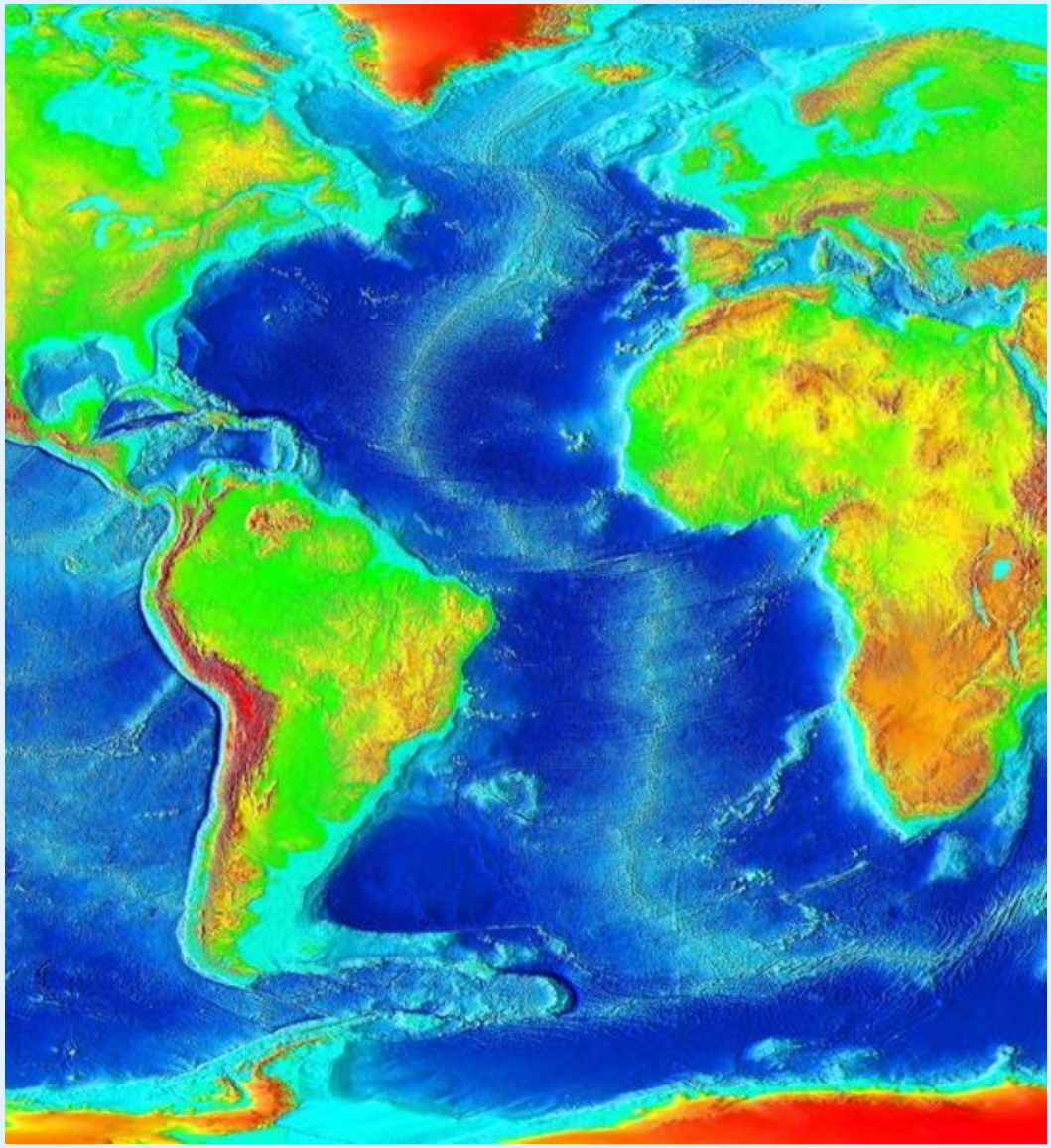
AN ATLANTIC NETWORK OF GEODYNAMICAL AND SPACE STATIONS – PROJECT RAEGE



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MINISTERIO DE FOMENTO
INSTITUTO GEOGRÁFICO NACIONAL

RAEGE workshop – Madrid, January 2009

IGN España

The RAEGE project

Establishment of an Spanish-Portuguese **Network of Geodynamical and Space Stations** *(RAEGE)* by the installation and operation of **four fundamental geodetic stations** provided with radio telescopes fulfilling the VLBI 2010 project specifications: Yebes (1), Canary Islands (1) and Açores Islands (2).

