 \phi) \text{ mGals}$$

- 355 - SATOMURA M. & I. NAKAGAWA - "Secular change of gravity near Lake Biwa-Ko".
Contr. Geophys. Inst., Kyoto Univ., n°12, p.101-115, 1972.
 Gravity measurements have repeatedly been carried out several times in the area around Lake Biwa-Ko since 1950 in order to detect, if possible, secular change of gravity. Results obtained by means of LaCoste & Romberg gravimeters in 1964, 1967, 1970 and 1971 show that gravity value has been increasing by about 0.1 mGal during recent several years on both shores of the southern part of the Lake Biwa-Ko. Results obtained by levelling surveys in the region concerned show the similar tendency as those by the gravity measurements.
- 356 - TIBERGHIEN V. - "Le champ de la pesanteur au Liban et ses interprétations".
Thèse de Dr. Ingénieur, Univ. Paris VI, 211 p, 1973.
 Le territoire libanais a été couvert de 500 nouvelles déterminations de la pesanteur (1971-1972) à l'aide d'un gravimètre Worden. Ces mesures, ainsi que celles exécutées en 1953 (230 stations) ont permis, après calculs, de réaliser les cartes des anomalies du Liban, à l'air libre (1/400.000), de Bouguer corrigées du relief proche (1/200.000), isostatiques dans l'hypothèse d'Airy, $T = 30$ Km (1/400.000). Il a été étudié l'effet de la géologie superficielle jusqu'à la couche du Jurassique et tout particulièrement dans la Béqaa où il en a été déduit, pour sa partie centrale, une carte au 1/200.000 du toit du Lutétien. Le Jurassique a été présumé à la cote - 2500 m dans la Béqaa centrale et S et à - 1000 m dans la Béqaa N. Toutes les corrections géologiques ont permis la réalisation d'une carte des anomalies régionales de Bouguer (1/400.000) qui a servi à l'interprétation du substratum profond : le Liban, dans son ensemble, n'est pas compensé isostatiquement ; l'épaississement de la croûte terrestre n'est vraiment effectif qu'à l'E de la Béqaa ; la Béqaa présente des analogies gravimétriques avec un fossé d'effondrement, résultat d'une distension dans les 15 premiers kilomètres ; enfin, si l'on décompose la croûte terrestre en couches superficielle et intermédiaire, le toit de cette dernière est sensiblement parallèle au toit du Jurassique. Il ressort que le Liban doit prolonger la structure crustale de la Méditerranée orientale mais que celle-ci doit être influencée aussi par la présence, en son milieu, du grand sillon méridien partant du NE de la Mer Rouge.
- 357 - JANKE P. - "Synoptischer Bearbeitung des südlichen Teiles von Skandinavien aus seismischen und gravimetrischen Ergebnissen".
Hamburger Geophysikalische Einzelschriften, H. 19, 95 S,
 Hamburg, 1973.
- 358 - INSTITUTE of GEOLOGICAL SCIENCES - "Bouguer gravity anomaly map of Malawi". London, 1974.
 Scale : 1/1.000.000, Gravity contour interval = 5 mGal.

- 359 - BALLARIN S., B. PALLA & C. TROMBETTI - "La gravità in Italia. Carta delle anomalie topografiche e topografico-isostatiche". Boll. Geod. Sci. Affini, Rivista dell'Istituto Geografico Militare, An. XXXI, n°4, Ott. Nov. Dic. 1972, p.461-489, Pise, 1972.

In the years 1952 and 1953, a gravimetric survey of the entire national territory and neighbouring seas was planned, and general rules to follow in the measurements, in the development of the computation (to obtain the mean heights of the ground and the reductions to bring to the observed values of gravity) and in the construction of the various maps of the isoanomalies were established.

After a short mention of the field works carried out by the various Agencies and Institutes interested in the survey, the lines of the work effectuated by the Institute of Geodesy and Topography of the Engineering Faculty of Pisa University are schematically shown in this paper.

Six maps of the isoanomalies at constant density and at variable density (the last of which finished only in July 1972) are attached, two of which being Bouguer's, two topographic-isostatic maps in the hypothesis of Airy-Heiskanen, and two topographic-isostatic maps in the hypothesis of Airy-Vening Meinesz.

For further information, see also "The Construction of the gravimetric map of Italy" by S. BALLARIN, B. PALLA, C. TROMBETTI, Memoirs of the Geodetic Commission of the Italian Republic, Third set, n°19, Florence, 1972.

- 360 - REILLY W.I. - "Interpolation, smoothing, and differentiation of gravity anomalies".

New Zealand J. Geol. & Geophys., v.12, n°4, p.609-627, Wellington, 1969.

Numerical methods are examined whereby gravity anomalies observed at randomly distributed points may be transformed into a continuous harmonic function on a level surface. The interpolated value $\bar{g}(z)$ at a height z at the origin is found from the observed values g_i at distances p_i , heights ξ_i and representing areas a_i , by a linear summation

$$\bar{g}(z) = \sum g_i f_i a_i / \sum f_i a_i$$

The weighting functions f_i are derived from the Fourier-Bessel integral expansion of the gravity anomaly field, and are designed to act as low pass filters. Two cases are considered : the first is a sharp cut-off filter, where the frequency v has an upper limit w , so that the frequency response is 1 for $0 < v < w$ and 0 for $v > w$, and

$$f_i = (1/2\pi) \int_{v=0}^{\infty} v \exp\{-v(z - \xi_i)\} J_0(vp) dv ;$$

the second is an exponential filter of theoretical frequency response $\exp(-v^2/w^2)$ for which

$$f_i = (1/2\pi) \int_{v=0}^{\infty} v \exp\{-v(z - \xi_i) - v^2/w^2\} J_0(vp) dv .$$

Differentiation of these formulae with respect to z yields the higher vertical derivatives directly from the observed anomalies. The methods include allowance for local variations in the density of observation points, and are designed to prepare data for the drawing of contour maps on a uniform basis by mechanical means ; of the two methods that of the exponential filter exhibits much greater numerical stability in handling irregularly distributed observations.

- 361 - REILLY W.I. - "Contouring gravity anomaly maps by digital plotter".
New Zealand J. Geol. & Geophys., v.12, n°4, p.628-632, Wellington, 1969.

Contouring gravity anomalies by digital plotter given values at points on a square grid is achieved by two-way polynomial interpolation so that the interpolated values fit exactly at the grid points. Contours are drawn for one grid square at a time using the $2n \times 2n$ array of grid values surrounding the square. The method of polynomial interpolation is designed to ensure continuity in the gradients of the contours across the boundaries of each square.

- 362 - REILLY W.I. - "New-Zealand gravity map series".
New Zealand J. Geol. & Geophys., v.15, n°1, p.3-15, Wellington, 1972.

The principal gravity map series in New Zealand is at a scale of 1/250.000 and is based on gravity surveys designed to cover the entire country at an optimum station density of 1 per 10 Km². Gravity anomalies are calculated on a uniform basis : they comprise the free-air anomaly, using the International Gravity Formula 1930, the Bouguer anomaly for a standard crustal density of 2.67 Mg/m³ with topographic correction to Hayford zone 0 (166.7km), and isostatic anomalies on the Airy-Heiskanen system (including indirect effect), with normal thickness of crust $T = 30$ km. The accuracy of anomalies is mostly in the range from 1 to 2 mGal, though in mountainous areas it may reach 5 to 10 mGal.

Gravity anomaly maps at 1:250.000 are being issued in both Bouguer and isostatic anomaly versions, and maps of isostatic vertical gradient anomalies are also being issued, having been derived by numerical differentiation from the observed gravity anomalies. Maps of Bouguer and isostatic anomalies have also been published on a scale to 1:4.000.000.

- 363 - ANDREW E.M. - "Gravity surveys in Jamaica".
Inst. Geol. Sci., Geophys. Rep. n°GP/0/40, 32 p, London, 1969.

- 364 - BALAN A. & A. LEBRAS - "Mesures gravimétriques en Territoire Français des Afars et des Issas, 1972".
Typewritten text, 54 p, Paris, 1973.

Schémas des stations de référence à Djibouti et à Ali Safieh, rattachées à Addis Ababa. Liste des stations principales.

365 - CASE J.E. & H.R. JOESTING - "Regional geophysical investigations in the Central Colorado Plateau".

U.S. Dept of the Interior, Geol. Survey Professional Paper 736, 31 p, Washington, 1972.

Gravity and aeromagnetic surveys covering about 15.000 square miles in the central Colorado Plateau in Utah, Colorado, Arizona and New Mexico were conducted to assist in determining the regional subsurface geology as it may relate to uranium, oil and potash exploration...

The gravity anomaly map shows several different types of anomalies. The dominant anomalies are conspicuous gravity lows over the salt anticlines. Both broad regional highs, which occur over the monoclinal uplifts where denser rocks are close to the surface, and regional lows, which occur over the basin and platform areas, are caused by lateral density contrasts related to structural relief. Superimposed on these broad anomalies are conspicuous highs and lows that are caused by rocks of different density within the Precambrian basement, by concealed major Paleozoic structures, and by variations in thickness of paleozoic sedimentary rocks. Small gravity highs are located over most of the laccolithic mountains ...

ACADEMIE des SCIENCES U.R.S.S. - Références bibliographiques :

366 - Géophysique - Index des articles 1972, 235 p, Moscou, 1973.

367 à 372 - Géophysique, N° 5 à 11, Moscou, 1973.

373 à 381 - Géophysique, N° 3 à 11, Moscou, 1974.

382 - Sér. 52, Géodésie et Astronomie, Index des auteurs 1972, 99 p, Moscou, 1973.

383 - Sér. 52, Géodésie et Astronomie, Index des articles 1972, 42 p, Moscou, 1974.

384 à 390 - Sér. 52, Géodésie et Astronomie, N° 5 à 12, Moscou, 1973.

391 - Sér. 52, Géodésie et Astronomie, Index des auteurs 1973, 95 p, Moscou, 1974.

392 à 402 - Sér. 52, Géodésie et Astronomie, N° 1 à 10, Moscou, 1974.

403 - YEREMEEV V.F. & M.I. YOURKINA - "L'expression des altitudes du quasigéoïde et des déviations de la verticale pour le champ de référence de l'ellipsoïde de niveau".

11 p, Présenté à l'Assemblée Générale de l'IUGG, Moscou, 1971.

404 - YEREMEEV V.F. & M.I. YOURKINA - "The grade measurements equations by the simultaneous utilization of terrestrial and satellite data".

13 p, Presented to the XVth General Assembly of IUGG, Moscow, 1971.

405 - OSTACH O.M. - "Solution of Stokes' problem for a boundary ellipsoidal surface by means of green functions".

16 p, Presented to the XVth General Assembly of IUGG, Moscow, 1971.

- 406 - DWORAKOWSKA J. - "Research work in the field of automation of preparing gravimetric catalogues and maps".
 Proc. Inst. Geod. & Cartog., t.XX, Z.2(47), p.57-70, Warszawa, 1973.
 The elaborated preliminary technology in the numerical process of compiling gravimetric catalogues and maps includes the use of an ODRA 1204 computer with a drum memory, an automatic coordinatograph KART 2, and devices for coding the data obtained on an 8-channel paper band.
 Due to the lack of a coordinatograph for drawing isolines automatically, the elaboration covered only the problem of automatic recording the coordinates of gravimetric points and of automatic calculating processes.
 In addition, the methodics and technology developed by the author make possible an accurate adjustment of anomalies in the contact zones of maps drawn in 1:50.000 scale.
 From the description of research work given in the paper one can appraise the effectiveness of the technology of automatic work, compared with the classical way of working up gravimetric materials.
- 407 - ZIELIŃSKI J.B. - "Application of the collocation method to the accuracy estimation of the Earth gravity field determination".
 Geod. i Kartog., t.XXIII, Z.1, p.20-49, Polska Akad. Nauk, Kom. Geod. Warszawa, 1974.
 In the paper the formulae are developed which enable to estimate the accuracy of the Earth gravity field determination from satellite orbit. The collocation method is briefly described in parts 2 and 3. In part 4 the idea and mathematical expressions are given for the gravity field determination, when two models are chosen :
 I - representation by the free-air gravity anomaly map ;
 II- model of the single layer with density μ . To this two models the collocation method is applied and formulae are found for the estimation error and error covariance.
- 408 - DOBACZEWSKA W., B. KOLACZEK & J. SLEDZINSKI - Premier symposium international - "Application des satellites artificiels de la Terre en Géodésie et Géodynamique", Athènes - Lagonissi, 14-21 Mai 1973.
 Geod. i Kartog., t.XXIII, Z.2, p.157-164, Polska Akad. Nauk, Kom. Geod., Warszawa, 1974.
- 409 - Geod. i Kartog., t.XXIII, Z.3, Polska Akad. Nauk, Kom. Geod., Warszawa, 1974.
- a) KOLACZEK B. - "Perspectives of investigations of the Earth's figure and dynamics in the light of using new observational techniques". p.171-184.
 Achievement of the decimeter accuracy in determinations of the Earth's figure and in investigations of the Earth's potential and the Earth's rotation becomes possible by the use of new observational techniques such as : laser and Doppler observations of artificial satellites, lunar laser ranging, very long base interferometry - VLBI. Accuracy of these techniques and using them into geodynamic investigations are reviewed in the paper together with the first results obtained on this way in the investigations of the Earth's crust and polar motion, geoid and Earth's potential.

- b) DOBACZEWSKA W. - "Détermination du potentiel de la gravitation de la Terre par la méthode de la masse de points".
p.239-245.

410 - Travaux de l'Institut Géophysique de l'Académie Tchécoslovaque des Sciences, t.XX (1972), N° 363-396, Praha, 1974.

- a) BURŠA M. - "The detailed quasigeoid on the territory of the ČSSR and its accuracy".
n°363, p.9-105.

The way is described of determining the detailed quasigeoid on the territory of the ČSSR from the discrete values of the deflections of the vertical, located at the apexes of surface elements $10' \times 15'$ and at the centre points of these elements. The accuracy of data used is discussed, the interpolation error of the deflections of the vertical and of the quasigeoid heights is derived. It was found that if the effect of the masses in the central circular area, radius 5 km, is eliminated, the accuracy of the interpolation of the deflections of the vertical is increased by about 30%. The resultant accuracy in determining the quasigeoid is evaluated.

- b) GARGALOVIČ L., Z. ŠIMON & L. TRÄGER - "Experimentelle Messung kleiner Schwereunterschiede".
n°364, p.107-126.

- c) VYSKOČIL V. - "Comments on the manifestation of the deep structure of Czechoslovakia in the anomalous gravity field".
n°365, p.127-140.

a - The "corrected" anomalies $\Delta g_{MS} = \Delta g - G_M - G_S$ give a better idea of the distribution of the masses in the consolidated part of the Earth's crust than the original Bouguer anomalies Δg .

b - In the Carpathian a relatively good correlation can be observed between the Bouguer anomalies Δg , or Δg_S , and the depths of the M-discontinuity. On the other hand, in the Bohemian Massif this correlation is practically zero, so that determining the shape of the M-discontinuity from Bouguer anomalies in this region is not realistic.

c - The analysis carried out yielded a comparatively small density jump at the M-discontinuity of about 0.15 to 0.20 g cm^{-3} . However, the possibility cannot yet be excluded that this is a fictitious differential density resulting from the compensation of the irregularities of the M-discontinuity inside the Earth's crust.

d - Isostasy has the nature of a statistical regularity and with respect to it all the irregularities in the distribution of the masses in the Earth's crust must be considered. The undulation of the terrain is only one of the causes of these irregularities.

e - The exploitation of gravity data may contribute to providing more accurate data on the deep structure of the Earth's crust, obtained by Deep Seismic Sounding.

- d) DOSTAL J. & B. CHAN - "On the exploiting of Doppler observations of artificial Earth satellites in physical geodesy".
n°367, p.169-176.

First of all, the relations for the Doppler shift of the radio signal frequency, transmitted by the artificial Earth satellite, are derived, particularly with regard to the exploitation in treating gravimetric and geodetic problems. Experimental Doppler observations of the Solrad 9 satellite, carried out by comparatively simple technical equipment, are then described, and the results of the experiment are discussed.

411 - Studia Geophysica et Geodaetica, t.17, n°4, Ceskosl. Akad. Ved., Praha, 1973.

- a) LAMBECK K. - "Temporal variations of rotational origin in the absolute value of gravity".
p.269-271.

When correcting precise gravity measurements for polar motion, the Earth's rotational deformation must be considered, as this will increase the correction based on a rigid Earth by about 15 %. Conversely the gravity observations can be used to estimate the Love numbers h_2 and k_2 at the Chandler frequency.

- b) BURŠA M. - "The Earth-Moon potential energy".
p.272-289.

The potential energy of the Earth-Moon system is derived and, thus, also the disturbing potential function, responsible for the lunar precession of the Earth's axis, with preserving the terms from the non-spherical disturbing body. The gravitational fields of the Earth and Moon are considered in the form of a development in terms of spherical harmonics up to $n = 4$.

- c) VYSKOČIL V. - "Structure function as a characteristic of geophysical fields".
p.295-299.

Facts about the statistical properties of random fields may be obtained by analysing their increments (i.e. the differences of values at two points). The properties of structure functions are described and the possibility of testing the statistical homogeneity of geophysical fields and their possible homogeneization are discussed.

- d) BURDA M. & V. VYSKOČIL - "Statistical characteristics of geophysical fields in Hilbert's space".
p.300-305.

A review of the terms of functional analysis, which can be exploited for statistical treatment of geophysical fields, is given. The procedure for determining the statistical characteristics of the fields, defined by a single realization, which does not require the limiting assumption of homogeneity to be introduced, is outlined.

- e) KUBACKOVA L. - "Change in the spectrum of a gravity anomaly caused by expressing it discretely".
p.306-313.

The spectral content of an operation which may be called the operation of selecting the step for treating a certain, discretely expressed datum, continuous by nature is shown.

412 - Studia Geophysica et Geodaetica, t.18, n°1, Ceskosl. Akad. Ved., Praha, 1974.

- a) BURŠA M. - "Tidal potential due to a non-spherical lunar body".
p.1-7.

The tidal potential is derived at a point on the Earth's surface for the case when the perturbing gravitational field is not spherically symmetrical.

- b) YEREMEEV V.F. & M.I. YURKINA - "Fundamental equations of Molodenskii's theory for the gravitational reference field".
p.8-18.

The paper is devoted to the solution of Molodenskii's integral equations ; the normal gravitational model has been newly defined and this has made it possible to decrease the magnitude of the absolute terms and quite eliminate the complicated terms of the 2nd order. The normal potential introduced is not constant on the surface of the ellipsoid, however, this did not complicate the solution of the integral equations in any way. The result may be exploited in determining the densities of the equivalent single layer, the co-ordinates of the origin of the reference system, and the potential, combining terrestrial and satellite data.

- 413 - Studia Geophysica et Geodaetica, t.18, n°2, Ceskosl. Akad. Ved., Praha, 1974.

