

## **PLANES in BLLAST**

Planes capabilities (range, endurance, flight level, instruments)

Sky Arrow

Aztec

Flight hours potential (French funding, EUFAR)

Sky Arrow

Aztec

How many days and flights?

BLLAST vs. EUFAR

Flight plans (to be discussed with the operations of other instruments)

Constraints (to cope with hilly/mountainous landscape, flight restrictions)

Single aircraft

Two aircraft

1 or 2 aircraft AND UAVs and/or tethered balloons

Flight patterns (straight and level runs, profiling, ...)

The **atmospheric payload** consists of a *Mobile Flux Platform*, based on the NOAA [BAT-Probe](#) for turbulence measurements.

Range: **Length:** 7.00 m; **Height:** 2.00 m;  
**Wingspan:** 9.00 m;

**Max range:** 500 km (at min scientific payload and max fuel)  
**Usual range during measurement flight:** 300 km

**Min speed:** 25 m/s  
**Max speed:** 55 m/s  
**Usual speed during measurements:** 40 m/s  
**Usual speed during transit flights:** 45 m/s  
**Ascent rate:** 4 m/s

Altitude:

**Min altitude:**

Above sea: 100 ft

Above ground: 100 ft

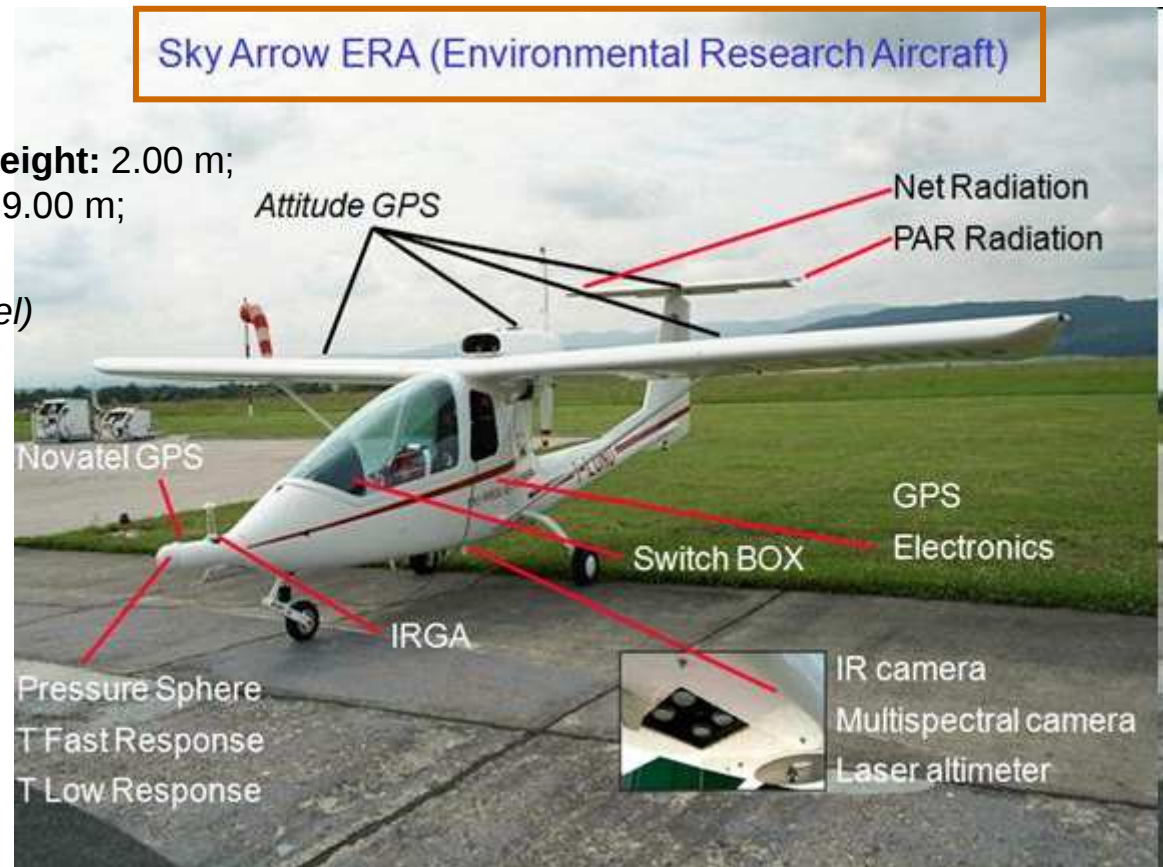
