Current French GRUAN discussion group

- **CNRS/INSU/IPSL:** M. Haeffelin, P. Keckhut, JC. Dupont
- **CNRS/U. Réunion:** J-L. Baray, F. Posny
- **Météo-France:** F. Besson, J. Parent-du-chatelet, H. Rocquet
French Observatories for Atmospheric Research

implemented a strategy based on atmospheric observation services to monitor important climate variables since 1990’s (GHG, aerosols, water, …)

French atmospheric research observatories are coordinated in Environmental Alliance program
operates surface and upper air operational (24/7) networks including 15 radiosonde sites around the world (~24 sondes per day: > 8500 sondes/yr)
Mission of the SIRTA Observatory

Observatory for Surveillance and Exploration of the Atmosphere

- **Remote sensing facility since 1999 in Palaiseau**
- **Radiosonde profiles since 1929 in Trappes**

**Surveillance:** Operate observation services and provide access to long series of atmospheric observations

- AERONET, BSRN, CLOUDNET, EARLINET, MWRNET, EG-VAP

**Exploration:** Host field campaigns to explore atmospheric processes or test new instruments

- MEGAPOLI, PARISFOG, TRACAGE, REACTIVITE OH, RISC-UV

**Teaching:** Experimental field work and projects in atmospheric science curriculum

- UPMC, UVSQ, X, ENS, Paris-7, EIT

Profiles
- UTLS
- Troposphere
- Mixing layer
- Surface
- Ground

Temperature
- Humidity
- Wind
- Precipitation

Clouds, Aerosols, Water Vapor, Fog, Gas (CO, O3)

Radiation
- Dynamics
- Turbulence
## Continuous Observations at SIRTA

### Contribution to international networks

<table>
<thead>
<tr>
<th>LIDAR</th>
<th>CLOUD-AEROSOL</th>
<th>355nm (ALS), 532/1064 (LNA), 905nm (CL31)</th>
<th>ACTRIS</th>
<th>M. Haeffelin</th>
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<tbody>
<tr>
<td>RADAR</td>
<td>CLOUD</td>
<td>95 GHz DOPPLER BASTA</td>
<td>ACTRIS</td>
<td>J. Delanoë</td>
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<td>RADAR/ SODAR</td>
<td>WIND PROFILE</td>
<td>UHF (Degreanne) PA2-NT (Remtech)</td>
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<td>E. Dupont</td>
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<tr>
<td>RADIO-METER</td>
<td>WATER VAPOR</td>
<td>GPS + MW-RADIOMETER</td>
<td>EG-VAP MWRNET</td>
<td>JC. Dupont</td>
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<td></td>
<td>LIQUID WATER</td>
<td>MW-RADIOMETER</td>
<td>ACTRIS, MWRNET</td>
<td>JC. Dupont</td>
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<td>CLOUD COVER</td>
<td>TSI SKY IMAGER</td>
<td>-</td>
<td>JC. Dupont</td>
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<td>RAD FLUXES</td>
<td>BSRN FLUX STATION</td>
<td>BSRN</td>
<td>M. Haeffelin</td>
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<td>AEROSOLS</td>
<td>SUN PHOTOMETER</td>
<td>SPMS, OPC, AMS</td>
<td>ACTRIS</td>
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<td>GAS</td>
<td>NOx/NOy, COV</td>
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<td>SURF. WEATHER</td>
<td>GROUND + AIR STATION</td>
<td>ECTD</td>
<td>JC. Dupont</td>
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<td>HEAT FLUXES</td>
<td>SONIC ANEMOMETERS</td>
<td>ECTD</td>
<td>P. Drobinski</td>
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<td></td>
<td>SYNOP PROFILES</td>
<td>RADIOSONDE 00+12TU</td>
<td>MF-Trappes</td>
<td>F. Besson</td>
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</tbody>
</table>

*Priority 1

*Priority 2
Radiosonde observations at SIRTA

Carried out by Meteo-France (00 and 12UT) as part of WMO network

Measurements in Trappes since 1929 (initiated by Robert Bureau 1892-1965)

Raw data received twice daily at SIRTA and processed automatically

Intercomparisons with other measurement sources (GPS, HATPRO MWR)

Source www.meteo.fr

1932
Radiosonde quality monitoring at SIRTA

Annual cycle of IWV derived from Radiosounding (Trappes) and MicroWave radiometer (SIRTA)

**IWV: RS vs HATPRO MWR**

- **MODEM M10 radiosonde** since mid Sept 2011
  - Day-night bias ~ +1 mm

- **HATPRO MWR**

- **MODEM M2K2 radiosonde** until mid Sept 2011
  - Day-night bias ~ -6 mm

**MODEM M10 radiosonde** since mid Sept 2011
- Day-night bias ~ +1 mm
European Climate Testbed Dataset

Harmonization of decadal datasets for climate feedback studies and AR-5 and CORDEX climate model evaluations

(EU FP7 EUCLIPSE; EU COST EG-CLIMET)

ECTD processing
- Quality control
- Measurement uncertainty
- Spatial variability
- Temporal harmonization
- NetCDF and semorization

State variables: tas, tasmin, tasmax, psl, ps, uas, vas, sfcWind
Humidity variables: hurs, huss, Pr
Heat fluxes: hfls, hfss
Ground radiative fluxes: rlds, rlus, rsds, rsus, rsdscs, rsuscs, rldscs
TOA radiative fluxes: rsdt, rsut, rlut, rlutcs, rsutcs
Water vapor: prw, wv
Cloud water: CF, clwvi

Total and clear-sky infrared flux

Total
Clear sky
The OPAR Observatory (La Réunion)

Subtropical Site of the Southern Hemisphere (Indian Ocean, 21°S, 55°E)

Operate observation services and provide access to long series of atmospheric observations

NDACC, SHADOZ, GAW, AERONET, WINPROF

Measurements performed to explore atmospheric processes in the Tropical Troposphere and Stratosphere

STRAT-TROP DYNAMICS, CYCLONES, CLIMATOLOGIES & TRENDS, TRANSPORT OF BIOMASS BURNING EMISSIONS...