- a) BURŠA M. - "The derivatives of the lunar disturbing potential harmonics with respect to Euler's angles".
p.103-119.

The derivatives of the harmonics $P^{(k)}(\sin \delta_0^n) \cos kT_0$ and $P^{(k)}(\sin \delta_0^n) \sin kT_0$, occurring in the development of the lunar disturbing potential, are derived upto $n = 4$ and for $k = 0, 1, \dots, n$. The equatorial co-ordinates δ_0, T_0 , are referred to the Moon's mass centre ; the procedure for the solar disturbing potential is formally identical.

- b) DIVIS K. & V. TOBYAS - "The effect of vibrations on the accuracy of measurements with a CG-2 gravimeter".
p.199-204.

The effect of vibrations on the accuracy of measurements with a CG-2 gravimeter was investigated on a vibrating table with a vertical, harmonic motion of an amplitude range of $0.1 - 4 \mu$ and frequency range of $10 - 100$ Hz. The error in determining the gravity is a non-linear function of the amplitude and frequency, and within the range of motion of the table amounts to as much as tens of milligals. A permanent seismic noise of average intensity does not generate an error in the gravimeter reading. The effect of wind and close sources of vibrations can only be evaluated by means of concurrent seismic observations of ground movement.

- 414 - Studia Geophysica et Geodaetica, t.18, n°3, Ceskosl. Akad. Ved., Praha, 1974.

- a) BURŠA M. - "Moments of the lunar disturbing force".
p.207-231.

The components of the moments of the external force due to the gravitational effect of the Moon are derived, which causes disturbances in the motion of the Earth round its mass centre, taking into account the gravitational fields of both bodies in the form of a development in terms of harmonics up to degree $n = 4$.

- b) VELKOBORSKÝ P. - "On the problem of determining the gradients of gravity anomalies".
p.232-237.

Green's theorem on harmonic functions makes it possible to determine the integral relationship between the harmonic function and its derivative with respect to the normal on a closed Lyapunov surface. The conditions of solvability are given by Fredholm's theory of integral equations. The solution for a sphere was presented by Molodenskii (1945) and the general solution with the help of Molodenskii's parameter k by Ostach (1969). The present paper indicates a possibility of solving this problem with the help of a system of linear algebraic equations, a simplified modification of the Ostach-Molodenskii solution and, finally, a method, based on Eremeev's solution of the fundamental integral equation (1969).

- c) BURŠA M. - "Scale factor for lengths of the geopotential model".
p.298-303.

Using the data in (E.M. GAPOSCHKIN, G. VEIS & J. LATIMER, Smithsonian Institution Standard Earth III. Coordinates. SAO, 1973), the scale factor for lengths is derived of the geopotential model $R_0 = GM/W_0$ (W_0 is the potential on a generalized geoid). The resulting value, $R_0 = 6363672.9$ m, which is 2 m less than the original value (BURŠA, St. Geophys. & Geod. n°337, v.13, 1969), is practically the same as that in (BURŠA, St. Geophys. & Geod. v.16, n°10, 1972).

415 - Studia Geophysica et Geodaetica, t.18, n°4, Ceskosl. Akad. Ved., Praha, 1974.

- a) BURŠA M. - "Comparison of SE and GEM geocentric system and recent parameters of the geopotential model".
p.313-318.

The value of the geopotential on the geoid W_0 , is computed, as well as the scale factor for lengths, $R_0 = GM/W_0$, from the GEM 3 and GEM 4 systems ; the systems SE I, II, III and GEM 3, 4 are compared, and the parameters of the best-fitting tri-axial Earth ellipsoid are computed.

- b) PELLINEN L.P. & O.M. OSTACH - "About the influence of terrestrial topographical masses on the deflections of the vertical and the quasi-geoid heights".
p.319-328. (Russian text).

In accordance with the requirements for solving the Molodenskii boundary-value problem of the theory of the potential, a theory of topographic gravity reductions and gravity anomalies has been elaborated. Their definitions are founded on the method of removing and restoring the effect of a topographic massif, all terrestrial topographical masses above the surface of reference being considered as such. The result is Eq.5, the term on the r.h.s. being close in absolute value to the terrain correction, the second close to the usual Bouguer reduction, and the third proportional to the potential of all topographic masses. To compute the third term one would have to know the geoid heights, however, it would be completely eliminated in formulating the boundary condition in the form of Eq.4 and neither

it is necessary for the boundary condition in classical form to compute the deflections of the vertical and the disturbing potential, or the quasi-geoid heights. This can be seen from the formulae for these quantities in the "zero-approximation".

- c) KUBÁCKOVÁ L. - "Autocovariance function and the spectral density of the anomalous gravitational field, transformed by an integral operator of the convolution type".
p.329-338.

The transfer of the fundamental statistical characteristics, i.e. covariance function and the density of the statistical power spectrum, of a random homogeneous field across a linear homogeneous filter is investigated. The results obtained are applied to the study of the said statistical characteristics of transformed anomalous gravitational field.

- d) CSAPO G. - "Vibration experiments with Sharpe Gravimeters".
p.386-389.

The results of gravimeter measurements are influenced by various external effects among them by natural and artificial vibration sources. The nature of this disturbing factor is not yet clear, but to study phenomena is very important. In this paper the author reports on his vibration experiments carried out with a geodetic-type Sharpe gravimeter in a laboratory. The experiments confirm the existence of a vibration interval which is very dangerous for gravimeter observations.

- e) TOBYAS V. - "The effect of the coupling between galvanometers on the characteristics of the Gs-ll Gravimeter".
p.394-404.

With the help of equivalent constants of the system of two galvanometers of an Gs-ll gravimeter simple formulae for the amplitude and phase responses were derived. The coupling between the galvanometers is responsible for the change in the transient oscillations, which are determined by equivalent circular frequencies and damping constants. As regards the main tidal terms with a diurnal and semi-diurnal period the effect of the coupling on the amplitude responsible is negligible, but the changes of the phase delay amount to 10 - 20 % of the phase lag of the gravimeter. With events of periods between 100 and 1000 s (e.g., surface earthquake waves and free oscillations of the Earth) the effect of the coupling is not negligible with both responses.

417 CENTRE NATIONAL pour l'EXPLOITATION des OCEANS - Bulletins
à d'Informations, Paris.
425 - N° 61 à 70, Janvier à Octobre 1974.

MELCHIOR P. - Chronique de l'UGGI :
426 - N° 93, 192 p, Dec. 1973
427 - N° 94, 256 p, Dec. 1973
428 - N° 95, 315 p, Dec. 1973.

- 429 - STACEY R.A., J.B. BOYD, L.E. STEPHENS & W.E.F. BURKE - "Gravity measurements in British Columbia with maps :

N° 152 - Kootenay River	N° 154 - Parship River
N° 153 - Fraser River	N° 155 - Skeena River".

Gravity map Ser., Earth Physics Branch, 13 p, Ottawa, 1973.

Gravity map 152, 153, 154 and 155 correspond to the 1:1.000.000 scale N.T.S. mapsheets 82, 92, 93 and 103 and cover southwestern Alberta, southern British Columbia, the continental shelf off British Columbia and part of the adjacent Pacific Ocean. The Bouguer anomalies have been contoured at 10 mGal intervals and are based on gravity measurements every 12 to 15 kilometres on land and over the continental shelf, and ship-board gravity meter measurements over the Pacific Ocean. The terrain corrections have been computed using either a rectangular or a circular graticule, or a combination of both, depending on the scale of the available topographic maps.

The major change in the Bouguer anomaly field is from positive values over the Pacific Ocean to negative values over the mountains of British Columbia - the actual change in the Bouguer anomalies being approximately - 100 mGal per kilometre increase in the elevation. Over 90 % of this observed relationship between the Bouguer values and the elevation of a region can be accounted for by assuming some form of isostatic compensation for the topography. In areas of subdued relief, such as the plains of Alberta, the interior plateau and the continental shelf of British Columbia, the changes in the Bouguer anomalies can be related to density variations in the surface rocks.

- 430 - SOBCZAK L.W. & J.R. WEBER - "Crustal structure of Queen Elizabeth Islands and polar continental margin, Canada".
from : AAPG Memoir 19, Arctic Geol., 1973.
Earth Physics Branch, Contr. n°463, 15 p, Ottawa.

Free-air and Bouguer anomaly maps have been compiled from about 9.000 gravity measurements made throughout the Canadian Arctic Archipelago and the Arctic Ocean. These measurements form part of a major survey of the Arctic being carried out by the Canadian Government.

Correlation of Bouguer anomalies with geologic and physiographic features shows that negative anomalies generally occur over sedimentary basins and mountainous regions and positive anomalies occur over fold belts and the ocean basin.

The major feature of the free-air anomaly map is a series of large, positive, elliptically shaped anomalies overlying the continental margin and striking parallel with the continental break. These anomalies, which are approximately 120 km in width and between 150 and 300 km in length, have amplitudes greater than 100 mGal and regional horizontal gradients as large as 2,5 mGal/km. Interpretation of the gravity data, using seismic and geologic data for control, indicates that these anomalies can be explained best by a composite structure consisting of a sedimentary layer up to 10 km in thickness and a crust which thins by as much as 17 km.

The average free-air anomaly of the relatively flat archipelago (mean elevation of 15 m) west of long. 90°W is about 7 mGal, this value indicates that the region is in approximate isostatic equilibrium.

- 431 - JOHNSON B.D. - "Analysis of the regional gravity field in Tasmania using orthogonalized trigonometric functions".
Geophys. J. R. Astr. Soc., n°36, p.285-294, 1974.

The regional component of the gravity field in Tasmania has been obtained by approximating a smoothed subset of the observed data by a terminated Fourier series. The trigonometric functions were orthogonalized with respect to the irregularly spaced data by the Gram-Schmidt method. A coefficient set was obtained in terms of the original trigonometric functions to enable the regional component of the field to be calculated at any-arbitrary position.

- 432 - FINETTI I. & C. MORELLI - "Geophysical exploration of the Mediterranean Sea".
Osser. Geof. Sper., Boll. Geof. teor. appl., v.XV, n°60, p.263-341, Trieste, Dec. 1973.

A vast and systematic geophysical exploration - consisting of gravity and magnetic surveys, digital seismics - conducted during several years, allowed to outline the main geophysical and geological characters of the whole Mediterranean basin. For practical reasons, besides for existing conditions, the examined area is presented schematically subdivided into Western Mediterranean, Tyrrhenian, Strait of Sicily, Southern Adriatic, Western Ionian, Eastern Ionian, Eastern Mediterranean.

The paper ends with a geophysical examination of the evaporite problem, of which critically analyzes the most significant aspects, and reconstructs the time-isochrone maps of this interval. It is proposed a model that considers the existence of two Mediterranean evaporitic basins : the western one, supplied by Atlantic waters through the Betic area and covering the Western Mediterranean and the Tyrrhenian Sea ; and the eastern one, supplied by Red Sea waters across the Suez Canal area, and covering the Levantine Sea, the Ionian Sea, the Adriatic and the eastern side of the Apennine syncline.

In a pocket are included the following maps - 1/400.000 - :

- bathymetric maps,
- free-air gravity maps,
- Bouguer gravity maps,
- Total intensity magnetic field maps,
- Indicative smoothed isochrone maps of "Upper miocene evaporite interval".

- 433 - CARROZZO M.T., G. de VISINTINI, F. GIORGETTI & M. SPRINGER - "Seismic activity and specific seismicity in Italy".
Osser. Geof. Sper., Boll. Geof. terr. appl., v.XVI, n°61, p.3-21, Trieste, Marzo 1974.

Among the methods for determining the seismicity of a region for a certain time interval, the authors choosed here two ones, already used by Russian and American seismologists ; seismic activity and specific seismicity. The theoretical outlines of the methods were derived from Riznichenko (1958), (1959), (1966) and St. Amand (1956) ; the earthquakes were drawn from the earthquake catalogue of Carrozzo & oth. (1973), for the time interval 1884-1971.

- 434 - CARROZZO M.T., F. GIORGETTI & H. NICOLICH - "An example of comparative analysis of geophysical data".
Osser. Geof. Sper., Boll. Geof. teor. appl., v.XVI, n°62/63, p.100-124, Trieste, Giugno-Set. 1974.

The data obtained in the geophysical exploration of the Tyrrhenian Sea offer the possibility to try a comparative interpretation of gravity, magnetic and seismic data.

Two seismic reflection lines (24-fold), MS-61 and MS-62, were shoted together with a refraction (sonobuoys) prospection. Digitizing the interpreted seismic sections, and the gravity and magnetic data, we can obtain by iterative computations a complete synthesis of all the geophysical information and give a quantitative sketch of the Crust down to the Moho discontinuity.

- 435 - FLEISCHER U. - "Seagratimetric : Shipboard gravity measurements".
J. Geophys., n°40, p.1-35, 1974.

After a brief historical review a description of these instruments is given which are in use for the measurements of gravity aboard surface ships. Problems with different kinds of filtering and the effect of accelerations on gyro-stabilized gravimeters are discussed, followed by a mathematical evaluation of cross-coupling and off-leveling errors. In addition, methods of navigation and reduction of sea gravity data are dealt with. At last, there is a general review of activities in marine gravity work and an interpretation of gravity anomalies of different North Atlantic structures, surveyed by German research vessels.

- 436 - MENZEL H. - "Tiefseekuppen (seamounts)".

Z. Geophys., B.37, S-595-626, Physica-Verlag, Würzburg, 1971.

Morphology and geographical distribution of seamounts are described. Views on genesis and formation of volcanic seamounts as derived from geophysical measurements are outlined. Also non-volcanic seamounts are dealt with. The gravimetric and magnetic investigations of seamounts are discussed in some detail. It results that geophysical observations on seamounts are important concerning problems of the sea-floor-spreading hypothesis and plate tectonics.

- 437 - PALMASON G., T.H. NILSEN & G. THORBERGSSON - "Gravity base station network in Iceland 1968-1970".

Jökull, n°23, p.70-125, Reykjavik, 1974.

A network of 39 new gravity base stations was established in Iceland during May, June and September 1968. These stations were used as bases for a regional gravity survey of Iceland which was started in 1968. The base stations are distributed almost equidistantly throughout Iceland, and are connected with the base stations in Reykjavik. Although several base stations in Reykjavik have been used in the past, Reykjavik A has hitherto been the main base. However, because its location is now impractical for general use, it has been replaced by Reykjavik AA, which is located in the building of the Science Institute of the University of Iceland. Three LaCoste and Romberg, Inc., Model G gravity meters were used during the survey (n° 137, 140 and 144).

The EASCL value of 982279.86 mGal for Reykjavik A, which is close to the average of the 1965 and 1970 values, has been used as the reference value for the present base station network.

Description and snapshots of gravity base stations are included.

438 - SOCIETE HELVETIQUE des SCIENCES NATURELLES - Procès verbal de la 119ème séance de la Commission Géodésique Suisse tenue au Bernerhof à Berne le 2 Juin 1973 avec des extraits des rapports sur l'activité de l'année 1972., 22 p, 1974.

440 - ASSOCIATION INTERNATIONALE de GEODESIE - Bulletin Géodésique, N° 100, Paris, Septembre 1973.

- a) KHAN M.A. - "Equatorial radius of the Earth : A dynamical determination". p.227-236.

An interesting variation on the familiar method of determining the earth's equatorial radius a_e , from a knowledge of the earth's equatorial gravity is suggested. The value of equatorial radius thus found is $6378,142 \pm 5$ meters. The associated parameters are : $GM = 3.986005 \pm .000004 \times 10^{20} \text{ cm}^3 \text{ sec}^{-2}$ which excludes the relative mass of atmosphere $\sim 10^{-6} \times GM$, the equatorial gravity

$\chi_e = 978,030.9$ milligals (constrained in this solution by the Potsdam Correction of 13.67 milligals as the Potsdam Correction is more directly, or less indirectly, measurable than the equatorial gravity) and an ellipsoidal flattening of $f = 1/298.255$.

- b) GRAFAREND E. - "Attempts for a unified theory of geodesy". p.237-260.

Based on exterior calculus, the G. Frobenius integration theorem, holonomic and anholonomic Riemannian geometry, the typical geodetic problems are summarized in a unified manner. The E. Cartan pseudotorsion of natural orthogonal coordinates causes the misclosure of a closed three dimensional traverse. Natural coordinate differences are path dependent, anholonomic, nonintegrable, nonunique, therefore. The geodetic pseudotorsion form depends only on the components of the A. Marussi tensor of gravity gradients. A physically defined coordinate system can be found which is pseudotorsion free, whose coordinates are holonomic, integrable, unique. The G. Frobenius transformation matrix is of rank three, explaining the number of three dimensions of an intrinsic surface geometry. The matrix elements depend on either the second derivatives of the real gravity potential and the Euclidean norm of its gravity vector or the second derivatives of the standard gravity potential, the Euclidean norm of its standard gravity vector and the vertical deflections. Incomplete information of the Earth's gravity field leads to the concept of boundary value problems and satellite geodesy.

- c) VANICEK P. & C.L. MERRY - "Determination of the geoid from deflection of the vertical using a least-squares surface fitting technique". p.261-280.

The least-squares surface fitting technique is applied to the problem of determining the geoid from a given set of deflections. A higher order mixed algebraic polynomial is used. The coefficients are computed so as to minimize the sum of the squares of the differences between the polynomial's derivatives in the meridian as well as prime vertical directions and the corresponding deflection components. Astro-geodetic geoids for North America and some selected sub-areas are presented. These are then compared with the U.S. Army Map Service 1967 and the Computer Sciences Corporation/Goddard Space Flight Centre 1972 geoids. The precision of this least-squares technique is discussed and possible refinements are proposed.

- d) PROVERBIO E. & V. QUESADA - "Analysis of secular polar motion and continental drift". p.281-292.

The secular latitude variations of the five ILS stations of Mizusawa, Kitab, Carloforte, Gaithersburg and Ukiah were analyzed taking into account the recent continental drift theory. Using Le Pichon's 1968 reconstruction, the rate of rotation was computed from the astronomical data, fixing the pole of rotation by Le Pichon's determination. The most reasonable solution was obtained considering Mizusawa, Kitab and Carloforte lying on the Eurasia plate, the two American stations as one on the American plate (Gaithersburg) and the other on the North - East Pacific plate (Ukiah). The resulting relative rate between the Euro-American plates is found to be $0''.0028/\text{year}$ and between the American - Pacific plates $0''.0032/\text{years}$, or about $1^{\circ},3/10^6$ years and in excellent agreement with the plate tectonic theory.

- 441 - MAKRIS J., L.N. MAVRIDIS, H. MENZEL, A. STAVROU & G. VEIS - "The gravity field of Attika, the Peloponnese and Kithira, Greece". Z. Geophys., B.39, S.929-936, Physica-Verlag, Würzburg, 1973.