**Max ceiling:** 12000 ft

**Usual ceiling during measurements:** 9000 ft

**Endurance at max scientific payload:** 4 h

Main retrieved parameters after post-processing:

- Pressure, temperature, moisture, radiation and wind
- TKE and fluxes of momentum, sensible heat, latent heat and CO<sub>2</sub>



## Piper Aztec from SAFIRE

### GENERAL DESCRIPTION

**Constructor** : Piper Aircraft Corp.

**Type**: PA23-250

**length**: 9.2 m, **wingspan** 11.3m

**Standard crew**: 1 pilot, 1 flight engineer, possibility of 1 scientist

Max altitude : 4000m

Endurance : 5 hours (decreasing to 2.5 hours with two passengers)

Practical cruise speed : 250km/h (70 m /s)



### Instrumentation

**1.3 m long nose boom** (attack and sideslip angles, dynamic and static pressure)

Temperature (Rosemount 102E2AL)

10 Hz H<sub>2</sub>O and CO<sub>2</sub> (Licor 7500A, to be installed)

GPS+INS Ixsea (to be installed)

Main retrieved parameters after post-processing:

- Pressure, temperature, moisture and wind
- Variances of wind (TKE) and scalars (T, q and CO<sub>2</sub>)
- Fluxes of momentum, sensible heat, latent heat and CO<sub>2</sub>: not sure, accuracy needs to be checked