AN ATLANTIC NETWORK OF GEODYNAMICAL AND SPACE STATIONS – PROJECT RAEGE

Baselines:

- Yebes – Gran Canaria : 1800 km
- Yebes – Santa María : 2000 km
- Yebes – Flores : 2400 km
- Gran Canaria – Flores : 2000 km
- Santa María – Flores : 540 km

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Azores Islands, Portugal

AN ATLANTIC NETWORK OF GEODYNAMICAL AND SPACE STATIONS – PROJECT RAEGE

Canary Islands, Spain

Initial equipment to be installed at each RAEGE station

- Geodetic VLBI 2010 radio telescope:
  - Diameter ≥ 13 m, freq ≥ 45 GHz
- Superconducting gravimeter.
- Permanent GNSS station.
- Satellite Laser Ranging (Yebes).

VLBI2010 radiotelescope

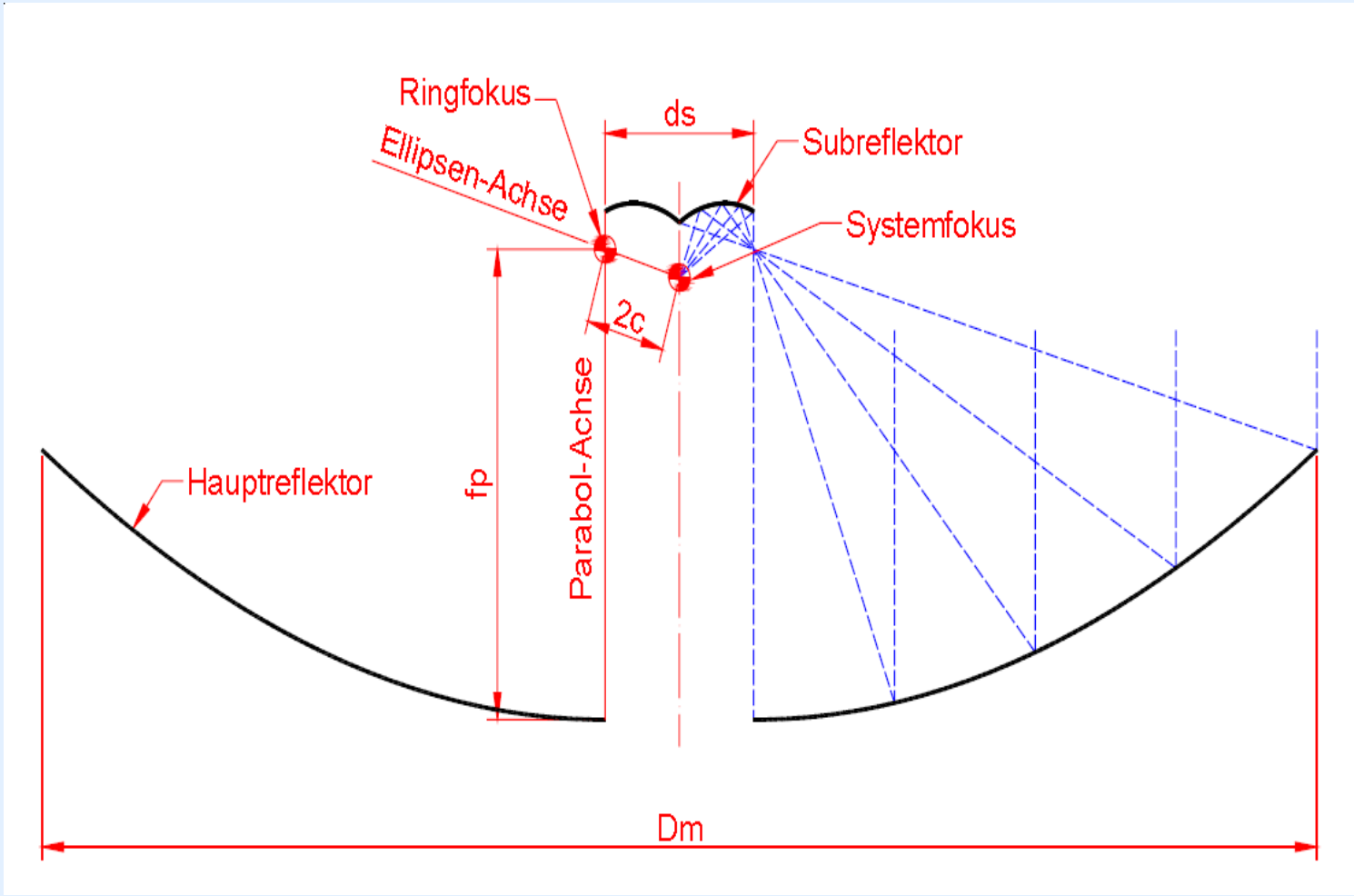
Goals:

- 1mm position + 0. 1mm/yr velocity accuracy
- Continuous observation of Earth parameters

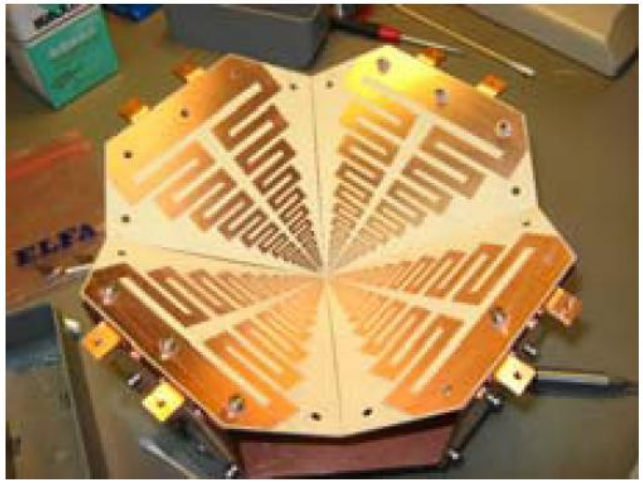
TTW:

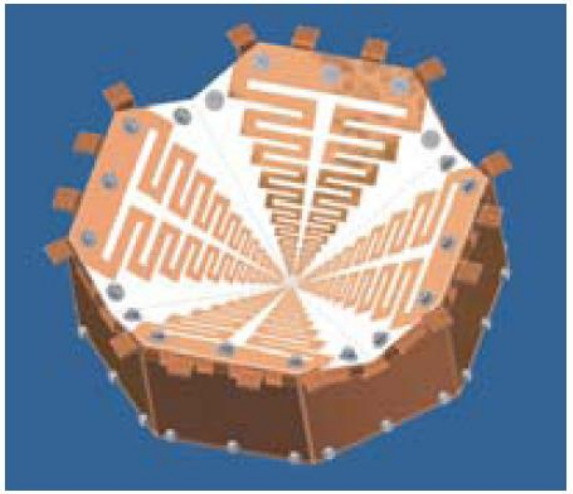
- 2 x 13.2 m RT, ring focus
- wide band feeds
- 12º/sec + 6º/sec moves

TTW radiotelescope optics: ring focus



VLBI2010 radio feed





ELEVEN feed:

- Developed at Chalmers University (Sweden) by Per-Simon Kildal.
- To operate in 2-14 GHz band.

Considerations of RAEGE:

- RAEGE project, as conceived, represents a scientific and technical contribution of first magnitude to the global IVS VLBI2010 project.
- From a technical point of view, RAEGE incorporates the most modern instrumentation of the IVS VLBI2010 radio telescopes, as well as complementary equipment (superconducting gravimeter, GNSS, etc.).
- The spatial distribution of the stations to be built (Yebes, Açores, Canary Islands) is of great value for the geodynamical studies to be performed, both for its geographical and its tectonic distribution (European, African, and American plates).

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Present status and 2010 work programs

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RAEGE station in Yebes (Guadalajara, Spain)

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Gravimeter building and equipment at Yebes:

- Seven pillars for instrument comparison
- Two gravimeters (A10 & FG5)
- Superconducting gravimeter (April 2010)