During the spring of 1971, 1200 gravity stations were established at the Peloponnese, Kithira and Attica in Greece. The data were reduced to free-air and complete Bouguer anomalies. (Terrain reduction 0 - 166.7 km) and compiled into maps of 5 mGal isolines. A first qualitative description of the field shows, that the strong positive Bouguer anomalies of the Aegean Sea continue over large areas of the eastern Peloponnese and Attica, indicating the extention limits of the Cycladic mass. The central Peloponnese becomes negative and the Bouguer field having a V-form arrangement with the open side to NNW, reaches its minimum of - 120 mGal at the Gulf of Patras. Increase of the sequences of sediments and the crustal thickness is a possible explanation. In general, the gravity field does not follow the morphological features indicating the absence of isostatic compensation.

- 442 - SOBCZAK L.W. & L.E. STEPHENS - "The gravity field of northeastern Ellesmere Island, part of northern Greenland and Lincoln Sea with map : N° 114 - Lincoln Sea".

Gravity map Ser., Earth Physics Branch, 9 p, Ottawa, 1974.

More than 700 gravity stations have been established in northern Ellesmere Island, in part of northern Greenland and on Lincoln Sea during the period 1957-1967. These measurements are presented in the form of a Bouguer anomaly map at a scale of 1/500.000. Primary gravity anomaly trends are parallel to major northeasterly structural trends. The most significant anomaly is an extensive low with a minimum value of - 120 mGal over Ellesmere Island which is attributed to the combined effect of ice caps, thick sequences of low-density sediments and a thickening of the crust below the mountains of the United States Range. A northeasterly extension of this low over Lincoln Sea suggests that the Franklinian geosyncline and Sverdrup Basin continue beyond the northeastern tip of Ellesmere Island. A prominent northeasterly trending high (maximum anomaly 50 mGal) over the Hazen Plateau and Lincoln Sea and a parallel low (minimum anomaly - 95 mGal) to the southeast over Judge Daly Promontory and Greenland are separated by a steep horizontal gradient (max. - 3.68 mGal/km). This change in anomaly may be explained by an abrupt step-like thickening of the crust of 10 km or more from the northwest to the southeast and may be related to an ancient plate boundary.

- 455 - GAMA L.I. - "Valores da gravidade nas regioes centro e sul do Brasil".
Obs. Nac., Publ. do Programa Gravimétrico n°4, 78 p, Rio de Janeiro, 1972.

Pursuant to the National Observatory gravity program for scientific purposes there were established 180 stations on bench marks along level lines extending over all states south of the - 12° parallel of latitude. The network contacts with the borders of Paraguai, Argentina and Uruguai. Double measurements in opposite directions were made with a LaCoste & Romberg meter (G-61). Differences above 0.05 mGal between out and back runs after elimination of the earth-tide effect were not as a rule admitted. The gravity datum for the Rio de Janeiro First Order Reference Station was still assumed to be 978,805.000 mGal conformable to the old Potsdam System. This procedure was observed for the sake of homogeneity with the previous complementary gravity survey of the northeast and east central part of the country.

About 930 gravity stations previously observed with Worden meter W-178 of the standard geophysical type were adjusted to the LaCoste gravity net. The accuracy of these Worden results is estimated at one tenth milligal.

Geographic coordinates were obtained from National Geographic Council maps on scales from 1/100,000 to 1/500,000.

Adjustment of gravity circuits was made by least-squares.

- 461 - SATO H. - "A study of horizontal movement of the Earth crust associated with destructive earthquakes in Japan".
Geogr. Survey Inst., Bull. v.XIX, part 1, p.89-130, Tokyo, 1973.

- 462 - DRAGIĆEVIC M.S. - "Carta Gravimetrica de America del Sur".
 Univ. Chile, Depart. Geof., Pub. n°167, 20 p, Santiago, 1974.
 A simple Bouguer anomaly map of Southern Andes was published in 1970. This map includes the Republics of Argentina, Bolivia, Chile, Uruguay and Southern Peru.
 The present work is an extension of that publication in order to cover most of the Andean Chain, and to provide a general vision of the major features of the Bouguer anomaly in South America.
 The following maps are included :
 1. South America, simple Bouguer anomaly,
 2. Septentrional Andes and Central America, simple Bouguer anomaly,
 5. Western Colombia, Bouguer anomaly,
 6. Chile, local Bouguer anomaly.
- DEFENSE MAPPING AGENCY, AEROSPACE CENTER - Quarterly accession list, DoD Gravity Library, St-Louis, 1974.
- 463 - 1 Oct. - 31 Dec. 1973,
 464 - 1 April - 30 June 1974,
 465 - 1 July - 30 Sept. 1974.
- 469 - GROTH E. & R. RUMMEL - "Improved Gravimetric Geoid for $7^\circ \leq \lambda \leq 12^\circ$ (E) and $47^\circ \leq \phi \leq 54^\circ$ (N)
 Z. Allgemeine Vermessungs-Nachrichten n°7, S.263-268, Darmstadt, 1974.
 A geoid obtained from gravimetric and satellite orbit data is evaluated for northern latitudes $47^\circ \leq \phi \leq 54^\circ$ and eastern longitudes $7^\circ \leq \lambda \leq 12^\circ$. Geoid heights are supposed to have relative accuracy of about ± 0.25 m in general. This is an improved solution with respect to an earlier computation of this geoid.
- 471 - DREWES H. - "Zur Berechnung der gravimetrischen topographischen Reduktion".
 Wissenschaft. Arb. Lehrstuhle Geod. Photog. & Kartog. Tech. Univ. München, n°56, 19 S, Hannover, 1974.
 The computation of the topographical reduction of gravity values is generally separated into two parts, the Bouguer plate reduction and the terrain correction. Usually the Bouguer plate is not calculated as a spherical layer but approximated by a horizontal plane. Sometimes this approximation is interpreted as a finite spherical plate with variable range. Both, the horizontal approximation and the spherical interpretation will cause errors in the topographical reduction. Investigations have been carried out to study the quantity of those errors and a general formula is given for the computation of a spherical Bouguer plate and the spherical terrain correction.
- 472 - ASSMUS E. & K. KRAUS - "Die Interpolation nach kleinsten Quadraten Prädiktionswerte simulierter Beispiele und ihre Genauigkeiten".
 D.G.K., Reihe A : Theor. Geod. H. n°76, 73 S, München, 1974.

473 - MORITZ H. - "Least-squares collocation".

D.G.K., Reihe A : Theor. Geod. H.n°75, 91 S, München, 1973.

Least-squares collocation is a generalized estimation method that combines adjustment, filtering and prediction. Besides the parameters, two sets of random variables are considered : the measuring errors, or noise, and another set, called signal ; these random variables are related through their covariances. This method is particularly appropriate for determining the terrestrial gravity field from arbitrary data, but it can also be applied, for instance, to transformation problems arising in geodesy and photogrammetry.

If one aims at full mathematical depth and elegance, then the theory of least-squares collocation requires the use of infinite-dimensional Hilbert space ; in this way the fundamental monograph by T. KRARUP (1969) is written. Our present exposition is, above all, intended to be elementary and readily accessible to geodesists. Thus the theory is developed in close analogy to least-squares adjustment, starting from a similar minimum principle.

Our presentation is, so to speak, itself an attempt to solve a minimum problem : to set forth the subject to an extent adequate for geodetic applications, at the same time keeping the mathematical machinery to a minimum. It has been possible to get along throughout with ordinary linear algebra, bypassing Hilbert space techniques. Thus the present elementary treatment addresses itself to the geodetic user, still, it may also have some theoretical interest from the point of view of logical economy.

474 - VEROFFENLICHUNGEN DER BAYERISCHEN KOMMISSION FÜR DIE INTERNATIONALE ERDMESSUNG der Bayerischen Akademie der Wissenschaften -

Beiträge aus der BRD zur Satellitengeodäsie - vorgelegt beim internationalen Symposium über terrestrische und Satellitentriangulationen vom 29. Mai bis 2. Juni 1972 in Graz.

Astr. Geod. Arb. H.n°31, 205 S, München, 1973.

475 - SIGL R. - "Die Arbeiten des Sonderforschungsbereiches 78 Satellitengeodäsie der Technischen Universität München im Jahre 1973".

Veröff. Bayer. Kom. Intern. Erdemes., Astr. Geod. Arb. H.n°32, 120 S, München, 1974.

476 - GROTH E. - "Gravimetric Untersuchungen am Institut für Astronomische und Physikalische Geodäsie der TU München und am Lehrstuhl für Astronomische Geodäsie und Satellitengeodäsie der TH Darmstadt 1968-70".

D.G.K., Reihe B : Angew. Geod., H. n°201, 38 S, München, 1973.

From 1969 to 1971 experiments were made at the Institut für Astronomische und Physikalische Geodäsie of the Technical University Munich, under the supervision of Prof. Dr. R. SIGL in order to test the maximum accuracy available in modern gravimetry ; possible variations of gravity readings with changes in temperature, air pressure, vibrations, calibration function etc... were investigated. Measurement of small gravity differences by recording gravity involves additional problems like output linearity etc. It became evident that, in principle, accuracy of one part in tenthousand is feasible even in measuring small gravity differences ; but today's field gravimeters usually do not yield this accuracy for gravity differences of the order of a few milligals.

- 477 - BONATZ M. & K. SCHULLER - "International Astro-Geo-Project Spitzbergen 1968-70 Gravimeterstation - Strenge Zweigruppen-Erdgezeitenanalyse nach der Methode der kleinsten Quadrate - erste Gruppenausgleichung". D.G.K., Reihe B : Angew. Geod., H.n°202, 67 S, München, 1973.

The results of gravimetric earthtide measurements 1969/70 at Longyearbyen, Spitsbergen were analysed for two systems with different length of calculation intervall by applying the first group-adjustment of the stringent Two-Group-Earthtide-Analysis after the least squares method (method of Schuster). The changes with time of the calculated amplitude-quotients and phasedifferences show, that the data besides the tides of the solid earth include additional actions of physical effects. The most important disturbing effects are due to the oceanic tides. These physical effects will be investigated by a following second group-adjustment.

- 478 - SCHLEUSENER A., W. TORGE & H. DREWES - "Präzisionsschweremessungen in Nordostisland 1970/71 - Beiträge zu den geodätischen und geophysikalischen Forschungsarbeiten in Island".

D.G.K., Reihe B : Angew. Geod. H.n°206, 25 S, München, 1974.

For detection of eventual secular gravity variations in the young volcanic zone of northeastern Iceland, a west-east gravity profile has been established in 1938 between Akureyri and Grimsstadir à Fjöllum ($\phi \approx 65^{\circ}40'$). This profile has been reoccupied in 1965 and 1970/71. In 1965 mean point distance has been reduced by additional stations to about 1 point/km, while in 1971 the profiles was extended to the east until the village of Hof, now covering a total length of 150 km.

The present publication contains the final results of the measurements carried out in 1970/71. Gravity values of the about 150 monumented stations have been observed with two LaCoste-Romberg gravity meters with an accuracy of $\pm 0.01 \dots 0.02$ mGal. The gravity connection between the profile and some stations of the world gravity net in Western Europe was performed with an accuracy of ± 0.05 mGal. Heights of the gravity stations have been determined by geometrical levelling in the western and by tachymetric methods in the eastern part of the profile.

- 479 - GERSTENECKER C. - "Die genaue Messung von kleinen Schwereunterschieden". D.G.K., Reihe C : Dissert., H.n°191, 81 S, München, 1973.

Die Messung kleiner Schwereunterschiede ist bis jetzt nicht mit einer Genauigkeit von ± 1 μ gal möglich. Erreichbar ist zur Zeit ein mittlerer Fehler für einen mehrmals gemessenen Schwereunterschied von etwa $\pm 5 - 10$ μ gal.

Die Fehler werden verursacht

- 1) durch Instrumenteneinfehler
- 2) durch Fehler der Eichfunktion
- 3) durch unzureichend genaue Korrekturen und Auswertemethoden.

Die Genauigkeit eines Messresultats kann durch den Einsatz mehrerer Instrumente gesteigert werden. Durch eine sorgfältige Untersuchung dieser Geräte und ihrer Eichfunktion und eine besondere Messanordnung kann dann ein mittlerer Fehler für das Mittel eines mehrmals gemessen kleinen Schwereunterschieds Δg von 3 μ gal erwartet werden.

Eine Genauigkeitssteigerung scheint auf Grund der Differenzen, die sich zwischen den einzelnen Instrumenten in 7. ergaben, nicht möglich zu sein. Nur wenn Instrumente, die einander entsprechende Ergebnisse liefern, für die Messungen benutzt werden, kann eine weitere Genauigkeitssteigerung erreicht werden.

- 481 - GÖPPEL W. - "Datenbank, Methodenbank u.v. Datenverbundsystem als Elemente eines informationssystems für das Vermessungswesen". D.G.K., Reihe C : Dissert., H.n°202, 95 S, München, 1974.
- 482 - BENNING W. - "Auswertung von Altimettermessungen für das Modell der einfachen Schicht des Erdschwerefeldes in der Satellitengeodäsie". D.G.K., Reihe C : Dissert., H.n°200, 79 S, München, 1974.
- 483 - ROCHOLL W. - "Untersuchungen zur Attraktionswirkung der Meereszeiten auf die Erdgezeitenregistrierungen in Europa". D.G.K., Reihe C : Dissert., H.n°203, 109 S, München, 1974.
- 484 - BROGIN K. - "Temperatureinfluss auf Kompensator-Nivellerinstrumente und seine auswirkungen im Nivellement". Geod. Geophys. & Veröff., R.III, H.24, 223 S, Berlin, 1972.
- 485 - ARNOLD K. - "Die Niveauflächen der Erde nach der Integralgleichung für das gravimetrische Zusatzglied und anderen Verfahren". Akad. Wissens. der DDR, Veröff, Zentralinst. Physik Erde, n°19, 61 S, Potsdam, 1973.
 The present short essay summarizes the author's work on the solution of the boundary value problem of physical geodesy according to the gravimetric additional term, published at various places in the past 13 years. First of all the boundary value problem is considered in a general way. The potential and its normal derivative are introduced as boundary values, and it is shown that based on this the geometry of the boundary surface can be uniquely determined. Suitable variations of GREEN's theorem lead to a formula for determining the deflections of the vertical at the Earth's surface including the terms of the second and of higher orders, which are distinguished from VENING-MEINESZ's classical solution, inter alia, by adding the gravimetric additional term to the free-air anomalies. For this additional term an integral equation is given, which is being developed to a NEUMANN series. The convergency of this series is shown. By superpositioning the disturbing potential with the potentials of the isostatic and of BOUGUER's masses a generalization of the results as well as formulae are arrived at with which the topographical reduction occurs and which are especially suitable for practical application. Proceeding from the deflections of the vertical one arrives at elevation anomalies and undulations of the geoid through integration. The solution obtained are explained and tested by means of practical examples and topographical models.

- 486 - FROLICH F. & U. WALZER - "Geodynamische Probleme".
 Akad. Wissens. der DDR, Veröff. Zentralinst. Physik Erde, n°21,
 62 S, Potsdam, 1973.
 From the scope of geodynamic problems, the questions in connection with the plate-tectonics and their effects, with the contrast of the Earth's crust and its development as well as with the Earth's core are singled out and studied in detail. New ways for clarifying of the convection problem are represented and discussed.
- 487 - NATIONALKOMITEE für GEODASIE und GEOPHYSIK - "Nivellements Höchster Genauigkeit".
 Geod. Geophys. Veröff., R.III, H.29, 196 S, Berlin, 1973.
- 488 - NATIONALKOMITEE für GEODASIE und GEOPHYSIK - "Arbeiten zum internationalen Geodynamik-Projekt in der DDR".
 Geod. Geophys. Veröff., R.III, H.28, 73 S, Berlin, 1973.
- 489 - ROMANIUK V.A. - "Measurement of the absolute value of the acceleration due to gravity (theory)".
 Geod. Geophys. Veröff, R.III, H.30, 294 S, Berlin, 1974. (Rusian text)
 The monograph deals with the theory of free-fall method to determine the absolute value of gravity acceleration. A study is made of the most simple experimental patterns, of the effects of different disturbances on the results of the measurements and of the techniques or methods of eliminating or taking into account these effects. The theory of observations in a weak moving system (the solid Earth surface) and in a moving system (e.g., a ship) is developed.
 The monograph consists of four chapters. Chapter 1 deals with the general theory of determining the absolute value of gravity using symmetrical and asymmetrical techniques. A study is made of the effect of the frictional forces proportional to the first and second powers of the velocity of the body, and of the effect of the height-dependent variation of gravity.
 Chapter 2 describes the general theory of observations in a moving system,
 Chapter 3 reviews observations according to symmetrical techniques in a moving system.
- 491 - FROHLICH H. & K.R. KOCH - "Integrationsfehler in den Variationsgleichungen für das Modell der einfachen Schicht in der Satellitengeodäsie".
 Mitt. Inst. Theor. Geod. Univ. Bonn, n°25, 33 S, 1974.
 For the representation of the Earth's gravity field in satellite geodesy by the potential of a simple layer the derivatives of the satellite positions with respect to the unknown density values of the simple layer are needed. They are obtained by the integration of the variational equations. To compute their coefficients, integrals over surface elements into which the surface of the Earth is divided are solved numerically. The errors of this integration in case of a spherical Earth are investigated in the variational equations.

- 492 - GHITAU D. - "Über ein Modell zur Bestimmung von zeitlichen Änderungen in dreidimensionalen geodätischen Netzen begrenzter Ausdehnung".
 Mitt. Inst. Theor. Geod. Univ. Bonn, n°26, 32 S, 1973.
 A computation model has been built up to describe variations in time of threedimensional coordinates from the measurements of horizontal direction, spatial distances, zenith angles, levellings, gravity differences and astronomic azimuths. The method of reduction onto the reference ellipsoid has been used. Group adjustments are proposed for the practical performance of the numerical computations. All amounts of change rates as obtained by the adjustment are to be checked by Student's test.
- 493 - BOSCH W. & H. WOLF - "Über die Wirkung von topographischen Lokal-Effekten bei profilweisen Lotabweichungs-Prediktionen".
 Mitt. Inst. Theor. Geod., Univ. Bonn, n°28, 30 S, 1974.
 The local effects from the attraction of near topographic features are to be eliminated from the deflections of the vertical before entering any prediction (or collocation) procedure. Disregarding this fact, in mountainous regions true errors for the interpolated deflection values will arise (up to 16"), by which their use for the purpose of triangulation and geoid determination seems to be very questionable.
- 494 - BENNING W. & H. FROHLICH - "Integrationsfehler für das Modell der einfachen Schicht in der Satellitengeodäsie bei verschwindender Aufpunktshöhe".
 Mitt. Inst. Theor. Geod. Univ. Bonn, n°29, 24 S, 1974.
 When using the simple-layer model in satellite altimetry, the Earth's gravitational potential has to be computed in the subsatellite point by solving surface integrals. Since this integration cannot be performed in closed form numerical and analytical methods have been developed, solving the integrals approximately, even if the kernel of the integral becomes singular. Differences and advantages of the methods in question are pointed out with regard to their practical application and accuracy.
- 495 - ANDERSEN O.B. - "Surface-ship gravity measurements in the Davis Strait, Western Greenland 1965".
 Mémoires Inst. Géod. Danemark, 3ème sér., t.39, 39 p, Copenhagen, 1973.
 The Graf-Askania sea gravimeter Gss 2-14 of the Danish Geodetic Institute mounted on its Anschütz stable platform was employed during the summer of 1965 on a gravity survey in the Davis Strait in an area 61° - 62° N, 50° - 54° W off the western coast of Greenland on board the inspection ship "Hvidbjørnen". The result of the survey is presented in this paper.
 The gravimetric expedition to Greenland started from the navy base Holmen in Copenhagen on May 25, 1965 and the values of g are referred to Buddinge pillar 1 : 981 557,91 mGal.