## Flight hours potential

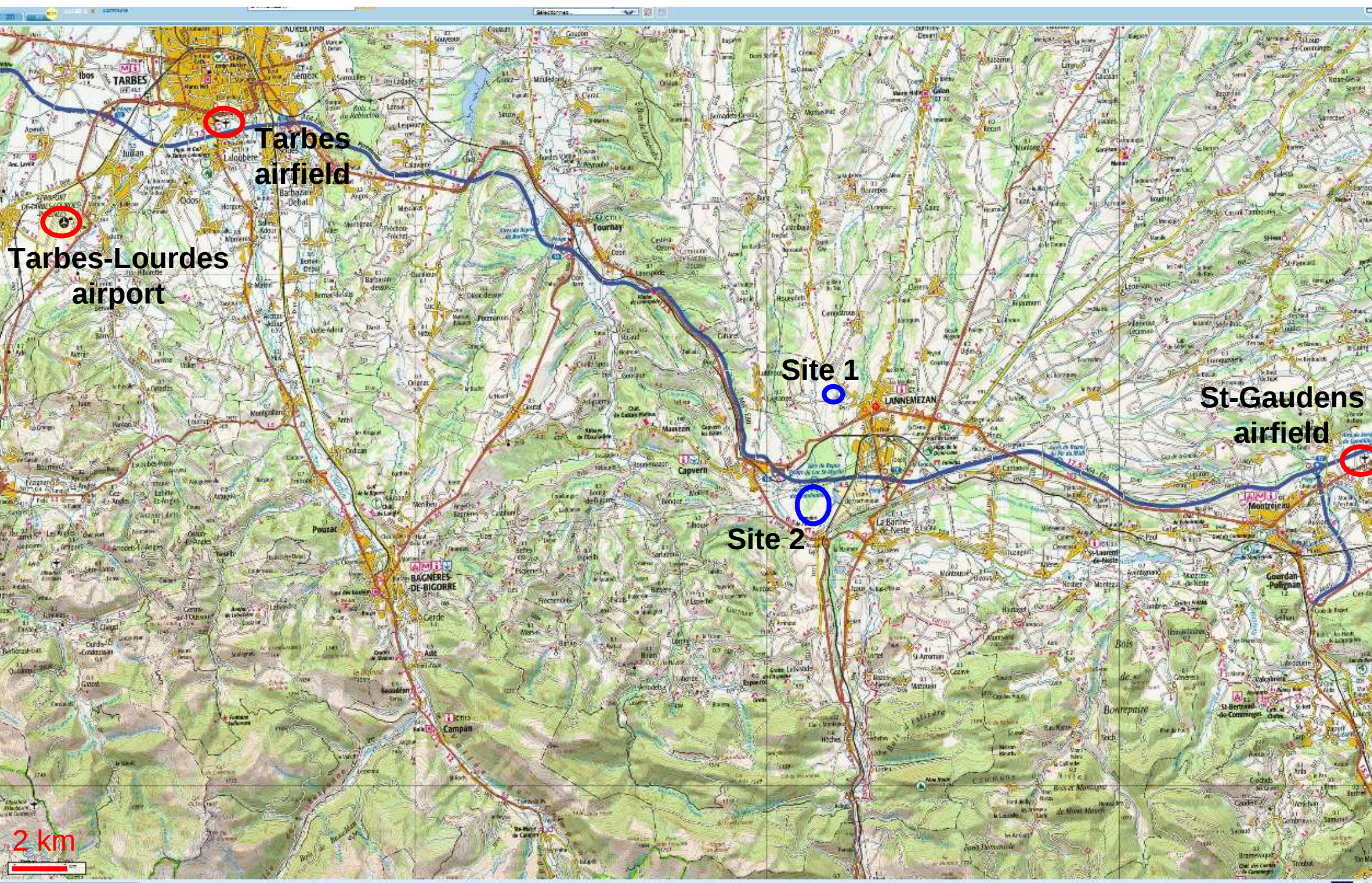
- Sky Arrow
  - ~ 25 flight hours granted (French agencies)
  - ~ 15 flight hours expected (EUFAR TA – BLLATE/J. Vila)
- Piper Aztec
  - ~ 25 flight hours granted (French agencies)
  - ~ 15 flight hours expected (EUFAR TA – BLLATE/D. Pino)

## How many days/flights?

- Piper Aztec: 1 flight  $\equiv$  2.5 hours, ~ 15 flights
  - if 10 IOP days are launched, then half of them could benefit from 2 flights
- Sky Arrow: 1 flight  $\equiv$  2-4 hours, ~ 10-15 flights
  - if 10 IOP days are launched, some of them could benefit from 2 flights

## If the EUFAR applications are successful:

- Shall we identify BLLAST flights and EUFAR flights?