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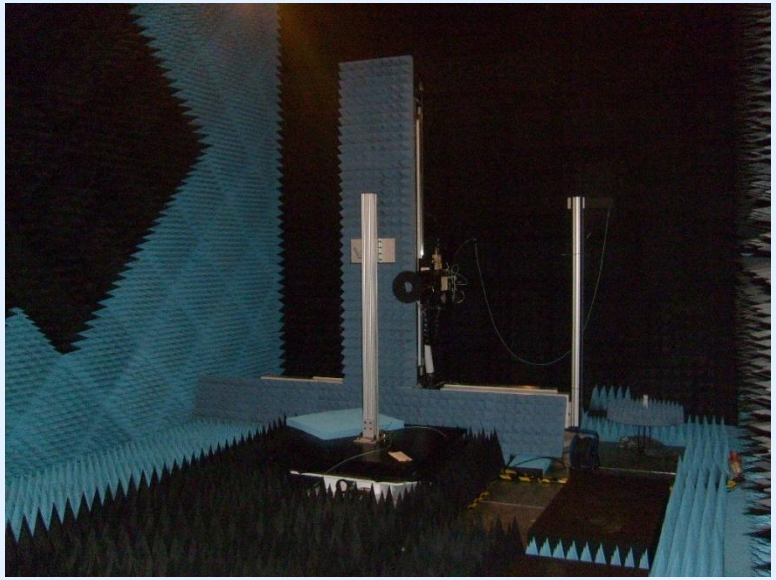
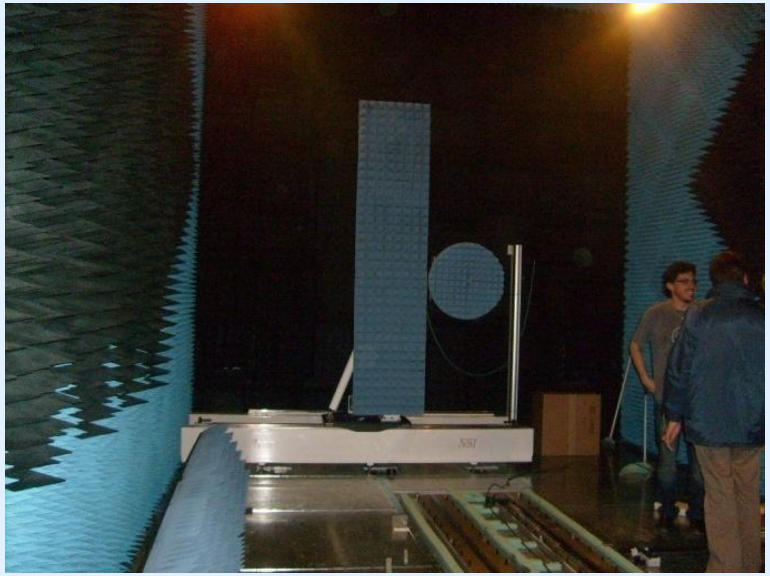
Laboratories and Anechoic Chamber





RAEGE station in Canary Islands (Spain)

To be equipped with:

- one radiotelescope
- one GNSS receiver
- one gravimeter

Possible locations:
- Maspalomas
- ….