Free-air anomalies (F.A.) and Bouguer anomalies (B.A.) were calculated at 668 positions in the Davis Strait. The anomalies were calculated from observed gravity with reference to the Kneissl-Marzahn system of international calibration values and compared with normal gravity as calculated from the international formula of 1930. If necessary, additional terrain corrections (T.C.) were applied making allowance for irregular topography.

Maps : free-air and Bouguer anomaly contours
Detail of sea-chart 1200, West Coast of Greenland.

- 496 - GOSLIN J., J. MASCLE, J.C. SIBUET & H. HOSKINS - "Geophysical study of the Easternmost Walvis Ridge, South Atlantic : morphology and shallow structure".
from : Geol. Soc. America, Bull. v.85, p.619-632, 1974.

The landward termination of Walvis Ridge consists of two east-trending basement ridges of probable basaltic composition enclosing a relatively important sedimentary basin. East of long. 10° E, the southern ridge disappears under the sediments of the continental margin.

The trends of the basement ridges are in good agreement with the inferred direction of initial opening. Since its formation, the Walvis Ridge has probably dammed sediment coming from the south. The proposed identification of layer A, a very strong horizon over which the reflectors are nearly undisturbed, may indicate that no major tectonic phase has affected this area since the shift of the pole of opening for the south Atlantic in Late Cretaceous-early Tertiary time.

- 497 - NEPROCHNOV Yu.P., L.P. KOSMINSKAYA & Ya.P. MALOVITSKY - "Structure of the crust and upper mantle of the Black and Caspian Seas".
Tectonophysics, v.10, p.517-538, 1970.

Many geophysical characteristics of the Caspian and Black Seas deep basins are similar, having : suboceanic type of the crust, low average seismic velocity, absence of earthquakes and relatively small variation of magnetic anomalies. However, the sediments in the Caspian Sea deep basin are folded whereas in the Black Sea they are approximately horizontal. The Caspian Sea also has a far greater thickness of sediment accumulation.

The deep basins of the Caspian, Black and Mediterranean seas represent a sequence having similar crustal structures but with a decreasing thickness of sediments and consolidated layer, in that order. It is possible that the intensive sinking and accumulation of sediments began earliest in the Caspian Sea and spreaded continuously to the Black Sea and then the Mediterranean Sea. The Caspian and Black Sea deep basins have existed for long time (perhaps from Paleozoic time or even earlier) as areas with a specific and related type of evolution.

- 498 - RABINOWITZ P.D. & W.B.F. RYAN - "Gravity anomalies and crustal shortening in the Eastern Mediterranean".
Tectonophysics, v.10, n°5/6, p.585-608, 1970.

Crustal shortening of the ocean floor in the eastern Mediterranean is recognized by a marked thickening of the sedimentary layer

seaward of the Hellenic and Calabrian island arcs. Steep gradients and large negative free-air anomalies in the gravity field along with a highly uniform, low regional heat flow are manifestations of the thickened crust. Bodies of recently deformed sediment in and seaward of the Hellenic Trough reveal the style, polarity, and dynamics of the thickening mechanism.

A linear buried anticlinal structure, inferred from analysis of surface ship gravity profiles, may mark the site of contemporary intrabasinal underthrusting. The distribution of earthquakes beneath the Mediterranean Ridge supports the interpretation that the Anaximander, Ptolomy, and Strabo Mountains are features comparable to large basement nappes. Cyprus is one such structure, offset to the south, where the oceanic crust and part of the upper mantle have been involved in the décollement.

- 499 - BOWIN C. - "Origin of the Ninety East Ridge from studies near the Equator".
from : J. Geophys. Res., v.78, n°26, p.6029-6043, 1973.
Contr. n°3023, Woods Hole Ocean. Inst.

A part of the Ninety East ridge near the equator was examined in 1971 by seismic profiling and gravity and magnetic observations. In the area examined, the topography of the ridge consists of blocklike or en echelon mountainous masses. A fracture zone trending north-south parallel to the overall trend was found along the eastern margin of the ridge topography. This fracture zone probably marks the principal boundary between the central Indian Ocean plate and the Wharton basin plate. The free-air gravity anomalies associated with the Ninety East ridge are small, and thus the mass of the ridge must in some way be compensated at depth. The Ninety East ridge may have originated as a result of emplacement of gabbro and serpentinized peridotite beneath normal oceanic crustal layers. The lower density of the gabbro and serpentinized peridotite beneath normal oceanic crustal layers. The lower density of the gabbro and serpentinized peridotite with respect to normal mantle at equivalent depths provides for both the uplift of the ridge and its compensation at depth.

- 500 - FLEISCHER U., F. HOLZKAMM, K. VOLLBRECHT & D. VOPPEL - "Die Struktur des Island - Färöer - Rückens aus geophysikalischen Messungen".

Sond. : Deuts. Hydrog. Zeits., Band 27, H.3, S.97-113, 1974.

A detailed gravimetric-magnetic and bathymetric survey was carried out along 66 tracks including 4 tracks of continuous seismic profiling across the Iceland-Faeroe Ridge with RV "Meteor", 1968-1972.

Results are given as a topographical map with 10 or 20 m contour interval, an isodynamic map and an anomaly map of total magnetic intensity, and free-air gravity anomalies with 5 mGal contour interval. Data evaluation included echo-sounding characteristics, sediment thickness, short-wave magnetic disturbances and correlations between these and simple Bouguer anomalies.

The map of bottom surface characteristics shows "rough" topography in local areas of the topmost parts of the ridge, its Atlantic flank, and on the shelves.

From Sparker profiles can be seen, that the basement lies bare in wide areas of the central ridge zone and is outcropping in certain parts of the Atlantic flank. This flank has a maximum sediment cover of 400 m (if $v_p = 2$ km/s is assumed), whereas the Arctic flank has a more regular cover up to more than 1000 m and well defined stratification within its upper layer.

A basement depression of about 40 km width and 500 m depth (or more) occurs on each of the three northwestern profiles. These sediment pockets are different in character and may be correlated to east-west directed, partly buried topographic valleys (profiles 1 and 3). Nevertheless, their coincidence with a long, nearly north-south striking gravity low points to an undivided trough filled with light material (- 0,8g/cm³). This could be as well sand or clay as pyroclastics (volcanic ash).

An additional indicator of sediment thickness is the amplitude of short-wave magnetic anomalies. Amplitudes smaller than 50 nT (maximum-minimum) occur at basement depths greater than about 600 m below sea level, those with more than 500 nT over the highest areas of the basaltic surface.

A strong correlation between the great number of local magnetic and gravity anomalies indicates intrusive bodies penetrating a large part of the ridge. It thus appears as a heterogeneous body, interspersed with material which intruded during successive volcanic cycles.

Magnetic lineations were nearly disguised by this process. Exceptionally, two broad negative anomaly strips could possibly be identified.

Our results are therefore consistent with an assumed origin of the Iceland-Faeroe Ridge by sea-floor spreading of constant rate but anomalously high mantle plume discharge.

In accordance with this hypothesis, a light body of acid, possibly granitic, material beneath the Faeroes shelf can be explained as a continental fragment.

501 - RECHENMANN J. - "Mesures gravimétriques dans le Tanezrouft Oriental (Algérie)".

C.N.R.S., Sér. : Géol. n°17, 71 p, 1973.

Cette note présente les résultats des levés gravimétriques et magnétiques effectués en Algérie de Décembre 1971 à Mars 1972 dans les régions d'Adrar et du Tanezrouft oriental dans le cadre d'une opération organisée conjointement par le CRZA (1), l'IMPGA (2) et l'ORSTOM (3).

Cette première campagne géophysique dans le Tanezrouft oriental se proposait d'apporter l'appui de la gravimétrie à la résolution de difficiles problèmes de géologie structurale, posés par le bouclier touareg et son contact avec le craton ouest africain.

Les anomalies de Bouguer calculées pour une densité de 2,67 sont représentées sur une carte au 1/500.000. Les isanomales sont tracées de 5 en 5 milligals à partir des valeurs des anomalies aux stations de mesures. Un carton indique les corrections isostatiques (Airy, 30 km) qui permettent de calculer en chaque point l'anomalie isostatique correspondante.

Les anomalies isostatiques tracées de 5 en 5 milligals, calculées dans l'hypothèse d'Airy, 30 km, font l'objet également d'une carte au 1/500.000 sur laquelle a été reporté en outre, un fond géologique simplifié.

On trouvera ensuite, après une présentation de la géologie de cette région des considérations générales sur les cartes gravimétriques, les relations qui peuvent être établies entre les anomalies gravimétriques et la géologie.

On notera enfin que cette campagne complète les quelques itinéraires espacés qui avaient été effectués dans le nord-ouest de l'Ahaggar par l'Institut de Météorologie et de Physique du Globe d'Alger (J.N. DELATTRE, B. CLAVE de OTAOLA, 1971), et qu'elle constitue une étape vers la couverture gravimétrique du Sud Algérien qui permettrait d'intéressantes comparaisons avec celle des pays limitrophes (Niger, Mali, Mauritanie) où elle a déjà été réalisée en grande partie.

- 504 - WEILMAN P., Yu.D. BOULANGER, B.C. BARLOW, S.N. SHCHEGLOV & D.A. COUTTS "Australian and Soviet gravity surveys along the Australian calibration line".

B.M.R., Bull. n°161, 172 p, Canberra, 1974.

The Australian Calibration Line (ACL) with a total gravity interval of 3 Gal, was established during 1970 between Laiagam in Papua New Guinea and Hobart in Tasmania. During 1973 the Australian Bureau of Mineral Resources and the USSR Geodesy and Cartography Survey made joint observations along the full length of the ACL. Measurements made with eight Soviet GAG-2 gravity meters established a gravity scale for Australia to an accuracy of 2.5 parts in 10^5 . This scale and a datum of 979 671.86 mGal for Sydney A were adopted for Australia in 1973.

The Soviet scale established for the ACL appears to be within 1 part in 10^4 of both the IGSN 71 scale established for the Western Pacific Calibration Line by absolute determinations, pendulum measurements and international gravity meter comparisons, and the scale established for the Soviet Calibration Line by OVM pendulums. The Soviet scale for the ACL defines a milligal which is 1.5 parts in 10^4 larger than that defined by IGSN 71 values for the ACL and 5 parts in 10^4 larger than the 1965 Mean Australian Milligal, that was used as an Australian milligal standard between 1965 and 1973. Both of these scales are partly based on Cambridge pendulum measurements made in Australia during 1950-51. These measurements are now thought to have been incorrect in scale.

LaCoste & Romberg gravity meters have been used during six surveys along the whole or part of the ACL. The LaCoste observations have been reduced using the Soviet ACL scale and the new datum for Sydney A. The most probable values for airport gravity stations, calculated from the LaCoste results, have a precision of better than 0.01 mGal and are consistent to within experimental error with values calculated from the GAG-2 results. LaCoste observations reduced using the Soviet ACL scale give more accurate values for the gravity differences of the main intra-city ties and calibration ranges along the ACL.

- 505 - WELLMAN P., B.C. BARLOW & D.A. COUTTS - "Comparison of Western Pacific and Australian calibration line gravity scales and an evaluation of secular variation".
 B.M.R., Geol. & Geophys., Record 1974/121, 6 p, Canberra, 1974.
 LaCoste & Romberg gravity meter measurements suggest that the IGSN71 scale on the Western Pacific Calibration Line is about 3 ± 1 parts in 105 smaller than the GAG-2 gravity meter scale along the Australian Calibration Line. On the Australian Calibration Line differences between measurements in 1965, 1970-71, and 1973 suggest that secular variation may be occurring at rates of up to 6 μGal per year.
- 506 - GAMA L.I. - "Valores da gravidade nas regioes Centro e Sul do Brasil".
 Obs. Nac., Pub. Programa Grav. n°4, 78 p, Rio de Janeiro, 1972.
 Pursuant to the National Observatory gravity program for scientific purposes there were established 180 stations on bench marks along level lines extending over all states south of the -12° parallel of latitude. The network contacts with the borders of Paraguai, Argentina and Uruguai. Double measurements in opposite directions were made with a LaCoste & Romberg meter (G-61). Differences above 0.05 mGal between out and back runs after elimination of the earth-tide effect were not as a rule admitted. The gravity datum for the Rio de Janeiro First Order Reference Station was still assumed to be 978,805.000 mGal conformable to the old Potsdam System. This procedure was observed for the sake of homogeneity with the previous complementary gravity survey of the northeast and east central part of the country.
 About 930 gravity stations previously observed with Worden meter W-178 or W-178 of the standard geophysical type were adjusted to the LaCoste gravity net. The accuracy of these Worden results is estimated at one tenth milligal.
 Geographic coordinates were obtained from National Geographic Council maps on scales from 1/100.000 to 1/500.000.
 Adjustment of gravity circuits was made by least-squares.
- 507 - GAMA L.I. - "Extensao da Rede do Nordeste".
 Obs. Nac., Pub. Programa Grav. n°6, 37 p, Rio de Janeiro, 1973.
 A westward extension of the gravity net established in the Northeast of Brazil as reported in "Valores da gravidade no Nordeste e regiao Centro-leste do Brasil" is described. There are obtained 445 new gravity values along level lines at an accuracy of 0.01 mGal. The instrument, measuring procedures and methods of circuits adjustment were the same as related in the above-mentioned publication.
- 509 - COLOMBI B., P. GIESE, G. LUONGO, C. MORELLI, M. RIUSCETTI, S. SCARASCIA, K.G. SCHUTTE, J. STROWALD & G. de VISINTINI - "Preliminary report on the seismic refraction profile Gargano - Saterno Palermo - Pantelleria (1971)".
 Osser. Geof. Sper., Boll. Geof. teor. & appl., v.XV, n°59, p.225-254, Trieste, Set. 1973.
 In 1971, a deep-seismic-sounding refraction profile was carried out in Southern Italy in order to investigate the transition between the continental and the oceanic crustal structure.

Between Pantelleria and the southern coast of Sicily, a typical continental crust is existing, indicated by a strong velocity increase from 6,3 to 8,0 km/sec in a depth range between 20 and 21 km. A moderate crustal low velocity layer showing a maximum decrease of about 1.0 km/sec could be detected. The maximum crustal thickness is reached under Sicily with about 35 km.

At the transition to the deep sea region of the Tyrrhenian Sea, velocity values of 7 - 8 km/sec (crust/mantle boundary) were measured in 20 - 25 km depth.

The cross section between the shelf edge and the coast near the Gulf of Salerno shows a crustal thickness of about 20 km. Because of the existence of a crustal low velocity layer and an upper mantle velocity of about 8.0 km/sec., this part of the crust may be classified as a continental one.

When moving in the NE-direction, the typical previously observed crust/mantle reflections become less clear, but a later distinct phase in greater distance appears, indicating a deeper interface at about 45 km depth. These two high velocity layers (30 km and 45 km) are separated by an intensive low velocity zone.

The internal crustal structure under the depression of NE-Puglia near Fogia, situated between the Apennine and the Gargano promontory, remains unknown due to the unfavourable distances between shotpoints and receivers. The total crustal thickness is about 35-40 km. Under the Gargano promontory, a velocity distribution is assumed similar to that in the platform of Puglia where a typical continental crust of 32 km thickness has been found.

510 - MAZZINI V.L. - "Extension de la red gravimetrica Argentina al continente Antartico, apreciaciones geofisicas".
Bol. Servicio de Hidrografia Naval, v.X, n°2, p.53-78, Buenos-Aires, 1973.

Following the recommendations approved by the International Association of Geodesy during the XV General Meeting of the International Union of Geophysics and Geodesy, held in Moscow (U.S.S.R.) during August 1971, the Geophysics Division of the Hydrographic Naval Service projected and measured the first stations of gravimetric bases on the Antarctic Continent related to the gravimetric network BA, CA, RA, Base of Calibration for Argentina.

Recommendations 11 and 14 of said meeting were thus accomplished in relating those measurements to the International Gravimetric Standardization Net 1971, whose original value for Potsdam "A" station is 981.260,19 mG al.

The programme allowed to relate gravimetric stations measured by expeditions from different countries, and published in the World Relative Gravity Reference Network Antarctica 1972, to the network 54, by measuring eight base stations on the Antarctic Peninsula, with starting point in Ushuaia "K".

It was thus obtained a general and provisional plan of free-air anomalies of the Antarctic Continent and Peninsula, as well as a detailed plan with free-air and Bouguer anomalies on Dundee Island as a contribution to geophysical and geological investigations.

511 - CENTRE NATIONAL pour l'EXPLOITATION des OCEANS - Bulletin d'Information N° 71, 22 p, Paris, Novembre 1974.

513 - MASSON SMITH D., P.M. HOWELL & A.B.D.E. ABERNETHY-CLARK - "The National Gravity Reference Net 1973 (NGRN 73)".
Ordnance Survey - Inst. Geol. Sci., Professional Papers New Ser. n°26, 22 p, 1974.

Field observations of gravity were carried out by the Ordnance Survey during the period 1964-1971. The measurements traversed the whole of the Ordnance Survey's Geodetic Levelling Network, with the exception of the Isle of Wight.

The definitive UK net finally used 135 observation points connected by 232 links as shown in fig.3, fig.4 and diagram 1. Of the 135 points, 95 are at OS FBM (Fundamental Bench Mark), 7 at the pendulum stations of the Long Calibration Line, 9 at IGSN 71 stations (of which two are also LCL pendulum stations) and 26 at the airport stations in UK and Europe.

In the final adjustment of all the observations in UK and Europe the differences in gravity values between IGSN 71 stations were treated as gravity meter links with fixed calibration and with weights derived from the standard errors of the IGSN 71 junction points.

The adjusted values for IGSN 71 stations in Europe and pendulum stations in UK are given in table 5 ; table 6 gives those determined at Airports in the UK. Table 7 lists total gravity values at precisely located, regularly maintained sites, mostly Fundamental Bench Marks, distributed throughout Great Britain. The results given in these tables define the National Gravity Reference Net 1973.