**Tarbes  
airfield**

**Tarbes-Lourdes  
airport**

**Site 1**

**Site 2**

**St-Gaudens  
airfield**

**2 km**

Vielha

Arreau

N43°

Bagnères-de-Bigorre

Argelès-Gazost

Lannemezan

Méridien d'origine Lourdes

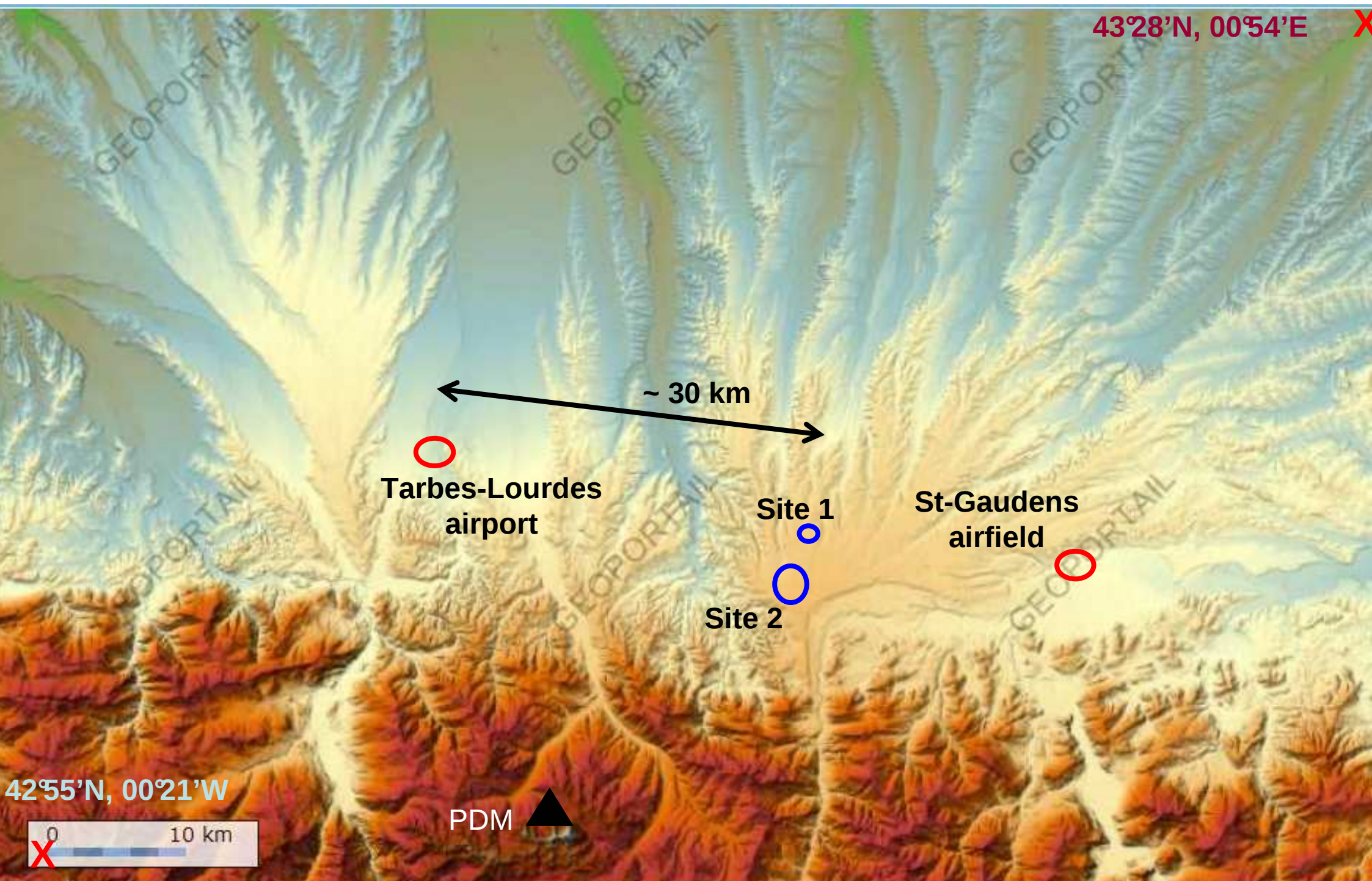
Tarbes

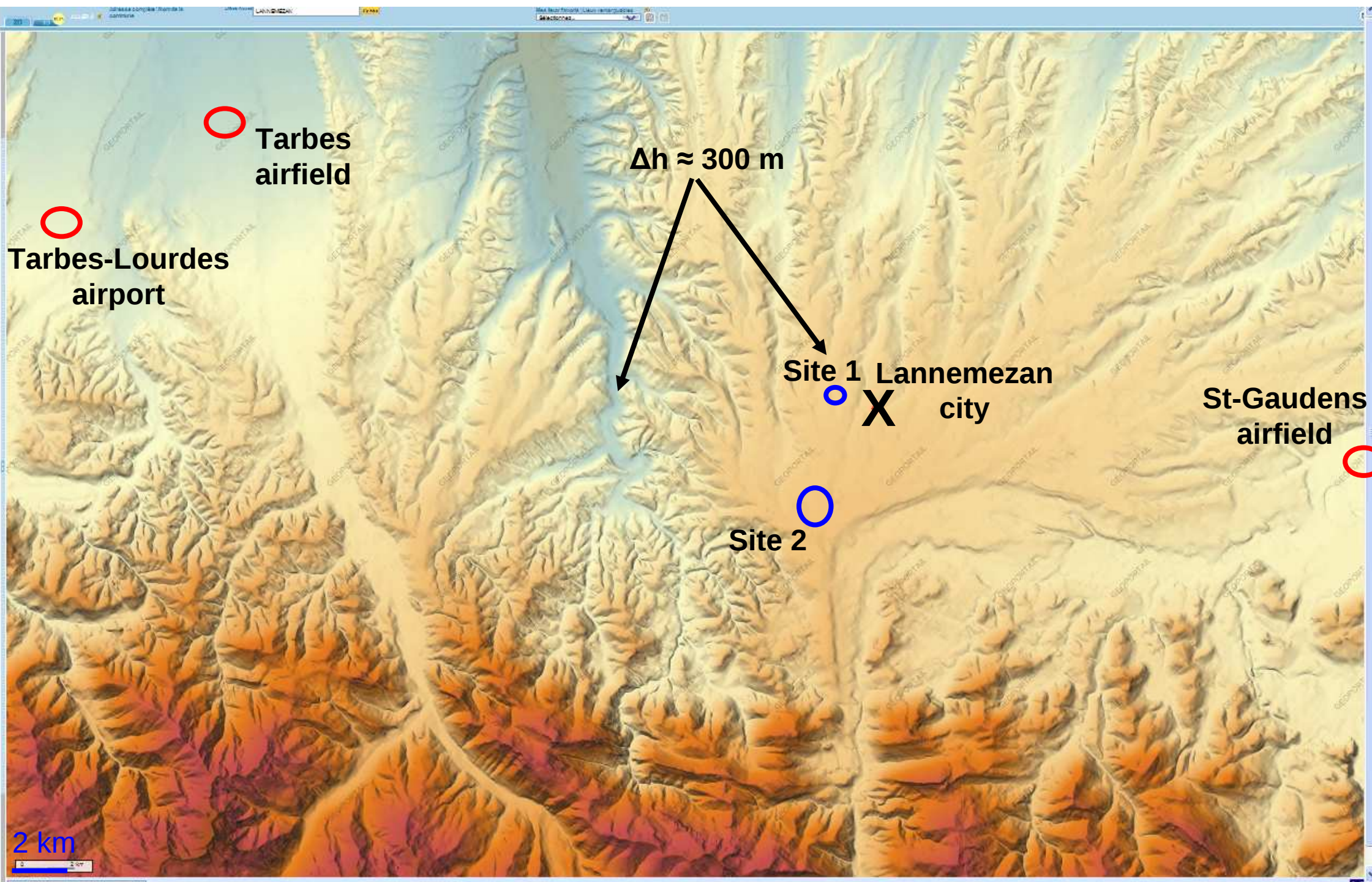
10.1 km

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43°28'N, 00°54'E