RAEGE stations in Azores

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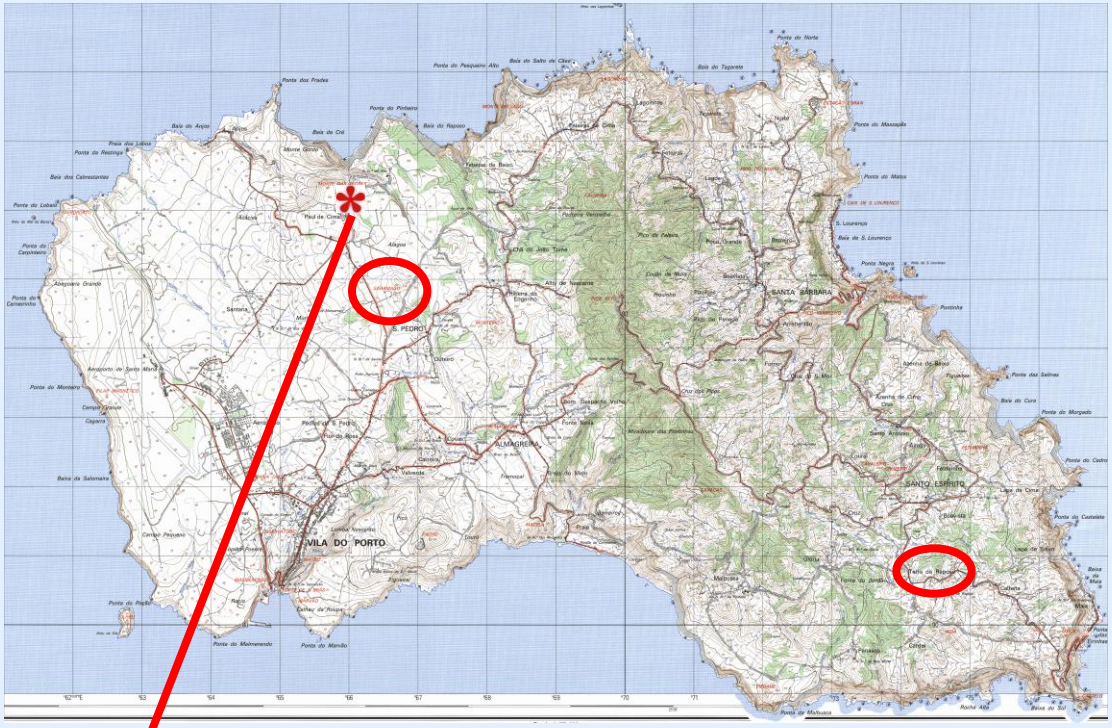
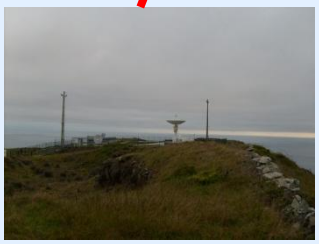
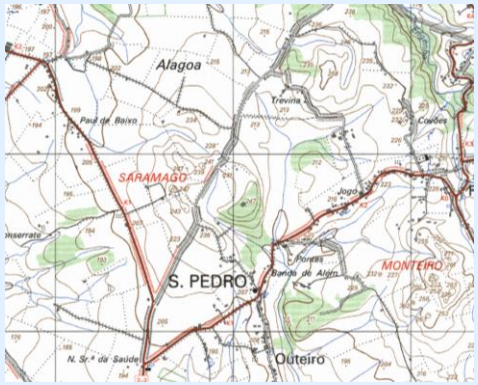
Santa Maria

