

SUBPIXEL campaign: Heterogeneity effects of land surface temperature from coarse (1000 m) to finer (2 m) spatial resolutions

Vicente Garcia Santos

Joan Cuxart, Maria Antonia Jiménez, Gemma Simó, Daniel Martínez Villagrasa, Rodrigo Picos, Vicente Caselles

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<u>OBJECTIVES</u>



Objectives are to assess:

- i) The Land Surface Temperature (LST) variability in a heterogeneous terrain (UIB Campus) at different spatial resolutions (from kilometric to meter scales).
- ii) The impact of such possible LST heterogeneities on the Surface Energy Balance (SEB) budget (i.e., on the Imbalance or non-closure of SEB equation).

MODIS 1 km², twice daily 10:49; 21:53 UTC



ASTER 90x90 m², 16 days 10:49; 21:53 UTC

Landsat 7-ETM+: 30x30 m², 16 days (7-9 days over Mallorca)



BLEAS

10:27-10:33 UTC



a) path/row 196/33 scene on June 28th of 2016

b) path/row 197/32, July 21st of 2016



Drone-TIR camera: 2 x 2 m²

IOP number	Date						UTC Hour					
1	19-jun-16	0400	0600	0800		1200	1400	1600	1800	2000		
2	28-jun-16				1000	1200	1400	1600	1800	2000	2200	0230
3	05-jul-16	0400	0600	0800	1000	1200	1400	1600	1800	2000		
4	14-jul-16	0400	0600	0800	1000	1200	1400	1600	1800	2000		
5	21-jul-16	0400	0600	0800	1000	1200	15	00	1800	2000	2200	

BLO

LST Local validation



LST variability along the day with Drone-TIR data (IOP3 05/07/2016)





LST variability with different TIR sensors: IOP 3 (05/07/2016)





LST variability with different TIR sensors: IOP 5 (21/07/2016)



$R_{n} + H_{+} + G_{-} + G_{-} + I_{m} = 0$

Imb = S + B + TT + A + Ot













L7_ETM	19/06/2016	28/06/2016	05/07/2016	21/07/2016
Imb (ECUIB)	73	109	164	52
Adv_Pole	24	3	-16	-0,03
30	-153	-0,003	-113	80
60	-142	51	-134	85
90	-52	30	-69	42
120	-19	69	-41	29
150	0,3	79	-21	17
180	9	192	-17	15

ASTER	19/06/2016	05/07/2016	21/07/2016_M	21/07/2016_N
Imb (ECUIB)	119	165	97	-12
Adv_Pole	22	-29	8	-22
90	-162	8	23	1
180	-92	-10	-2	0

Conclusions

- i) LST variability is evident along the day and significant at the center hours of the day. This variability can be also observed with LST products from satellite sensors with spatial resolution around 100 m.
- ii) The LST variability could explain big part of the imbalance detected in a SEB station, by means of the Advection term and at scales of 100-200 m.
- iii) However, further studies are required to reach satisfactory conclusions.