514 - MORELLI C., C. GANTAR, T. HONKASALO, R.K. McCONNELL, J.G. TANNER, B. SZABO, U. UOTILA & C.T. WHALEN - "The International Gravity Standardization Net 1971 (IGSN 71)".
IUGG - AIG, Pub. Spec. n°4, 194 p, Paris, 1973.

The International Gravity Standardization Net 1971 is presented. A worldwide network, consisting of 24.000 gravimeter, 1.200 pendulum and 10 absolute measurements collected over twenty years, has been adjusted by a small Working Group of Special Study Group 5 of the International Association of Geodesy, discussed and approved within the same Association and adopted at the XV General Assembly of the International Union of Geodesy and Geophysics in Moscow, Aug. 1971.

The concept of the IGSN 71 differs from that of earlier gravity reference systems in that datum is determined, not by an adopted value at a single station, but by the gravity values for 1854 stations obtained from a single least squares adjustment of absolute, pendulum and gravimeter data. Standard errors for IGSN 71 gravity values are less than ± 0.1 mGal. The use and maintenance of the system is discussed.

The International Gravity Standardization Net 1971 has been approved and adopted as the international gravity standard replacing the Potsdam datum. The resolution passed at the XV General Assembly of the IUGG in Moscow, August 1971 is given below.

- 515 - SUZUKI H. - "Establishment of the gravimetric network in Japan".
from : Bull. Geog. Survey Inst., v.XX, part 1, 150 p, Tokyo, 1974.
Putting together the results of the pendulum and gravimeter observations by the Geographical Survey Institute, a very reliable gravimetric network was established in Japan. Every gravity value was determined referring to the hitherto adopted reference value at the former pendulum station University of Tokyo, 979 801 00 Gal in the Potsdam system which was deduced by E. BORRASS in 1911. Our International pendulum observations have shown that this value is very nearly correct and no correction more than 1 milligal is necessary. Of course, this reference value will be changed into a new one when a reliable gravity system such as the International Gravity Standardization Net 1971 is completed in the near future.
- The gravimetric network in Japan consists of 8 reference, fundamental and supplementary fundamental stations, 89 first order stations and more than 10 000 second order stations.
- 516 - SEGAWA J. & C. BOWIN - "The Tokyo surface ship gravity meter : recent developments for solving non-linear rectification error and phase lag problems".
Woods Hole Ocean. Inst., WHOI-73-89, Tech. Rep. 42 p, 1973.
The T.S.S.G. has been using the frequency of a single vibrating string to measure vertical acceleration ...
In order to check the performance of the T.S.S.G. equipped with the new processor, we carried out comparison measurements using both the T.S.S.G. meter and the LaCoste & Romberg Air-Sea Gravity Meter S-32 on the same ship. The comparison measurements resulted in a reasonably good coincidence for the results of the two meters, suggesting that the T.S.S.G. meter can be used for accurate measurement of gravity at sea.
- 517 - MONGET J.M. & C. BOWIN - "A gravity data library : organization and effective utilization".
Woods Hole Ocean. Inst., WHOI-74-33, Tech. Rep., 80 p, 1974.
An outline of the organization of a digital data file of worldwide gravity information in use at the Woods Hole Oceanographic Institution is presented. This file was developed to provide an efficient and cost-effective method for retrieving and displaying gravity data for any selected part of the globe. The techniques are also applicable to other types of data files. To aid the possible adoption by others of the techniques described, background information and philosophy of file organization is also presented.
- 518 - BOWIN C. & L. GOVE - "Gravity base station descriptions".
Woods Hole Ocean. Inst., WHOI-74-11, Tech. Rep. on microfiche, 3 p, 1974.
Descriptions of gravity base stations occupied by the Woods Hole Oceanographic Institution during the years 1962 through September 1973 are presented. The measurements were made with LaCoste & Romberg Geodetic Gravity Meter n°G-18. The gravity values, in the Potsdam System, given for these stations are for the most part based on a value of 980118.00 for the National COMMERCE gravity base in Washington, D.C.

For those stations for which IGSN 71 values are available, the differences between the IGSN 71 values and the G-18 values have a mean of - 13.34 mGal, a standard deviation of 0.64 mGal, a median of - 13.53 mGal, and an RMS of 13.36 mGal. The internationally adopted difference between the IGSN 71 System and the Potsdam System is - 14.00 mGal. This report is issued in microfiche because, on microfilm, it will be easiest to have it with a gravity meter at all times for reference.

519 - CSAPO G., K. Ya KOZYAKOVA, M. MAJEWSKA, R.B. RUKAVISHNIKOV & L. TRAGER - "Investigations of the dependence of the dial constants of CG-2 Sharpe gravimeters on the effects of external factors".

Pub. Hungarian Geophys. Inst. "Roland Eötvös", 137 p, Budapest, 1974.

Present monograph describes the results obtained by the calibration method of CG-2 gravimeters/Sharpe and the investigations to study the effects of the external medium on the dial constants of gravimeters.

The determination of the dial constant and non-linearity of the reading scale, as well as the dependence of dial constant on temperature, pressure/altitude of the observation point above sea level/, time, were carried out not only by CG-2 gravimeters /Sharpe and Scintrex of geodetic type/, but several other types of gravimeters as well.

520 - Bulletin Géodésique de l'A.I.G., N° 110, 1er Décembre 1973.

- a) BALODIMOS D.D. - "The use of artificial satellites for geodesy and geodynamics".
Int. Symposium, Athens, 14-21 May 1973, p.325-334.
- b) KOVALEVSKY J. - "Meeting of the IUGG/IAG ; Commission of satellite geodesy (Cospar panel 1c).
p.335-346.
- c) BOULANGER Y.D., S.N. SHCHEGLOV, P. WELLMAN, D.A. COUTTS & B.C. BARLOW - "Soviet-Australian gravity survey along the Australian calibration line".
p.355-396.

The Australian gravity scale was refined by accurate-measurements during 1973. A new National Gravity Base Station for Australia, Sydney A, replaces NGBS, Melbourne A. A gravity value of 979671.86 mGal (IGSN 71) at Sydney A was adopted as the new datum for Australia. The gravity scale for Australia is now defined along the 3 Gal Australian Calibration Line to an accuracy of 2.5×10^{-5} by measurements using GAG-2 Soviet gravity meters. All Australian gravity values will be recomputed to the new datum and scale, to be consistent with international fundamental standards (Système International).

- d) SAITO T. - "The non-linear least-squares of condition equations".
p.397-404.

In this paper the author constructs general algorithms for the non-linear least squares of condition equations and shows the procedure of their application for the settlement of the problem of unfavourable condition equations in the adjustment of a quadrilateral.

- e) RAPP R.H. - "Geoid information by wavelength".
p.405-412.

Two models describing potential coefficient behavior are used to estimate the root mean square geoid undulation by wavelength. Four wavelength types were defined : long wavelengths : $\ell = 2$ to 10 ; intermediate wavelengths : $\ell = 11$ to 100 ; short wavelengths : $\ell = 101$ to 1000 ; and very short wavelengths : $\ell = 1001$ to ∞ . By one representation of potential coefficient behavior the intermediate wavelength geoid information was ± 5.64 m, the short wavelength, ± 0.66 m, and the very short wavelength, ± 0.05 m. The procedures of this paper were applied to an actual residual undulation computation using detailed gravity material.

- f) PAUL M.K. - "A method of evaluating the truncation error coefficients for geoidal height".
p.413-426.

Neglecting distant zones in the computation of geoidal height using Stokes' formula gives rise to some truncation error. This truncation error is expressible as a weighted summation of the zonal harmonic components of the gravity anomaly. Making use of the well-known properties of Legendre polynomials, a compact method of computing these theoretical coefficients has been developed in this paper.

- 521 - BOULANGER Yu.D. et al. - "Expédition gravimétrique en mer sur les bateaux de l'Académie des Sciences de l'URSS - Catalogue des observations gravimétriques : 5ème voyage du bateau N.I.S. Dimitri MENDELEEV, équipe N° 9, Océans Atlantique et Pacifique, 1971.
Acad. Sci. URSS, Inst. Phys. Terre O.Yu. Schmidt, 186 p, Moscou, 1972.

Le catalogue contient des résultats gravimétriques (5823 points) obtenus pendant le 5ème voyage du "Dimitri MENDELEEV", en janvier - mai 1971, dans les Océans Atlantique et Pacifique.

Les mesures de pesanteur ont été faites avec 2 gravimètres marins automatisés qui comportaient un appareil optico-mécanique permettant la transformation du calcul (code AMG) n°3 et n°4, installés sur une plateforme gyrostabilisatrice (code HGM).

Le contrôle des gravimètres a été obtenu par la comparaison avec des mesures pendulaires faites dans les ports rencontrés suivants : Kaliningrad, Kingston, Honolulu, Suva (radio), Yokohama et Vladivostok.

- 522 - BOULANGER Yu.D. et al. - "Expédition gravimétrique en mer sur les bateaux de l'Académie des Sciences de l'URSS - Catalogue des observations gravimétriques : 5lème voyage du bateau NIS "VITIAZ" : Partie Equatoriale de l'Océan Pacifique, 1972".
Acad. Sci. URSS, Inst. Phys. Terre O.Yu. Schmidt, 190 p, Moscou, 1973.

Le catalogue contient les observations gravimétriques obtenues pendant le 5lème trajet du NIS "VITIAZ" en janvier - mai 1972 dans la zone équatoriale de la partie ouest de l'Océan Pacifique.

Les mesures de la pesanteur ont été effectuées par 2 gravimètres marins Graff GSS-2 n°76 et n°77, placés sur une plate-forme gyrostatique. Les mesures ont été effectuées sous la forme de profils continus d'une longueur d'environ 15.000 miles.

Dans les ports (Vladivostok, Tarawa, Ile Ocean, Brisbane, Nauru, La Haye, Vladivostok, on a fait en même temps des mesures de pesanteur avec un appareil pendulaire et avec des gravimètres, afin de fixer le niveau de référence des gravimètres.

523 - MORRIS P. - "Density, magnetic and resistivity, measurements on Irish rocks". Communic. Dublin Inst. for Advanced Studies, Ser. D, Geophys. Bull. n°31, 47 p, 1973.

524 - YOUNG D.G.G. - "The Donegal granite, a gravity analysis". Proc. Roy. Irish Acad., v.74, Section B, n°6, p.63-73, Dublin, 1974.

A gravity survey in Co. Donegal has provided further examples of the frequently observed association of negative gravity anomalies with granite intrusions. The gravity features over three such intrusions, the Main Donegal granite, the Rosses ring complex and the Ardara granite are analysed and discussed in relation to their deep structure and mode of origin. The thicknesses of the granites calculated on the basis of their gravity effects are less than had been anticipated from knowledge of granites similar in age and tectonic setting elsewhere, and in the case of the Main granite would be consistent with a derivation from underlying Lewisian strata.

525 - MORRIS P. - "A Tertiary dyke system in South-West Ireland". Proc. Royal Irish Acad., v.74, Section B, n°13, p.180-184, Dublin, 1974.

Evidence is presented which demonstrates that a Tertiary dyke of at least 70 km in length is present in the extreme south-west of Ireland, a region generally regarded as being free from the effects of volcanicity of this age.

526 - YOUNG D.G.G. & R.J. BAILEY - "An interpretation of some magnetic data off the West coast of Ireland".
from : Geol. J., v.9, pt 2, p.137-146, 1974.

A total field magnetic anomaly contour map of the continental margin west of Ireland is described by reference to geological structure previously established by seismic reflection profiling. The western Irish Mainland Shelf, Porcupine Seabight Trough and Porcupine Ridge were previously defined as major north-south elements in the structure of the margin. Each is readily distinguished on the magnetic anomaly contour map. To the north these features terminate against, or merge with, the east-west Slyne Ridge. A pronounced change in the magnetic anomaly pattern at about 53°N suggests that the southern limit of this Ridge coincides with a major geological discontinuity extending from near the coast of Ireland to the continental slope, some 320 km to the west.

The magnetic anomaly contour map gives general support to the idea that the Slyne Ridge and Porcupine Ridge represent submerged blocks of marginal continental crust, and that the Porcupine Seabight Trough is founded upon crust significantly different in character.

527 - SCHOOL of COSMIC PHYSICS - "Gravity anomaly map of Ireland". Communic. Dublin Inst. for Advanced Studies, Ser. D, Géophys., Bull. n°32, 1974.

The accompanying Bouguer anomaly map is drawn on to a scale of 1/750 000 similar to that of the 1962 edition of the Geological Map of Ireland of the Geological Survey. It is compiled from data collected by the Geophysical Section of the School of Cosmic Physics in the Dublin Institute for Advanced Studies and from the Geological Survey Gravity Anomaly Map of Northern Ireland.

The Bouguer anomalies were derived assuming a value of 981 265.0 mGal at Pendulum House, Cambridge and calculated against the International Gravity Formula of 1930, reduction being made to mean sea level using a density of 2 670 kg/m³ for the DIAS data.

The mean station density for two thirds of the area is greater than one station per three sq.km. In the remaining area mainly south of latitude 53° the density is one station per three to seven sq. km.

The contour interval is 5mGal.

- 528 - NAGY D. - "Free-air anomaly map of Canada from piece-wise surface fittings over half-degree blocks".

from : The Canadian Surveyor, v.27, n°4, p.293-300, 1973.
Earth Physics Branch, Contr. n°487, Ottawa.

The region of Canada, which has been covered by gravity surveys (including 1970 data), has been subdivided into 2,923 surface elements of sides of a half-degree along the meridian and approximately equivalent length along the parallels. The gravity anomaly at the center of each element was estimated by fitting a low-order polynomial surface to the free-air anomalies within each element. The extreme values are - 160 and 96 milligals, with over 85 per cent of the anomalies being in the range of - 40 and 20 milligals. About two thirds of all computed anomalies are estimated to have standard deviations less than ± 10 milligals.

- 529 - GEMAEL C. - "Gravidade normal no sistema geodésico de referencia 1967".

from : Bol. Univ. Federal do Parana Geod. n°13, 26 p, 1972.

- 530 - MUELLER I.I., M. KUMAR, J.P. REILLY, N. SAXENA & T. SOLER - "Global satellite triangulation and trilateration for the national geodetic satellite program (solutions WN 12, 14 and 16)".

The Ohio State Univ., Dept. Geod. Sci., Rep. n°199, 255 p, Columbus, 1973.

- 531 - MERCHANT H.C. - "Stabilized laser gravimeter".

AFCRL-TR-74-0355, Applied Phys. Lab. HN-10, Univ. Washington, Final Rep. for period 1 May 1974 - 30 June 1974, 1974.

The design, development and testing of a stabilized laser gravimeter are described. In this design a mirror forming one end of a Fabry-Perot optical cavity is mounted on a unique mechanical suspension system using endloaded beams. The low frequency suspension required for high sensitivity is obtained by making use of the decrease in frequency of a vibrating beam system with increasing end load.

The wavelength of an external HeNe illuminating laser is tuned to maximize the output of the Fabry-Perot cavity by following a fringe. The reference length for the system is provided by a second laser whose wavelength is stabilized by a vibration-rotation absorption line in methane. The output of the system is the beat frequency between the two lasers. The sensitivities of the optical and mechanical systems have been demonstrated separately in laboratory tests. Further testing will involve the measurement of Earth tides in the field.

- 532 - DEFENSE MAPPING AGENCY, AEROSPACE CENTER - Quarterly accession list, 1 Jan - 31 March 1974.
DoD Gravity Library, 2 p, St-Louis, 1974.
- 533 - YANAI K., K. KIZAKI, T. TATSUMI & T. KIKUCHI - "Antarctic geological map series - sheet 1 : East Ongul Island".
Nat. Inst. Polar Res., Explanatory text 13 p, Tokyo, 1974.
Since 1956 when the Japanese Antarctic Research Expedition (JARE) was started, several Japanese geologists among the members of the JARE summer and/or wintering parties have performed geological surveys in the Lützow-Holm Bay area and its environs East Antarctica.
The Lützow-Holm Bay and neighboring areas are composed mainly of high-grade metamorphic rocks associated with plutonic rocks of Precambrian and lower Palaeozoic Periods known as the plutono-metamorphic age. Many contributions on the above areas' geology including petrology, mineralogy, palaeontology and sedimentology have been published in several kinds of academic periodicals and books. However, no detailed geological map except that of East Ongul Island has been published.
- 534 - YANAI K., T. TATSUMI & T. KIKUCHI - "Antarctic geological map series - Sheet 2 : West Ongul Island".
Nat. Inst. Polar Res., Explanatory text 5 p, Tokyo, 1974.
- 535 - INSTITUTO PANAMERICANO de GEOGRAFIA e HISTORIA - Revista cartografica.
Comision de Cartografia, Ano XXI, n°23, 183 p, Buenos Aires, 1972.
- a) FISCHER I. - "Estructura basica del datum Sudamericano de 1969". p.9-28.
El control geodésico existente de primer orden del Continente Sudamericano ha sido compensado sobre el Datum Sudamericano de 1969 (SAD 69) como un Sistema de Control Continental Coherente, y los detalles de la compensación dentro de cada país han sido entregados a tales países. Esta obra recapitula los antecedentes históricos del proyecto dentro del PAIGH, define el nuevo datum geodésico y provee mapas del geoide y fórmulas para transformación de datum.
- b) FISCHER I. - "The basic framework of the South American datum of 1969". p.29-48.
The existing first order geodetic control of the South American continent has been adjusted on the South American Datum of 1969 (SAD 69) as a Coherent Continental Control System, and the details of the adjustment within each country have been furnished that country. This paper recapitulates the historical background of the project within the PAIGH, defines the new geodetic datum, and provides geoid charts and datum transformation formulas.

536 - KIVINIEMI A. - "High precision measurements for studying the secular variation in gravity in Finland".

Pub. Finnish Geod. Inst., n°78, 68 p, Helsinki, 1974.

Measurements for the secular variation in gravity were carried out in Finland between the Vaasa, Äänekoski and Joensuu stations in October, 1966, in November 1967 and in October, 1971. Further measurements between the Vaasa and Äänekoski stations were carried out in October, 1972 and 1973.

All gravity measurements connected with this study were carried out with LaCoste and Romberg gravimeters model "G".

All reductions and all other computations and adjustments were carried out to a precision of 0.1 μ Gal.

537 - GRAFARENDE E. - "Gravity gradients and three dimensional net adjustments without ellipsoidal reference".

AFCRL-TR-73-0534, Sci. Rep. n°8, Dept of Geod. Sci. n°202, 125 p, 1973.

The report analyzes the practical applicability of the Marussi transformation from natural nonunique coordinates into the unique coordinates astronomical longitude and latitude, and geopotential by means of gravity gradients and the euclidean norm of the gravity vector as integrating factors. If we tolerate point errors of about ± 10 m the r.m.s. error of gravity gradients is found to be about ± 1 E for point distances of about 15 km and pole free latitudes. Analogous values are ± 1 m and $\pm 0.1 \pm 10$ cm and ± 0.01 E approximately. A very detailed error analysis for the Marussi transformation is given, completed by an example for a three-dimensional net adjustment based on the Frobenius theorem and available gravity gradient information.