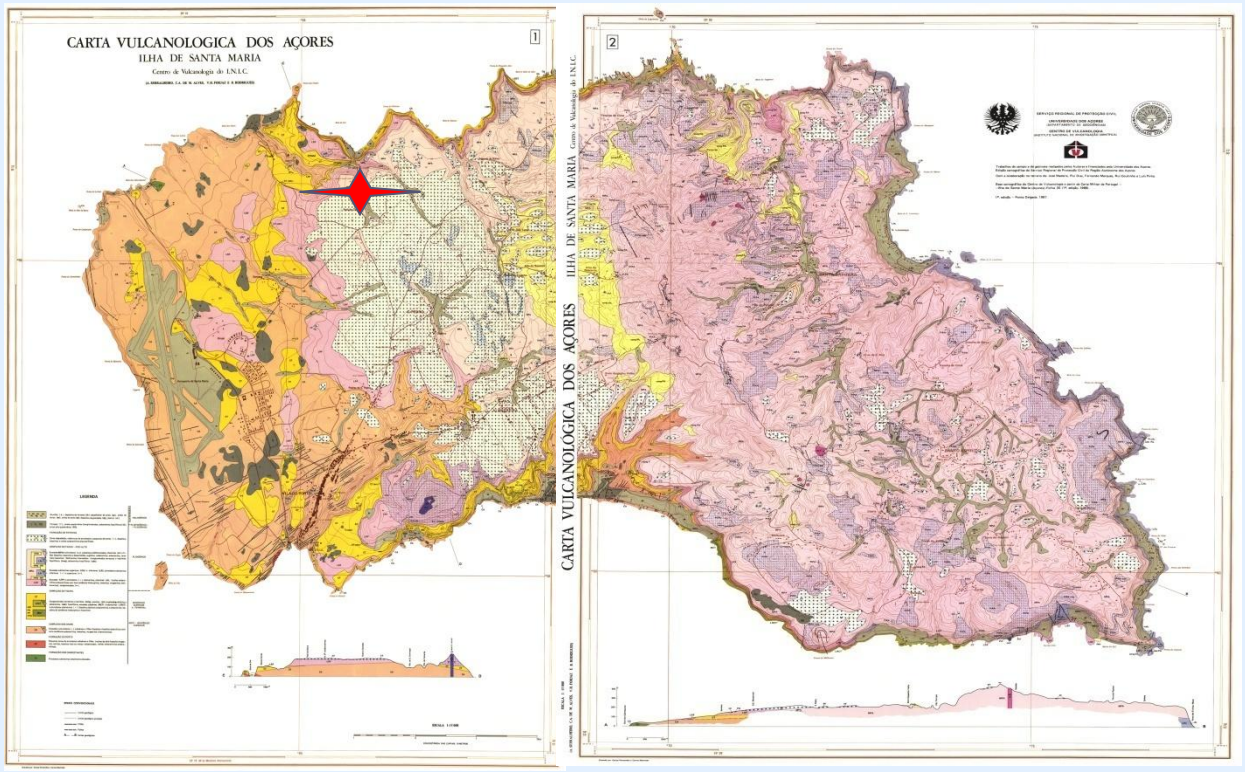




Santa Maria: Saramago



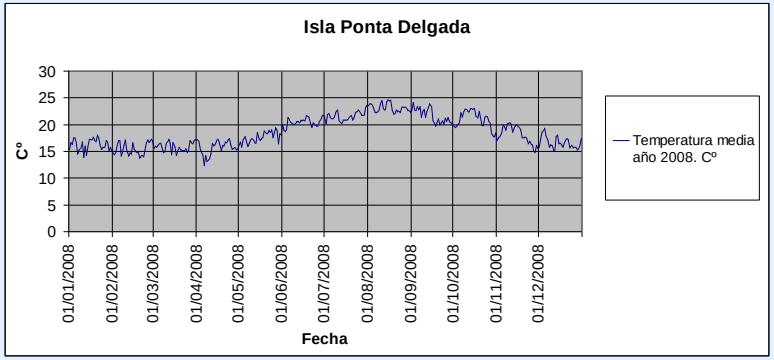
Geological study of Santa Maria



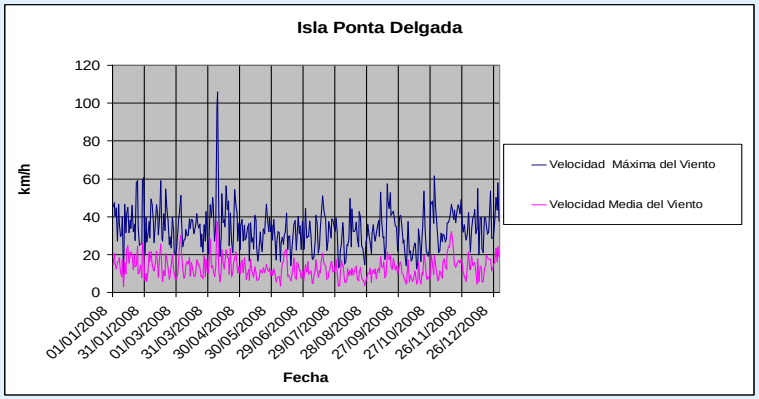
Aluvión
Conglomerado
Basaltos

Meteorology near Santa Maria

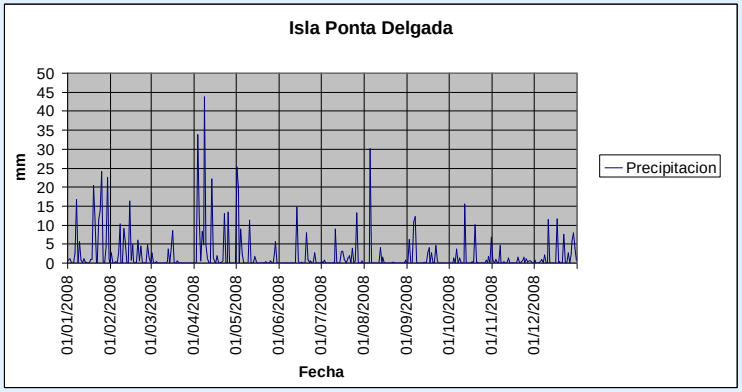