Many collaborations (French and international) for both technical and scientific projects.

LATMOS-Paris, LA-Toulouse, NASA, SOUTH AFRICA, IASB-Bruxelles...
## Continuous Observations at OPAR

<table>
<thead>
<tr>
<th>Instrument Type</th>
<th>Parameter</th>
<th>Wavelength</th>
<th>Network</th>
<th>Contact Person(s)</th>
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<tr>
<td>LIDAR (Y. COURCOUX)</td>
<td>O3</td>
<td>289-316nm and 308-355 nm</td>
<td>NDACC</td>
<td>J.L. BARAY, T. PORTAFAIX, G. ANCELLET, S. G. BEEKMANN</td>
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<tr>
<td></td>
<td>T</td>
<td>532/1064nm</td>
<td>NDACC</td>
<td>P. KECKHUT</td>
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<td>WV</td>
<td>532nm</td>
<td>NDACC</td>
<td>P. KECKHUT, J.L. BARAY</td>
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<tr>
<td>RADAR (Y. COURCOUX)</td>
<td>Wind, Turbulence, Precipitation</td>
<td>Degreane Doppler</td>
<td>CWINDE</td>
<td>B. CAMPISTRON</td>
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<tr>
<td>SPECTRO AND RADIO-METER (J.M. METZGER)</td>
<td>O3-NO2</td>
<td>SAOZ</td>
<td>NDACC</td>
<td>A. PAZMINO</td>
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<td>CO &amp; Trace Gases</td>
<td>FTIR</td>
<td>NDACC</td>
<td>M. DE MAZIERE</td>
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<td>UV</td>
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<td>AEROSOLS</td>
<td>PHOTOMETER</td>
<td>AERONET</td>
<td>P. GOLOUB</td>
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<td>IN SITU</td>
<td>PTU-WIND O3</td>
<td>RADIOSONDES</td>
<td>NDACC-SHADOZ</td>
<td>F. POSNY</td>
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<td>CO2-CH4-H2O</td>
<td>PICARRO</td>
<td>RAMCES</td>
<td>M. RAMONET</td>
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<td>CO</td>
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<td>PTUV prof</td>
<td>RS at 12UT</td>
<td>MétéoF</td>
<td>F. BESSON</td>
</tr>
</tbody>
</table>
Radiosonde observations at OPAR

(F. Posny, J.M. Metzger)

- Météo-France: 12UT M2K2 at Gillot Airport since July 2011 (soon M10)
- OPAR: Once a week at Gillot Airport since 1992 (more than 600 profiles)
- Temperature-Humidity-Wind M2K2 Modem Sonde + ENSCI-Z ECC ozone
- SHADOZ and NDACC station
- 4 Dual flight Modem M2K2 & Vaisala RS80 intercomparisons from 2008 to 2010: good agreement
- Participation in the Juelich Ozone Sonde Intercomparison Experiment (JOSIE), Smit et al., JGR 2007

Dual Flight Vaisala - Modem on 5 November 2008

Tropospheric Ozone annual cycle from Reunion radiosondes 1998-2008. From Clain et al., ACP 2009
New NDACC H2O Raman Lidar at OPAR Maïdo Observatory

- New H2O & N2 Raman channels added to OPAR and OHP NDACC Lidars
- New Lidar (1.2x6-m telescope) to be deployed at Maïdo (June 2012)

**Frost point hygro vs Lidar**
OPAR: The new Maïdo Observatory

Situation of the Maïdo facility:
- On the western part of Reunion Island
- 2200 meters above sea level
- Above the boundary layer, in the less cloudy part of the Island

Finance:
Infrastructure: 9 M€ including building 4.7M€, power lines & access road 2.3M€, studies, ecological aspect 2M€, instruments 2.8M€

Calendar:
- First documents written for the project: 1989
- First drawings: September 2007
- Beginning of the road works: May 2010, the 3rd
- Beginning of the building work: October 2010
- Commissioning of the facility: June 2012

Facility capacity:
- Surface of the project: 6600 sqm including access road access, container areas, parking, building, electrical substation, outside
- 600 sqm building including Lidar space 173 sqm, Labs (FTIR, MWR, ..) 129 sqm, Rooms, workshops, meeting room, Storage: 300 sqm
- Scientific area on the roof: 224 sqm
A French contribution to GRUAN would be based on collaborative efforts from CNRS-INSU and METEO-FRANCE who have a long history of working together for climate studies.
GRUAN-France implementation plan

2012:
- Write French GRUAN commitment plan
- Conduct characterization of error sources in MODEM M10 radiosonde PTUV profiles with full support from MODEM. Collaboration with H. Vömel (LC, DWD) and R. Philipona (MS)

2013:
- Implement independent ground-checks in Trappes and Gillot using standard humidity chamber
- Consider to perform Stratospheric frost-point hygro. + RS measurements once monthly in Gillot if funding can be secured
- Participate in GRUAN task teams

Some concerns:
- Personnel reduction at MF: Are GRUAN requirements compatible with automated RS? With daytime or weekdays only?
- Where to find funds for recurrent additional GRUAN costs in a period when all organizations are facing budget cuts
Thank you for your attention
Any questions?