538 - REED G.B. - "Application of kinematical geodesy for determining the short wave length components of the gravity field by satellite gradiometry".

AFCRL-TR-73-0535, Sci. Rep. n°9, Dept. Geod. Sci. n°201, 163 p, 1973.

This report describes an investigation into the use of satellite borne gravity gradient devices for the recovery of terrestrial gravity information in terms of discrete mean gravity anomalies, point masses or potential coefficients. Simulation studies were conducted considering two possible instrument configurations :

- 1) a hand-mounted system capable of sensing five independent components of the gravity gradient tensor and
- 2) a rotating gravity gradient system.

The spatial partial derivatives of a gravitational potential are developed using the methods of tensor calculus with specialization to the potential in spherical harmonics. A method is presented for estimating the root mean square magnitudes of all components of the gravity gradient tensor. The resulting estimates and the simulated solutions for the hard-mounted system strongly indicate that the measuring sensitivities required for the cross-gradient terms are beyond practical limits for satellite gradiometers. In addition, the effect of altitude attenuation on the gradients was evaluated.

The simulation experiments demonstrated that a rotating gradiometer with a sensitivity and accuracy of 0.01 E can satisfactorily resolve $2^\circ \times 2^\circ$ mean gravity anomalies (equivalent to degree 90) with an accuracy of 0.5 to 1 milligals at 250 to 300 km altitude.

- 53 - SEPPELIN T.O., W.T. RIORDAN & W.J. CHAPPAS - "Computational methods for determining $1^\circ \times 1^\circ$ mean gravity anomalies and their accuracies". DMAAC - Ref. Pub. n°73-0001, 30 p, St-Louis, 1973.

This publication contains the explanations of the methods used in computing the $1^\circ \times 1^\circ$ mean free-air gravity anomaly ($\bar{\Delta}g_f$) values and their accuracies to be published in DMAAC Reference Publication N° 73-0002.

The information contained in this report is in two parts. Part I identifies each computational method, gives a written definition, and furnishes the equations with a sample computation. When and how the method should be used and any strengths and shortcomings of the method are addressed. Part II identifies the method used to arrive at an accuracy value for each computational method, gives a written definition with associated equations, and provides a sample computation. Shortcomings of the methods are started.

- 540 - MORITZ H. - "Stepwise and sequential collocation". AFCRL-TR-73-0432, Sci. Rep. n°10, Dept. Geod. Sci., Rep. n°203, 43 p, 1973.

In stepwise collocation, the estimation procedure is split up into two steps, corresponding to a partitioning of the covariance matrix to be inverted. Formulas for signal and parameter estimates and for their error covariances are derived and interpreted statistically. Stepwise adjustment by parameters and by conditions is exhibited as special cases of stepwise collocation. Sequential collocation is an extension of the procedure so as to comprise several steps. Finally, the relation between sequential collocation and Kalman filtering is considered in some detail.

- 541 - MORITZ H. - "Computation of ellipsoidal mass distributions". AFCRL-TR-73-0725, Sci. Rep. n°13, Dept. Geod. Sci., Rep. n°206, 55 p, 1973.

The present report studies the computation of density distributions for the reference ellipsoid using a spherical-harmonic expansion to the second order in the flattening. The computational formulas are given and, as an example, a polynomial model is calculated.

It is found that, for each density distribution in hydrostatic equilibrium, there exists a corresponding ellipsoidal configuration such that corresponding internal level surfaces have very nearly the same flattening. The deviations of ellipsoidal mass distributions from hydrostatic equilibrium figures are investigated, and formulas and numerical estimates are given for the separation between surfaces of constant density and surfaces of constant potential, and for non-hydrostatic stress differences.

- 542 - TSCHERNING C.C. & R.H. RAPP - "Closed covariance expressions for gravity anomalies, geoid undulations, and deflections of the vertical implied by anomaly degree variance models".
AFCRL-TR-74-0231, Sci. Rep. n°14, Dept. of Geod. Sci. Rep. n°208, 89 p, 1974.

This report first develops a new anomaly degree variance model by considering potential coefficient information to degree 20, and updated values of the point anomaly variance (1795 mGal^2), the 1° block variance (920 mGal^2) and the 5° block variance (302 mGal^2), the variances being given respect to the Geodetic Reference System 1967. This new model was computed assuming that anomaly information was given on a sphere of radius 6371 km with the radius of the best fitting Bjerhammar sphere found to be 6369.8 km.

This new model and several other models were used to develop closed expressions for the covariance and cross-covariance functions between gravity anomalies, geoid undulations (or height anomalies), and deflections of the vertical. It is shown how these global covariance expressions can be modified for use as local covariances and for use when mean anomalies are being considered. A Fortran subroutine is provided for the determination of the covariance values implied by the recommended anomaly degree variance model.

- 543 - MORITZ H. - "Some first accuracy estimates for applications of aerial gradiometry".
AFCRL-TR-74-0317, Sci. Rep. n°15, Dept Geod. Sci., Rep. n°209, 72 p, 1974.

The purpose of this report is to derive some first estimates of accuracies obtainable in the geodetic use of aerial gradiometry. For simplicity, mainly the second vertical gradient T_{zz} is considered ; the use of other gradients and their optimal combination by least-squares collocation is also outlined.

Regarding the accuracy of the geoid obtainable from a uniform coverage of the Earth by uncorrelated and equally accurate square block values of T_{zz} , it is found that the standard error of the geoidal height is proportional to the block side a .

The standard error of mean block values of T_{zz} , interpolated from a measured profile through the center, is proportional to a^2 , so that the corresponding geoidal error is proportional to a^3 . Numerical estimates, based on a simple model of the field covariance function, indicate that, by using a suitable profile spacing, geoidal accuracies in the decimeter range can be reached.

- 544 - SHAPIRO I.I. & R.W. KING - "Analysis of lunar laser and ALSEP VLBI data for geodetic purposes".
AFCRL-TR-74-0382, Final Rep. for period 1 Sept. 73 - 1 July 74, 14 p, 1974.

The M.I.T. Planetary Ephemeris Program has been used to perform simulated least squares estimates of geodetic and other parameters relevant to the analysis of lunar laser ranging observations. These observations can produce improved estimates of :

- 1) observing station locations,
- 2) variations in the diurnal rotation rate,
- 3) polar motion, and
- 4) the Earth's gravitational constant.

.../...

Since the laser data are highly sensitive to the lunar physical libration, differential very-long-baseline interferometry observations of the ALSEP transmitters have been processed to aid in the analysis of the laser data.

- 545 - ACKERMAN S. - "Data acquisition and retrieval system for a geodetic rangefinder".

AFCRL-TR-73-0401, Final Rep. 1 June 1972 to 31 May 1973, 44 p, LTIRF-359/ACK, 1973.

An instrument has been developed to measure, digitalize and store the amplitudes of signal pulses from an optical rangefinder. The pulses may be as short as 5×10^{-9} seconds in duration, 12×10^{-6} seconds or more apart, and may have peak values from 20 to 2,400 millivolts. These pulse amplitude measurements, and the related rangetime interval and fiducial time data, are retrieved on paper tape. Format characters are inserted so that the TTY print-out is in a convenient form for study or editing. This equipment is expected to reduce the preprocessing of geodetic range information accumulated during the orbital pass of a geodetic satellite from one man-week to three or four man-hours.

The use of a D17B (Minuteman) computer for data processing and retrieval tasks at the AFCRL geodetic range-finder station was studied. It was determined that this computer is not well suited to these applications.

- 546 - FEDINSKI V.V. - Mesures gravimétriques en mer - Recueil d'articles, n° 5, Univ. Moscou, 1970.

I - Appareils et méthodes des mesures de pesanteur en mer

- a) PANTELEIEV V.L. & U.V. BOBROV - "Dispositif pour l'enregistrement des accélérations horizontales, par une suspension à la cardan. p.5-10.
- b) KEJOUTINE N.G. - "Influence des vibrations et des microséismes sur la période des oscillations d'un pendule différentiel". p.11-17.

II - Expéditions gravimétriques en mer de l'Université de Moscou

- c) GLADOUN V.A. & I.N. KAPTSOV - "Travaux gravimétriques au cours des 40 et 41ème expéditions du bateau "VITIAZ".
p.18-20. Carte schématique des trajets dans l'Océan Indien ...
- d) STROIEV P.A. & V.L. PANTELEIEV - "Mesures gravimétriques en mer pendant le 42ème voyage du bateau "VITIAZ".
p.21-27.

Appareils, méthodes de mesures, travaux effectués.
Carte schématique des trajets dans la mer du Japon. Le rattachement a été fait avec l'Université de Tokyo.

III - Résultats des mesures de pesanteur dans les Océans et sur le Continent Antarctique.

- e) VACHTCHILOV U. Ja. & A.G. GAINANOV - "Sur la nature des anomalies de pesanteur dans la zone de l'arc insulaire des îles Kouriles".
p.28-31.
- f) GAINANOV A.G., E.N. ISAIEV, P.A. STROIEV & S.A. OUCHAKOV - "Isostasie et structure de la lithosphère de la Mer de Bering et de l'arc des Aléoutiennes".
p.32-40.
- g) GAINANOV A.G., Ju.I. SVISTOUNOV, P.A. STROIEV & A.A. SCHREIDER - "Vue générale des recherches géophysiques de la structure de l'écorce terrestre dans l'Océan Indien".
p.41-53.
- h) GAINANOV A.G., E.D. KORIAKINE & P.A. STROIEV - "Quelques données nouvelles concernant la structure profonde de l'écorce terrestre des zones de transition entre les Océans et les Continents".
p.54-64.
- i) GROUCHINSKI N.P. - "Sur les réductions de la pesanteur pour les régions marines et quelques remarques sur la liaison des anomalies de pesanteur avec l'épaisseur de l'écorce terrestre".
p.65-74.
- j) FEDINSKI V.V. - "Remarques sur les anomalies de Bouguer dans les Mers et les Océans".
p.74-75.
- k) STROIEV P.A. & A.I. FROLOV - "Contribution à l'étude relative aux erreurs systématiques dans la mesure des altitudes, faites par les expéditions soviétiques, japonaises et américaines dans l'Antarctique Est". p.76-82.
- l) KORIAKINE E.D., P.A. STROIEV & A.I. FROLOV - "Résultats des mesures de pesanteur sur la Terre Enderby, en Antarctique Est".
p.83-95.
- m) FROLOV A.I. - "Quelques remarques sur les rapports statistiques utilisés dans les recherches sur la structure de l'écorce terrestre".
p.96-103.
- n) FROLOV A.I., P.A. STROIEV & E.D. KORIAKINE - "Champ de pesanteur et structure de l'écorce terrestre de la Terre de Wilkes et de la Terre de Victoria (Antarctique Est)".
p.104-113.

547 - FEDINSKI V.V. - Recherches gravimétriques en Mer - Recueil d'articles, n° 6, Univ. Moscou, 1972.

I - Théorie, appareils et méthodes relatives aux mesures de pesanteur en mer

- a) LEVITSKAIA Z.N. - "Effet de mouvement orbital dans les observations gravimétriques en mer (effet de "cross-coupling").
p.5-26.

Les indications du gravimètre amorti placé sur une plateforme hydrostatique sont déformées par l'influence commune d'accélérations perturbatrices horizontales et verticales (effet de cross-coupling) :

$\Delta g_c = \dot{x} \varphi$. Parmi les autres effets de second ordre, l'effet de cross-coupling (effet C.C.) introduit la plus grande erreur dans la valeur mesurée de la pesanteur.

Les formules approchées pour la grandeur et le signe Δg_c relativement aux amplitudes et fréquences des accélérations perturbatrices et de la sensibilité dynamique du gravimètre sont données par un examen théorique de quelques schémas idéalisés du mouvement du navire et du mouvement du pendule du gravimètre...

On a créé un matériel expérimental important pour mesurer l'effet C.C. et sa dépendance des conditions d'observation. C'est la méthode de mesure continue de l'effet CC $\Delta g_c(t) = \ddot{x}(t)\varphi(t)$ qui donne la plus grande certitude. Pour calculer cette valeur on a mis au point des dispositifs de calcul numériques et analogiques.

L'effet C.C. d'après les données expérimentales est négligeable seulement lorsque la mer est très calme. Lors d'une grande agitation ($Z_0 \approx 80$ Gals) Δg_c atteint 30 mGal. Les méthodes envisagées pour supprimer l'influence de l'effet C.C. sur les indications du gravimètre sont :

1) l'emploi de 2 appareils identiques, dont les pendules sont orientés dans des directions opposées ; la moyenne des indications des 2 appareils est libre de l'influence de l'effet C.C.

2) la gravitation lente du gravimètre autour d'un axe vertical ; les erreurs positives et négatives s'annulent l'une l'autre.

La méthode la plus sûre de calcul de l'influence de l'effet C.C. sur la valeur mesurée de la pesanteur est le calcul continu du produit $\dot{x}\varphi$ et la correction continue sur l'enregistrement du gravimètre. Cette méthode diminue les erreurs systématiques, semi-systématiques et accidentelles de l'effet C.C.

Il existe un second type de C.C., déterminé par les défauts de construction de l'appareil. L'erreur qu'il produit est du même ordre que pour le 1er type de l'effet C.C. La méthode de suppression des erreurs de 2ème type de l'effet C.C. est le renforcement de la force des liaisons.

- b) PANTELEIEV V.L. & Z.N. LEVITSKAIA - "Suppression des influences parasites dans les indications du gravimètre marin avec l'aide de filtres R.S.". p.27-35.

1) Problème de l'obtention d'un filtre R.S. "idéal" de basses fréquences.

2) Calcul des filtres R.S. pour différents coefficients de charge d'après le critère de la déformation minimale d'amplitude du signal utile, (changement de la pesanteur au fur et à mesure de l'avance du bateau) et de la diminution maximale de la perturbation (composante verticale d'accélération du mouvement du support). On a montré que pour de faibles coefficients de charge ($a \leq 2$) la caractéristique d'amplitude et de fréquence de la chaîne R.S. de 4-5 anneaux permet de dégager le signal utile avec une erreur de ± 2 mGal.

3) Evaluation des déformations de phase du signal utile introduites par le filtre.

4) Le temps du processus transitoire du filtre avec une déformation minimale du signal utile est proche de 400 secondes dans un large diapason de changement des paramètres du filtre a, n, T .

- c) PANTELEIEV V.L. & Z.N. LEVITSKAIA - "Quelques caractéristiques de transformations linéaires de lissage lors de la mesure de la pesanteur faite sur un support mobile".
p.36-43.
- d) PANTELEIEV V.L. & V.A. GLADOUN - "Dynamique du ressort en quartz dans un milieu instable".
p.44-54.
- e) KORIAKINE E.D. - "Nomogramme pour le calcul des corrections d'Et.8s".
p.55-56.
- f) VORONAIKIN E.G. - "Gravimètre gyrostabilisé TAGG-1".
p.57-66.
Schéma et vue générale de l'appareil.
L'erreur des mesures est de \pm 1,5 mGal ; la zone d'utilisation atteint 2 Gal. L'appareillage pèse 30 kg et a les dimensions suivantes : 320 x 320 x 815 mm.
- g) MELIKHOV V.R., A.G. GAINANOV & V.L. PANTELEIEV - "Calcul de la correction pour la topographie du fond de l'Océan".
p.67-71.

II - Expéditions gravimétriques en mer de l'Université de Moscou

- h) GAINANOV A.G. & V.L. PANTELEIEV - "Travaux gravimétriques en mer, lors du 6ème voyage du navire "Académicien KOURTCHAKOV".
p.72-82.
De juin à novembre 1969, des mesures ont été faites surtout dans la région de la crête médio-atlantique ; le réseau a été rattaché au réseau mondial, à Reykjavik, Boston, Southampton et Dakar ainsi qu'à Las Palmas et Brest.
- i) KORIAKINE E.D. & A.I. FROLOV - "Travaux gravimétriques de l'Institut Astronomique Steinberg (GAICH) et de l'Institut Géologique de l'Arctique (NIIGA) avec la participation de l'Institut de Recherches Arctique et Antarctique, lors de la 14ème Expédition soviétique dans l'Antarctique".
p.83-105.
Le catalogue des résultats se trouve dans la publication suivante des mêmes auteurs, N° 548, f).
- j) BAGRAMIANTS V.O., K.N. KOJANOV, Yu.A. PAVLOV & P.A. STROIEV - "Essai de relevé gravimétrique sur un navire de petit tonnage, dans la partie Ouest de l'Océan Pacifique".
p.106-111.
- k) STROIEV P.A. - "Travaux gravimétriques lors du 47ème trajet du navire "VITIAZ" dans la mer du Japon".
p.112-115.

III - Résultats gravimétriques en mer

- l) GLADOUN V.A., I.N. KAPTSOVA, V.C. SIMAKOV & A.G. GAINANOV - "Essais de profils gravimétriques avec un gravimètre automatique lors du 41ème voyage du "VITIAZ".
p.116-126.
Mesures dans la mer d'Oman, coupe schématique de l'écorce terrestre de l'île Sokotra au port de Karachi (Indes).
- m) LITINSKI V.A. - "Essais d'observations gravimétriques sur un brise-glace".
p.127-142.
- n) VACHTCHILOV Yu.I. & M.G. POPOV - "Evaluation quantitative de la structure des blocs de l'écorce terrestre et du manteau supérieur dans les Mers Noire, Caspienne et Méditerranée, d'après les résultats gravimétriques".
p.143-153.
- o) CHREIDER A.A., G.M. VALIACHKO, V.R. MELIKHOV, E.G. MIRLINE & A.G. GAINANOV - "Sur l'hétérogénéité des caractères physiques de la lithosphère de la crête arabo-indoue".
p.154-162.

548 - GROUCHINSKI N.P. - Recherches gravimétriques en mer - Recueil d'articles n° 7, 1971-1972, Univ. Moscou, 1973.

I - Théorie, appareils et méthodes relatives aux mesures de la pesanteur en mer

- a) GROUCHINSKI N.P. & N.B. SAGINA - "Mesure absolue de haute précision, de la pesanteur et perspectives de développement du réseau de référence mondial".
p.4-10.
- b) KEJOUTINE N.G. & E.P. KALININA - "Résolution quantitative de l'équation des oscillations "perturbées" d'un pendule gravimétrique".
p.11-17.
- c) GLADOUN V.A. & A.V. STAKLO - "Emploi de dispositifs analogiques dans les appareils gravimétriques".
p.18-29.
- d) BOBROV U.V. - "Gravimètre marin de petit gabarit".
p.30-34.
- e) PANTELEIEV V.L. - "Gyrostabilisateur des gravimètres marins".
p.35-47.

II - Expéditions gravimétriques en mer de l'Université de Moscou

- f) KORIAKINE E.D. & A.I. FROLOV - "Catalogue des points gravimétriques observés dans le voyage dans l'Antarctique du bateau "Prof. ZOUBOV" en 1968-69".

p.48-73.