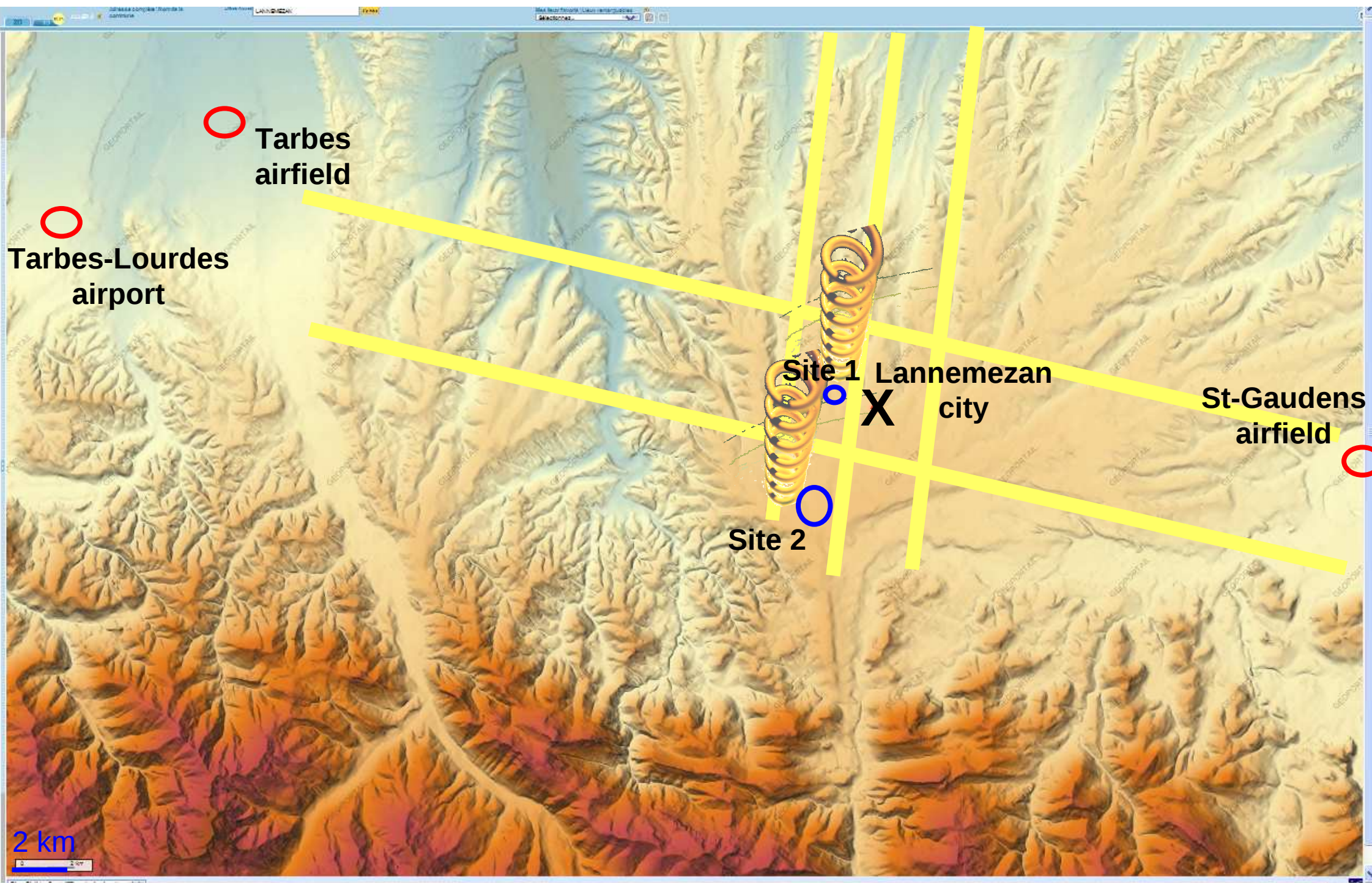




## Usual flight figures:

- straight and level stacked runs
  - branch length  $> 10$  km for flux calculation (20 km or more better)
  - well designed for flux profiles retrieval
- continuous profiling (slant ascent/descent,  $\sim 500$  ft/min)
  - not valid for flux estimates, mean profiles + variances and TKE (to be checked) ?
- Horizontal gridding
  - well adapted for horizontal variability
  - time consuming
- Stacked crosses
  - combining horizontal gradients and flux profiles
- Lagrangian exploration
- etc.





Flight plans : different possible deployments of platforms:

- Single aircraft
- Two aircraft
- 1 or 2 aircraft AND UAVs and/or tethered balloons