Temperature



Wind



Rain



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Flores

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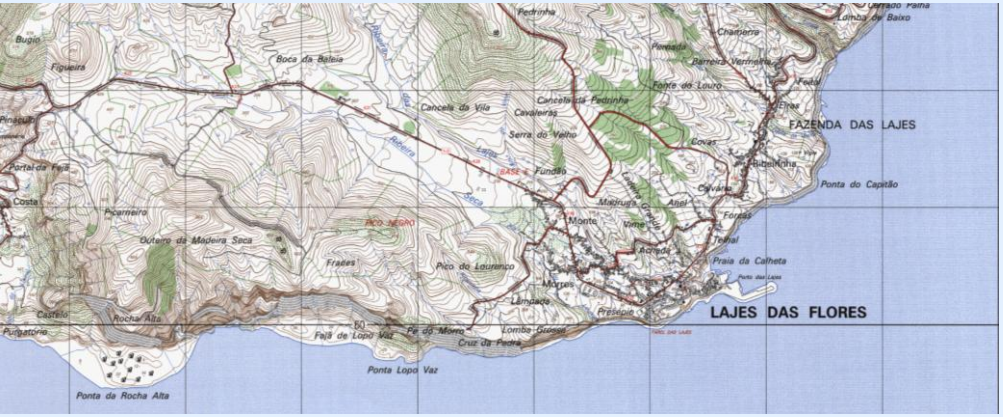
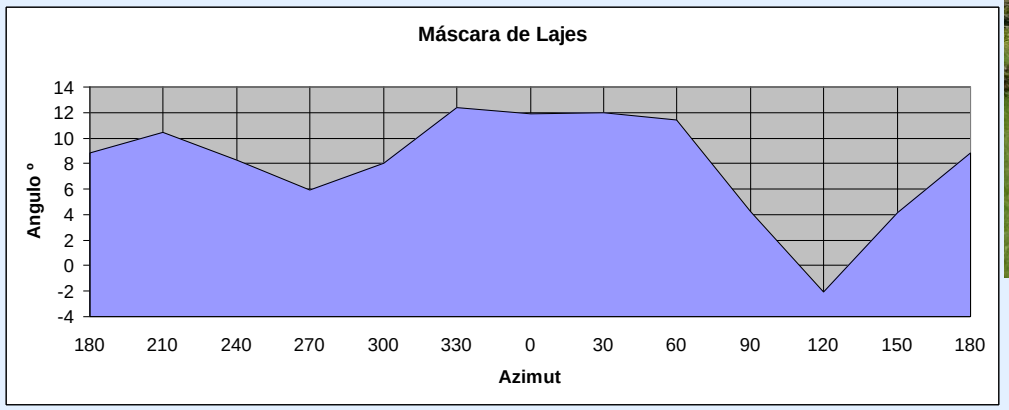
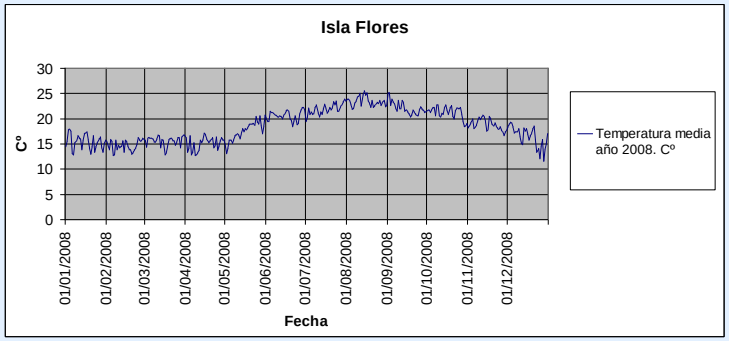
Flores: Lajes