Les mesures sont faites sur des profils continus ; les moyennes sont calculées toutes les 20 minutes, ce qui correspond à des intervalles d'environ 8 km, étant donné la vitesse du bateau de 13 à 14 noeuds.

Dans ce catalogue qui contient les résultats de 1253 points, sont indiquées :

- les coordonnées géographiques,
- la profondeur H,
- la valeur de g observée en Gals,
- l'anomalie à l'air libre et de Bouguer calculées par rapport à la formule internationale (1930).

III - Résultats des mesures de pesanteur dans les Océans et dans l'Antarctique

- g) STROIEV P.A., A.G. GAINANOV & U.A. PAVLOV - "Nouvelles données sur l'isostasie et la structure profonde de l'écorce sous la mer du Japon".
p.74-85.
- h) KOVILINE V.M. & P.A. STROIEV - "Structures principales de l'écorce terrestre de la zone de transition dans la région de la mer du Japon".
p.86-101.
- i) GAINANOV A.G. - "Sur la densité des roches magmatiques dans la zone des "rifts" des Océans Atlantique et Indien".
p.102-107.
- j) GAINANOV A.G., E.D. KORIAKINE & P.A. STROIEV - "Anomalies régionales de la pesanteur dans l'Océan Indien".
p.108-112.
- k) KORIAKINE E.D. - "Premier profil gravimétrique continu dans l'Océan Antarctique".
p.113-116.

- 549 - PLAUMANN S. - "Sur gravimetrischen Bestimmung der Dichte von Seamounts mit Anwendung auf die Kleine und Große Meteor-Kuppe". Geol. Jb, E.2, S.99-110, Hannover, 1974.

In 1967 seamounts have been one of the objects of RV METEOR cruises. The Small and Great Meteor Seamount have been gravimetrically surveyed, which leads to results about the mean density of the seamount-forming rocks.

A simple method is derived, by which in the case of areal gravity measurements in a similar manner as in the case of profiles a comparison of "measured" and "calculated" curves allows to test, whether the seamount is of uniform density and which in case the mean density is. For the Small Meteor Seamount a mean density of $2.65 \text{ g} \cdot \text{cm}^{-3}$ was found. The main of the Great Meteor Seamount has a density of 2.72. Model reflections give hints that the central or upper part of Great Meteor Seamount is of even higher density.

- 550 - PALMASON G. - "The insular margin of Iceland".
The Geology of Continental Margins, 17 p, 1974.

Recent geophysical surveys of the Icelandic insular shelf are described and some results presented, in particular from the southern part of the shelf. It is concluded that the shelf is built chiefly of basalts and that sediments from land have been deposited mainly seaward of the shelf edge. The margin has been modified in some places by later volcanism which, together with sediment deposition, has extended the shelf farther out.

- 551 - DEPARTMENT of SCIENTIFIC & INDUSTRIAL RESEARCH, Geophysics Division - "Gravity map of New-Zealand, 1/250.000, sheet 8 : TAUPO".
Bouguer anomalies, isostatic anomalies, isostatic vertical gradient anomalies at 500 m. above sea level., Wellington, 1974.

- 552 - DEPARTMENT of SCIENTIFIC & INDUSTRIAL RESEARCH, Geophysics Division - Gravity map of New Zealand, 1/250.000, sheet 10 : WANGANUI".
Bouguer anomalies, isostatic anomalies, isostatic vertical gradient anomalies at 500 m. above sea level., Wellington, 1974.

- 553 - DUBLIN INSTITUTE for ADVANCED STUDIES - "Gravity anomaly map of Ireland, Bouguer anomaly". Scale 1/750.000.
Dublin, 1974.
Equidistance des courbes : 5 mGal.

- 554 - ACADEMIE des SCIENCES U.R.S.S. - Références bibliographiques : Géophysique, index des Auteurs 1972,
119 p, Moscou, 1974.

- 555 - ACADEMIE des SCIENCES U.R.S.S. - Références bibliographiques : Sér. 52, Géodésie et Astronomie - Index des Articles 1973.
38 p, Moscou, 1974.

ACADEMIE des SCIENCES U.R.S.S. - Références bibliographiques : Géophysique.

- 556 - N° 12, 285 p, Moscou, 1974. (Texte russe).

- 557 - N° 1, 265 p, Moscou, 1975. " "

- 558 - N° 2, 263 p, Moscou, 1975. " "

- 559 - N° 3, 298 p, Moscou, 1975. " "

ACADEMIE des SCIENCES U.R.S.S. - Références bibliographiques : Sér. 52,
Géodésie et Astronomie.

- 560 - N° 12, 43 p, Moscou, 1974. (Texte russe).
 561 - N° 1, 45 p, Moscou, 1975. " "
 562 - N° 2, 39 p, Moscou, 1975. " "
 563 - N° 3, 47 p, Moscou, 1975. " "

CENTRE NATIONAL pour l'EXPLOITATION des OCEANS - Bulletin d'Information.

- 567 - N° 72, 23 p, Paris, Décembre 1974.
 568 - N° 73, 24 p, Paris, Janvier 1975.
 569 - N° 74, 27 p, Paris, Février 1975
 570 - N° 75, 19 p, Paris, Mars 1975.

DEFENSE MAPPING AGENCY, AEROSPACE CENTER - DoD Gravity Library.

- 571 - Quarterly accession list, 1 Oct. - 31 Dec. 1974, 3 p, St-Louis, 1974.
 572 - Quarterly accession list, 1 Jan. - 31 Mar. 1975, 1 p, St-Louis, 1975.

- 582 - BEERS L.D. - "The Earth's gravity field from a combination of satellite and terrestrial gravity data".

Hawaii Inst. Geophys., Univ. Hawaii, HIG-71-18, 82 p, 1971.

The long-wavelength components of the Earth's gravity field to the 8th harmonic degree obtained solely from artificial Earth-satellite data are combined with 1593, $5^\circ \times 5^\circ$ mean gravity anomalies obtained from 18, 409, $1^\circ \times 1^\circ$ mean gravity anomalies computed solely from gravimetric data. The theoretically expected relationship between the satellite-derived and the computed gravimetric data, that the two should give identical representation of the frequency range which overlaps in both, is utilized to construct an "areal function". The variations in this function are estimated by the classical least-squares method. 999 unknown anomalies are computed. The maximum standard error of unit weight is ± 5.1 mGals. The resultant anomalous gravity field is expressed in terms of spherical harmonic coefficients of geopotential to the 21st harmonic degree in order to facilitate comparisons with other currently available satellite and/or combination solutions, which are usually given in terms of spherical harmonic coefficients, sometimes because of the mathematical nature of the end product of the solution, but occasionally out of mere fashion only.

- 584 - KHAN M.A. & G.P. WOOLLARD - "A review of the perturbation theory as applied to the determination of geopotential".

Hawaii Inst. Geophys., Univ. Hawaii, HIG-68-1, 63 p, 1968.

A review of close satellite theory as applied to determine geopotential from the orbital motion of artificial Earth satellites is given. The most recent dynamical solutions (as of June, 1966) for geopotential coefficients obtained from the optical and Doppler tracking of satellites are used to compute the Earth's anomalous

gravity field in terms of geoidal undulations and gravity anomalies with respect to the various reference ellipsoids. A "mean solution", obtained from a linear combination of three of the available solutions, is also used for the same purpose. The maximum departure of the geoid from the surface of the international reference ellipsoid is much greater than that usually obtained from surface gravity data. As expected, the shorter wavelength component seems to be most poorly represented in the satellite data.

- 585 - LOREN W., K. & G.P. WOOLLARD - "Magnetic investigations in the Labrador and Scotia seas, USNS Eltanin Cruises 1-10, 1962-1963". Hawaii Inst. Geophys., Univ. Hawaii, HIG-68-4, 120 p, 1968.

Magnetic and gravity data were obtained in the North Atlantic and the Labrador Sea in March and April, 1962, during a shakedown cruise (Cruise 2) of the U.S.N.S. ELTANIN, prior to its use in Antarctic waters. Magnetic data were obtained in the Eastern Pacific and the southern oceans (Scotia Sea) from June 1962 through December 1963 (Cruises 3-10). Analysis of the magnetic data show magnetic lineations axial to the Labrador Sea, similar to those described by Vine and Matthews over the Mid-Atlantic Ridge. Gravity and magnetic data reflect the thick sedimentary and meta-sedimentary sequence present on the Grand Banks, and suggest fault control of the northern side of the Banks.

Magnetic data in the Scotia Sea suggest crustal migration of the Pacific crust into the Atlantic, and appear to extend the symmetry of the Scotia Sea eastward from the South Sandwich Trench. Correlation between the magnetic data and other geophysical measurements, together with geological observations, appear to substantiate this hypothesis and give an insight into the crustal structure of the Scotia Sea.

- 586 - KHAN M.A. & G.P. WOOLLARD - "Methods of analysis and comparison of geophysical data on a plane, with specific application to the Solomon Islands area".

Hawaii Inst. Geophys., Univ. Hawaii, HIG-68-17, 100 p, 1968.

Techniques of frequency representation and of comparison of various geophysical data on a bounded plane area are outlined, and applied to the gravity field over the Solomon Islands area. The general effectiveness of these techniques in the study of crustal and upper mantle structure on a regional scale, rather than on a global scale as in studies based on spherical harmonic representation, is demonstrated. The results of this analysis, in conjunction with the geophysical information provided by the recent seismic refraction work in the area, are used to examine and establish the interrelationships among the various parameters of the crust and the mantle.

- 587 - KHAN M.A. - "On the equilibrium figure of the Earth".

Hawaii Inst. Geophys., Univ. Hawaii, HIG-68-10, 39 p, 1968.

If de Sitter's hydrostatic equations are developed independent of the external potential theory, the hydrostatic geopotential coefficient J_h occurs explicitly on the right-hand side of those equations.

Since J_h here has to be treated as an unknown in the solution, it becomes rather difficult to solve the equations independently regardless of which of the dynamical parameters associated with the Earth is taken as the initial datum. Solution is possible, however, with the help of a boundary condition derived from the external potential theory which neither assumes nor discounts the presence of equilibrium conditions in the Earth's interior. If a general solution is constructed on this basis, the three particular solutions, usually quoted in literature, stem from it in the wake of the appropriate assumptions. Of course, the only meaningful solution -- of these -- is that corresponding to the polar moment of inertia as the initial datum. It is essential that the solution be constructed in this way in order to demonstrate clearly the correct structure of the problem of hydrostatic equilibrium.

The anomalous gravity field of the Earth referred to the hydrostatic figure is compared with that referred to the international reference ellipsoid.

- 588 - HIRVONEN R.A. - "Adjustment of satellite triangulations".
Hawaii Inst. Geophys., Univ. Hawaii, HIG-68-20, 21 p, 1968.

The elementary problem considered was : Given Earth-fixed space directions from two non-intervisible ground stations A and B to two elevated points 1 and 2, find the direction AB. Since more than two elevated points were to be used in the practice, a preliminary adjustment for each side AB was carried out. As the result of this adjustment, the two correlated quantities S_{AB} and t_{AB} , which were obtained, can be used as fictive observations, in the main adjustment of a network of several stations.

If there are N stations, the main adjustment contains $3N$ parameters. Of these, four cannot be determined by triangulation. It hardly seems worthwhile, however, to include in the main adjustment such observations as satellite distances, ground triangulations, levelings, and astronomical coordinates (with gravimetric deflections of the vertical). It is suggested, therefore, that four other conditions be used, in order to keep the gravity center of all stations and the mean scale of the approximate coordinates fixed. In this way, the overall accuracy obtainable by the adjustment of the network can be estimated.

- 589 - MATHUR S.P. - "Standardization of gravity and Bouguer anomalies in India".

Hawaii Inst. Geophys., Univ. Hawaii, HIG-69-6, 51 p, 1969.

About 150,000 gravity measurements made in India during the past two decades were based on various floating datums. In an attempt to bring these data to a standard datum, 287 of the old pendulum and gravimeter stations were reoccupied by a gravimeter and tied to the standard calibration range established for India by Manghani and Woppard in 1963. A correlation analysis of the differences between the old and the new sets of gravity values indicated a simple regression of the differences on the old gravity values. The regression coefficient obtained for the set of pendulum stations differed significantly from that obtained by Woppard and Rose (1963) for a different sampling and this regression was rejected because of this inconsistency and lack of information about the types of pendulum used.

.../...

The regression for the gravimeter stations indicated correction of the old values by :

- 1) a constant and,
- 2) a term linearly dependent on gravity for their standardization to the national datum of Dehra Dun (979.0640 Gal).

Simple Bouguer anomalies were computed for about 4,000 of the standardized values and about 1,000 new gravity stations covering formerly poorly covered areas. The anomalies show no consistent correlation with surficial geology but do reflect the major tectonic features. Low and broad anomalies in broad anomalies in areas of high-density rocks, such as the Deccan Plateau basalts, the Cuddapah basin, and others, point to a dominance of the effects of deeper mass variations in the crust. Regional anomalies were therefore obtained by filtering out the components due to the near-surface and smaller features. Using a three dimensional anomaly computation procedure, a structural map of the "M" (Mohorovicic) surface was derived assuming a sea-level crustal thickness of 32 km and a density contrast of 0.4 gm/cc at the "M" boundary.

Two large regions of low gravity are seen in the regional anomalies. One is a semi-circular low, with a minimum of - 120 mGal, centered over the Mangalore coast and practically covering all of the triangular peninsula of India. The other region lies over northern India where the gradients towards the Himalaya Mountains are steep, i.e., increasing from about 60 mGal/100 km over the deeper part of the Indo-Gangetic basin to about 140 mGal/100 km in the Punjab and Kashmir foothills of the Himalaya Mountains. Central India is covered by a zone of relatively high gravity values, which roughly follow the northern boundary of the peninsula.

The "M" surface is generally depressed under the peninsula, with a maximum depth of about 42 km under the Mangalore coast. In central India it rises to form a NW-SE trending upwarp along whose axis the surface lies at a depth of about 30 km farther west under Rajasthan. West of the Ganges delta the surface lies at a depth of about 34 km. North of this upwarp it dips downward again to depths of about 40 km under the Himalayan foothills and about 50 km or more under Kashmir.

This interpretation of the regional gravity field appears to be substantiated by regional uplift over the area of postulated anticlinal uplift of the "M" surface as delineated by the Satpura Mountains, the Mahadeo Hills, the Maikal Range, the Kaimur Hills which trend east-west across central India, and the Aravalli Range which appears to lie on a north-south trending spur on the main crustal anticline in western India. The deepening of the "M" surface as the Himalayan Mountains are approached is to be expected for a major orogenic feature of this type of Alpine age. The only question concerning the interpretation pertains to marked negative gravity values in southern India--which may be related at least in part to a major negative mass inhomogeneity in the upper mantle. But in the absence of seismic crustal measurements, this uncertainty cannot be resolved at this time.

591 - MALAHOFF A. & G.P. WOOLLARD - "The new Hebrides Islands gravity network". Hawaii Inst. Geophys., Univ. Hawaii, HIG-69-14, Final Report, Part I, 38 p, 1969.

412 land gravity observations were made in the New Hebrides Islands during the months of June - September 1967.

.../...

Reoccupations of previous gravity bases in Fiji at the Solomon Islands indicate the measurements have an absolute reliability of better than 0.1 mGal on the Madison, Wisconsin world gravity datum used by Woppard for his world standardization gravity net. The Bouguer gravity anomaly field, based on a density of 2.3 gm/cm³, varies from a + 60 milligal low observed over the northwestern corner of Espiritu Santo Island to a + 210 milligal high observed over the island of Maewo. The interpretation of the gravity anomalies in terms of crustal thickness suggests a generally thin crust beneath the New Hebrides Islands arc. Derived crustal thicknesses values range from 24 to 26 km along the western margin of the islands adjacent to the New Hebrides Trench, to 20 km along the eastern margin of the islands where the New Hebrides Islands arc abuts against the Fiji Plateau. The maximum crustal thickness indicated is beneath the northwestern end of Espiritu Santo Island and beneath Malekula Island. Local gravity highs of + 210 and + 170 milligal observed over Maewo and Pentecost islands respectively are associated with ultrabasic intrusions. All the andesitic and basaltic volcanic centers over the islands are characterized by anomalies ranging between + 150 and + 160 milligals in amplitude. The structural setting of the New Hebrides Archipelago as interpreted from the gravity, bathymetric, geologic, and geomagnetic data is that of an island arc with ocean-floor underthrusting occurring along the western margin of the arc. The arc is also apparently undergoing active northwest-northeast oriented, crustal tension. Fractures such as the d'Entrecasteaux Fracture Zone cross the island arc and abut against the Fiji Plateau. Volcanism and high Bouguer gravity anomalies are associated with the east-west fractures, where they cross the northwest-northeast oriented fractures aligned along the crest of the New Hebrides Islands arc.

592 - WOOLLARD G.P., M. MANGHNANI & S.P. MATHUR - "Gravity measurements in India".

Hawaii Inst. Geophys., Univ. Hawaii, HIG-69-17, Final Report, Part 2, 297 p, 1969.

- Details on the gravity measurements,
- Table of 1° x 1° gravity anomaly and elevation values,
- Remarks on the Bouguer anomaly,
- Appendix : Line drawings of sites occupied,
- Principal facts for gravity stations in India.

593 - WOOLLARD G.P., L.F. MACHESKY & R.L. LONGFIELD - "Results for a series of North-South gravity control traverses in the United States".
Hawaii Inst. Geophys., Univ. Hawaii, HIG-69-22, Final Report, Part 3, 147 p, 1969.

The work herein reported represents the latest phase of a continuing program by various individuals and agencies to standardize gravity data in the United States. In contrast to the initial network of pendulum gravity stations established by the U.S. Coast and Geodetic Survey over the United States (Duerksen, 1949), which was intended to define regional variations in gravity in an area for which there were no data, the present program is addressed to the problem of evaluation and standardization of the large body of existing data in the United States.

.../...

The present program capitalizes on the new airport gravity base network as control for a series of regionally distributed North-South gravity traverses along which observations were made at approximately 10-mile intervals. The objective was to establish a basis for evaluating and adjusting other gravity traverse data to form a regional gravity traverse network over the United States. These would permit most of the gravity data in the country to be evaluated and adjusted to a common datum and calibration standard. This report presents the results obtained and also presents an evaluation of the reliability of the results reported for the airport gravity base net.

Appendix : North-South gravity traverses - United States

- 1) Calibration tables for gravimeters used,
- 2) Description airport gravity bases used for control,
- 3) Principal facts for traverse stations.

595 - WOOLLARD G.P. & K.I. DAUGHERTY - "Collection, processing and geophysical analysis of gravity and magnetic data : gravity gradients associated with sea-floor topography".
Hawaii Inst. Geophys., Univ. Hawaii, HIG-70-19, Final Report 1969-70, 253 p, 1970.

The following report is devoted principally to a review of the relation of free-air and Bouguer anomaly values to seafloor topography. Because of the voluminous amount of data and graphs incorporated in the report, all of the basic data and associated graphs showing traverse locations, profile plots and change in Bouguer and free-air anomaly values as a function of elevation (depth of water) are appended as a separate volume. This arrangement, it is believed, will facilitate relating the text to the basic material. As the data are segregated and examined in the text on the basis of seafloor topographic forms that are believed to have a similar origin (continental slopes, continental border trenches, island arcs and trenches, the oceanic rises and ridges), the same arrangement and order is used in subdividing the data in the Appendix. The first section, however, is devoted to complete ocean transits, and was used to obtain a "feel" as to how gravity anomalies vary with topographic relief in crossing ocean basins.

596 - GEMEEL C. & F. HATSCHBACH - "Cartas de reduçao topo-isostatica para o estado de minas gerais".
Boll. Univ. Federal do Paranà, Geodésia, n°14, 6 p, 1973.
Cartes de réductions topo-isostatiques (zones 18 à 1) calculées dans les hypothèses de Pratt-Hayford ($H = 113,7$ km) et d'Airy - Heiskanen ($T = 20, 30$ et 40 km).

597 - GARRICK R.A. & T. HATHERTON - "Seismic velocity studies in the Southern Alps, New Zealand".

from : N.Z. J. Geol. & Geophys., v.16, n°4, p.973-995, 1973.

Seismic velocities of outcropping basement rocks were measured at 35 sites east and west of the Alpine Fault. Velocities range from 3.20 km/s to 5.15 km/s and although there are no statistical differences between the velocity distributions east and west of the fault, local velocity variations have geological implications ...

Reflections 11-21 km east of the fault are tentatively explained as being derived either from the top of an old magma chamber, or from the Alpine Fault plane should this dip south-east. The Haast Schist Group was found to have velocities similar to rocks of Mesozoic age.

- 598 - HOCHSTEIN M.P. & F.J. DAVEY - "Seismic measurements in Wellington Harbour".

from : J. Roy. Soc. New Zealand, v.4, n°2, p.123-140, 1974.

Seismic surveys in Wellington Harbour (Port Nicholson) show that the greywacke basement under the harbour is an undulating erosional surface which has been depressed to a depth of about 400 m in the northwestern part. ...

The seismic velocity structure of rocks in the direct vicinity of the transcurrent Wellington Fault, aligned along the northwestern side of the harbour, is not known in detail. The crust zone of the Wellington Fault is, however, likely to be about 500 to 1000 m wide under the harbour, and this zone has a subsurface slope about 30° to 50°. On land, near Thorndon and at Petone, the crust zone is about 200 to 400 m wide. The inferred widening of the fault zone under the harbour is probably a consequence of the curving of the Wellington Fault in this region.

Gravimetric profil - Model of structure.

- 599 - LOUIS M. - Bulletin Géodésique of the I.A.G., N° III, 1er Mars 1974.

- a) HALMOS E., I. KADAR & F. KARSAY - "Local adjustment by least squares filtering".
p.21-52.

Studying the rules of information flow from the input measuring data towards the output unknowns in geodetical networks, it can be said that this is a strongly damped process. This enables to develop information - collecting and information - dividing algorithms, the labour - intensity of which is independent from the size of network and depends alone from the accuracy needed. Two kinds of basic methods were used during our investigations ; they can be applied for geodetical networks of arbitrary size (arbitrary number of measuring results and of unknowns), due to their generality. They were :

A) Input oriented local smoothing processing, here the measuring results were in their turn and their information content divided among the unknowns.
B) Output oriented local smoothing processing, here the information demand of the unknowns is satisfied in their turn from the measuring results.

The mutual information content $I(X_i ; Y_j)$ between the measuring result X_i and unknown Y_j is practically zero out of a certain circle with radius r_0 in case of homogeneous geodetical networks, thus in both A) and B) cases the information is only extended to the next values (neighbours), i.e. to limited i and j sets.

A special method is suggested for the determination of the filter-coefficients which produces the physical model of information propagation by means of random walking on the graphs of the network.

The theoretical investigations are proved by experimental calculations on real and model networks.

- b) REECE J.S. & J.G. MARSCH - "Simultaneous observation solutions for NASA MOTS and SPEOPT station positions on the North American datum". p.53-72.

Simultaneous observations of the GEOS-I and II flashing lamps by the NASA MOTS and SPEOPT cameras on the North American Datum (NAD) have been analyzed using geometrical techniques to provide an adjustment of the station coordinates. Two separate adjustments have been obtained. An optical data - only solution has been computed in which the solution scale was provided by the Rosman - Mojave distance obtained from a dynamic station solution. In a second adjustment, scaling was provided by processing simultaneous laser ranging data from Greenbelt and Wallops Island in a combined optical - laser solution. Comparisons of these results with previous GSFC dynamical solutions indicate an rms agreement on the order of 4 meters or better in each coordinate. Comparison with a detailed gravimetric geoid of North America yields agreement of 3 meters or better for mainland U.S. stations and 7 and 3 meters, respectively, for Bermuda and Puerto Rico.

- c) GRABER M.A. - "The equivalence of reducing gravity along a perpendicular and along a plumb line".
p.73-80.

The set of plumb lines and the set of lines perpendicular to the geoid are shown to be geodesics of the local geometry. From the properties of geodesics, it is shown that the two sets are identical. Therefore, reduction of gravity along a perpendicular is equivalent to reduction along a plumb line.

- d) O'KEEFE J.A. - "The absolute value of the geopotential".
p.81-84.

It is suggested that it would be worthwhile to determine the absolute value of the geopotential on the geopotential surface which corresponds to mean sea level. This number would replace the Earth's semi - major axis as the parameter which fixes the Earth's size ; but slight variations in the parameter might be employed to study the dynamics of the sea.

Fixing this number involves knowing the geopotential for a point on the orbit of a satellite whose true gravitational potential is also known.

- e) BALMINO G. - "La représentation du potentiel terrestre par masses ponctuelles".
p.85-108.

Un modèle de représentation du potentiel terrestre par 126 masses ponctuelles de profondeurs situées entre 1000 et 1500 km a été construit à partir de la Standard Earth II du S.A.O. et utilisé avec succès pour la représentation du géoïde, des anomalies de gravité, ainsi qu'en calcul d'orbites par correction différentielle utilisant des observations réelles de satellites artificiels.

Les propriétés de décroissance rapide de ces fonctions sont mises en évidence, et leur utilisation envisagée à l'analyse scientifique de mesures altimétriques

600 - LOUIS M. - Bulletin Géodésique of the I.A.G., N° 112, 1er Juin 1974.

- a) Septième Symposium International sur les Marées Terrestres (Sopron, 10-15 Septembre 1973) - Compte-rendu par le Prof. LECOLAZET, p.137-143.
- b) PROVERBIO E. & V. QUESADA - "The secular variation of longitudes and plate tectonic motion".
p.187-212.

According to the plate tectonic theory of Le Pich n (1968) we summarized the absolute values of the angular rate of rotation of the Eurasia and America plates determined by astronomical latitude observations. The authors then tried to use the data of longitude observation so far available to emphasize the existence of similar crust movements. The analysis of longitude data has shown the minor homogeneity of these astronomical observations especially as far as the observations obtained by means of PZT are concerned. By using particularly accurate observational data (Torao & Okasahi, 1965, 1969) the data of longitude variations confirm the existence of movements in the Earth's crust, exactly equal to those deduced by the analysis of latitude observations and in agreement with the results of geophysical measurements.

600bis - LOUIS M. - Bulletin Géodésique of the I.A.G., N° 113, 1er Sept. 1974.

- a) LOUIS M. - Réunion du Comité Exécutif de l'Association Internationale de Géodésie - Paris (25-27 Février 1974).
p.231-240.
- b) ANGUS-LEPPAN P.V. - Symposium on the Earth's gravitational field and secular variations in position - Sydney (26-30 November 1973).
p.241-246.
- c) BLAHA G. - "Influence de l'incertitude des paramètres tenus fixes dans une compensation sur la propagation des variances - covariances"
p.307-316.

Bien qu'applicable à une gamme de problèmes de compensation par la méthode des moindres carrés, cet article (condensation d'un rapport du même titre et par le même auteur) a été inspiré par la compensation des réseaux géodésiques en deux dimensions. Celle-ci se fait selon les ordres des réseaux en gardant, pour des raisons pratiques bien évidentes, les coordonnées des points de l'ordre supérieur en général inchangées lors de la résolution du système des autres coordonnées. Cependant, si on négligeait la contribution de l'incertitude des paramètres "fixes" lors de la propagation des variances - covariances, la qualité des résultats indiquée par la compensation serait trop optimiste, sans aucune signification réelle. Le but principal de la présente étude est de corriger les matrices de variances - covariances de cette influence en considérant la méthode générale des moindres carrés avec des paramètres pondérés, inconnus, ou la combinaison des deux. Cette approche représente une généralisation du traitement exposé dans l'article cité en référence,^{*} dans le sens qu'il permet l'inclusion dans le modèle mathématique de paramètres totalement inconnus.

^{*} PAPO H.B. - Bull. Géod. N° 107, p.89-96, 1er Mars 1973.

1 - LOUIS M. - Bulletin Géodésique of the I.A.G., N° 114, 1er Décembre 1974.

- a) EITSCHBERGER B. & E. GRAFAREN - "World geodetic datum WD 1 and WD 2 from satellite and terrestrial observations".
p.364-386.

By minimizing the global distance between the (quasi-) geoid and an ellipsoid of revolution, the best parameters of an ellipsoid and its location parameters are estimated. Input data are the absolute value of the geopotential at (quasi-) geoid level, a set of harmonic coefficients from satellite, terrestrial or combined observations, the mean rotational speed of the Earth, and approximate values of the semimajor axis and the eccentricity of the ellipsoid. The output ranges from 6378137,63 m and 6378141,62 m for the best semimajor axis and from 298.259758 and 298.259651 for the reciprocal value of the best ellipsoidal flattening within WD 1 and WD 2. The best translational parameters are 6.4 cm (Greenwich - direction), 0.8 cm (orthogonal to Greenwich-direction), and 1.9 cm (parallel to rotational axis of the Earth); the best rotational parameters are - 0.2" (around Greenwich-direction) and 1.1" (around orthogonal to Greenwich-direction). The dependence of the datum of the (quasi-) geoid geopotential is studied in detail.

- b) KLOSKO S.M. & W.B. KRABILL - "C-Band station coordinate determination for the geos-C altimeter calibration area".
p.387-408.

Dynamical orbital techniques were employed to estimate the center-of-mass station coordinates of six C-Band radars located in the designated primary GEOS-C radar altimeter calibration area. This work was performed in support of the planned GEOS-C mission (December, 1974 launch). The sites included Bermuda, Grand Turk, Antigua, Wallops Island (Virginia), and Merritt Island (Florida). Two sites were estimated independently at Wallops Island yielding better than 40cm relative height recovery, with better than 10 cm and 1 m (relative) recovery for ϕ and λ respectively.

The tracking data used in this analysis were taken during 1969 when the radars tracked the GEOS-II transponder. The data used were exclusively that from the estimated sites and included 18 orbital arcs which were less than two orbital revolutions in length, having successive tracks over the area. In all, over 120 passes of data were used. Range biases were estimated. Error analysis and comparisons with other investigators indicate that better than 2 m (1σ) relative recovery has been achieved at all sites.

The techniques employed here, given their independence of global tracking support, can be effectively employed to improve various geodetic datums by providing very long and accurate baselines. C-Band data taken on GEOS-C should be employed to improve such geodetic datums as the European - 1950 using similar techniques.

- c) CARRUTHERS R.M. & C.V. REEVES - "Botswana gravity reference net".
p.409-418.

Gravity reference stations for the National Gravity Survey of Botswana have been established at twenty-three sites throughout the country in a net linked to existing bases in South Africa, Kenya and Zambia with an internal accuracy of better than 0.5 gravity units (one gravity unit, gu , equals an acceleration of 10^{-6} m.s^{-2}). The field procedure and reduction of data are explained and a list is given of the gravity values.

- d) GRABER M.A. - "On a chain suspended in a non-uniform gravitational field".
p.419-424.

It is possible to simply describe the curve followed by a chain suspended in a non-uniform gravitational field. Parallel discussions are given using the two theories of gravitation, Newtonian and general relativistic.

602 - LOUIS M. - Bulletin Géodésique of the I.A.G., N° 115, 1er Mars 1975.

- a) FISCHER I. - "Does man sea level slope up or down toward north ?".
p.17-26.

Geodesists and oceanographers agree on the height differences in mean sea level in the east-west direction, but they disagree almost always on the north-south slope, each suspecting systematic errors in the leveling methods of the other. The apparently contradictory results are compatible, however, if the difference in the reference surfaces is fully taken into account.

- b) BARANOV W. - "La formule de Stokes est-elle correcte ?".

p.27-34.

- c) KOCH K.R. - "Processing of altimetry data".
p.35-40.

Two methods are discussed for the processing of altimetry data. For the first method it is assumed that the altimetry data, may be analyzed independent of the orbit computation for the satellite that carries the altimeter. Because of the high accuracy of the altimetry data, which can only be fully utilized if it is also introduced into the orbit computations, the second method deals with a simultaneous processing of altimetry data, orbit tracking, and gravity anomalies for the continents. To represent the gravity field, the potential of a simple layer is chosen whose unknown density is assumed to be constant over surface elements into which the surface of the Earth is divided. Depending on the accuracy and the amount of the altimetry data, the surface elements for the density values are chosen smaller or larger, so that a very flexible representation of the Earth's gravity field is obtained. Because of the amount and the resolution of the altimetry data a large number of density values have to be determined in a least squares adjustment. To facilitate the computations, buffer zones are introduced so that the large system of normal equations can be broken up into small independent subsystems.

- d) GROTH E. - "Microgravimetry - High precision observations of small gravity differences".

p.41-56.

The application of a Sartorius 4104 microbalance after Gast in vertical gradiometry was tested. A small mass of about 20 grams is suspended on thin fibers of different lengths $\Delta l \leq 80$ cm. From the weight difference of the small mass obtained at different levels along the plumb line the corresponding differences of gravity along the plumb line are inferred. The microbalance is mounted on a steel rack; measurements at constant low pressure (moderate vacuum) show the applicability of the balance as gravity difference sensor for field work.

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When environmental effects are further reduced (i.e., temperature is kept constant within $\pm 0.1^\circ\text{C}$, pressure is controlled within 0.1 Torr etc...) the resolution of the balance can be fully exploited so a relative accuracy of $\pm 10^{-9}$ should be feasible and for laboratory experiments should be of the order of a few parts in $\pm 10^{-10}$.

Vertical gravity gradients as observed on an improved moving platform with a LaCoste model G gravimeter are discussed. New possibilities of microgravimetry are pointed out.

High precision observations and establishment of a system in an area of tectonic interest for detecting secular gravity changes are described.

- e) RAPP R.H. - "Effet of certain anomaly correction terms on potential coefficient determinations of the Earth's gravitational field".
p.57-64.

For proper computation of the Stokes' constants, or the evaluation of potential coefficients from terrestrial gravity data, surface free-air anomalies should be corrected to sea level. Such a correction is composed of two parts, the first, the Molodensky correction, G_1 , and a second, a term depending on the degree (n) and the expansion of $(h \Delta g)$. This paper examines these terms numerically, computing for 1654 5° equal area blocks values of G_1 and the total correction based on spherical harmonic expansions to degree 20. The largest correction found was 0.37 mGals. Corrections to potential coefficients caused by the anomaly correction were computed and compared to the original coefficients. The ratio between the coefficient corrections and the full coefficients generally increased by degree having a maximum ratio of 0.21 percent at degree 14 indicating that at the present time the corrections considered are negligible up to at least degree 20.

- f) MATHER R.S. - "On the evaluation of stationary sea surface topography using geodetic techniques".
p.65-82.

One of the principal problems in separating the non-tidal Newtonian gravitational effects from other forces acting on the ocean surface with a resolution approaching the 10 cm level arises as a consequence of all measurements of a geodetic nature being taken either at or to the ocean surface. The latter could be displaced by as much as ± 2 m from the equipotential surface of the Earth's gravity field corresponding to the mean level of the oceans at the epoch of observation - i.e., the geoid. A secondary problem of no less importance is the likelihood of all datums for geodetic levelling in different parts of the world not coinciding with the geoid as defined above.

It is likely that conditions will be favourable for the resolution of this problem in the next decade as part of the activities of NASA's Earth and Ocean Physics Applications Program (EOPAP). It is planned to launch a series of spacecraft fitted with altimeters for ranging to the ocean surface as part of this program.

Possible techniques for overcoming the problems mentioned above are outlined within the framework of a solution of the geodetic boundary value problem to ± 5 cm in the height anomaly. The latter is referred to a "higher" reference surface obtained by incorporating the gravity field model used in the orbital analysis with that afforded by the conventional equipotential ellipsoidal model (Mather 1974 b).

The input data for the solution outlined are ocean surface heights as estimated from satellite altimetry and gravity anomalies on land and continental shelf areas. The solution calls for a quadratures evaluation in the first instance.

The probability of success will be enhanced if care were paid to the elimination of sources of systematic error of long wavelength in both types of data as detailed in (Mather 1973 a, Mather 1974 b) prior to its collection and assembly for quadratures evaluations.

- g) CORON S. - Compte-rendu de la Commission Gravimétrique Internationale, Paris, 2 - 6 Septembre 1974.
p.83-97.

- 603 - KHAN M.A., G.P. WOOLLARD & K.I. DAUGHERTY - "Statistical analysis of the relation of marine gravity anomalies to bathymetry".
Hawaii Inst. Geophys. Univ. Hawaii, HIG-71-20, Final Rep. 1970-71, 141 p, 1971.

The present report deals with items 4 and 5 as related to oceanic areas :

- 4) Geophysical analysis of gravity in relation to other geophysical data.
- 5) Possible improvement in existing gravity prediction schemes or design of new ones.

The mode of study, a statistical regression analysis, is somewhat different from that employed in earlier studies of gravity relations in oceanic areas submitted by the contractor to ACIC (Woppard, 1962 and 1970). The results bear out earlier conclusions that the prediction of gravity in oceanic areas presents a complex problem, but one which nevertheless does not appear to be any more complex than that originally faced in the prediction of gravity in continental areas.

- 604 - WOOLLARD G.P. & M.A. KHAN - "Prediction of gravity in Ocean areas".
Hawaii Inst. Geophys., Univ. Hawaii, HIG-72-11, Final Report 1971-72, 119 p, 1972.

- Densities used in Bouguer reduction;
 - Two-step Bouguer reduction and choice of associated apparent densities :
 - . Continental areas
 - . Oceanic areas
 - Prediction of gravity
 - . Outline of the gravity Prediction scheme
 - . Data used
 - . Gravity prediction scheme
 - Short wavelength of local topographic term
 - The intermediate wavelength Crustal term
 - The long-wavelength gravity term.
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