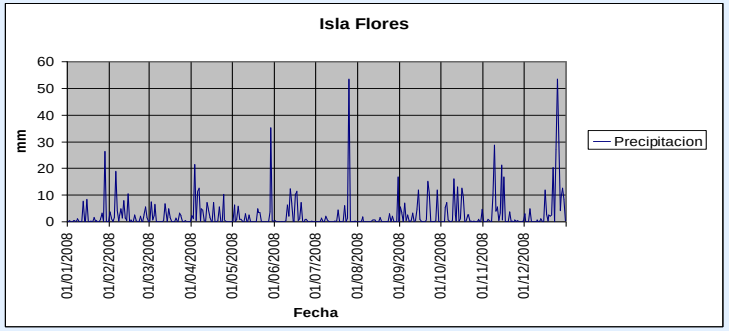


Meteorology at Flores

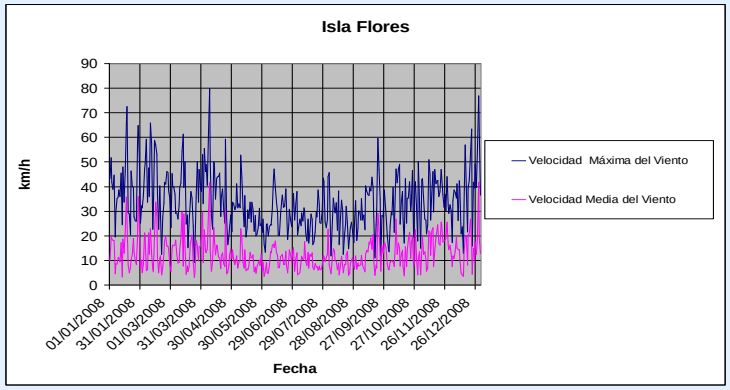
Temperature



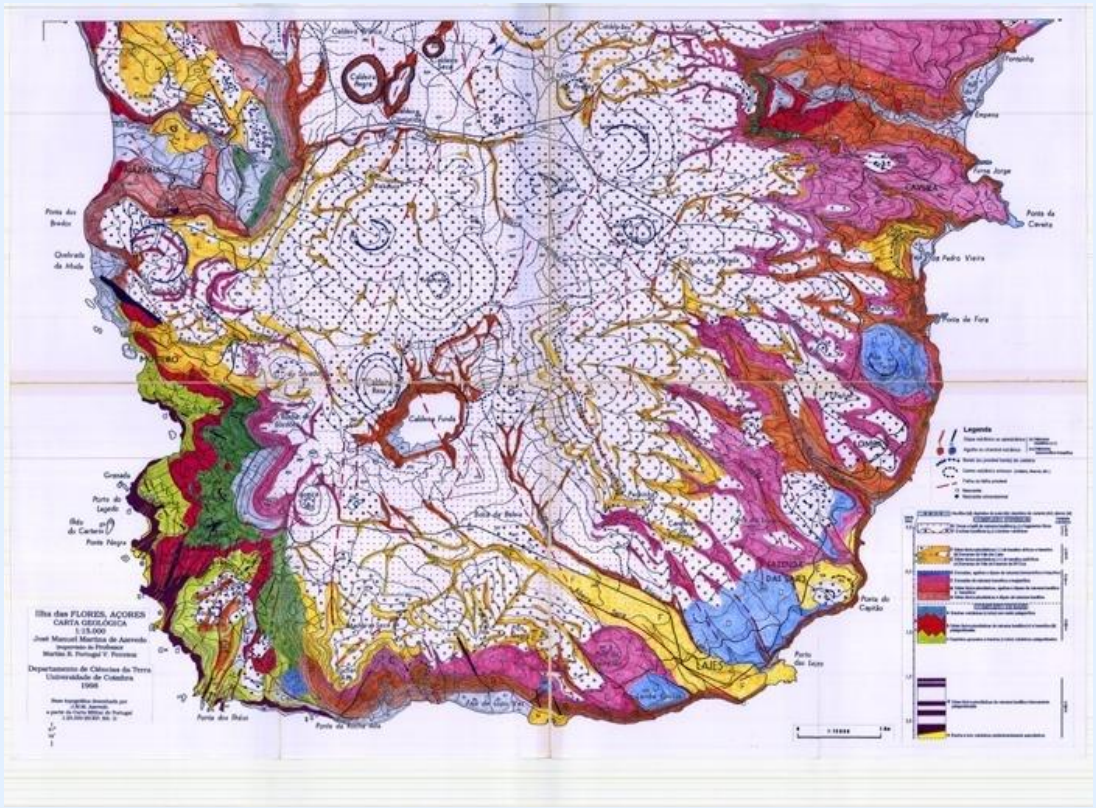
Rain

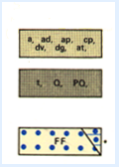


Wind



Geological study of Flores





Aluvión
Conglomerado
Basaltos

Yebes work program in 2010

- Geological study for the antenna and SLR placements.
- Installation of the superconducting gravimeter.
- Design (and starting of construction?) of a new control room, including the time/frequency building.

Gran Canaria work program in 2010

- Selection of the station placement in the area of Maspalomas.

Azores work program in 2010

- Meteorological stations to be installed in potential RAEGE station placements for continuous monitoring.
- Geological studies in all those locations.
- Radio frequency interference (RFI) measurements with stand-alone equipment.
    - Range: 1 to 26.5 GHz
- Teodolite measurements in potential locations.

General project work program in 2010

- Started the call for tender process for the first three RAEGE antennas (those to be financed by IGN)
- Construction of antennas expected to start in June-July 2010

Thank You