French Observatories for Atmospheric Research potential candidates for GRUAN contribution

SIRTA

www.sirta.fr

Institut Pierre-Simon Laplace
Atmospheric Research Observatory

National Experimental Facility

OPAR
OSU-RÉUNION
LACy
LATMOS

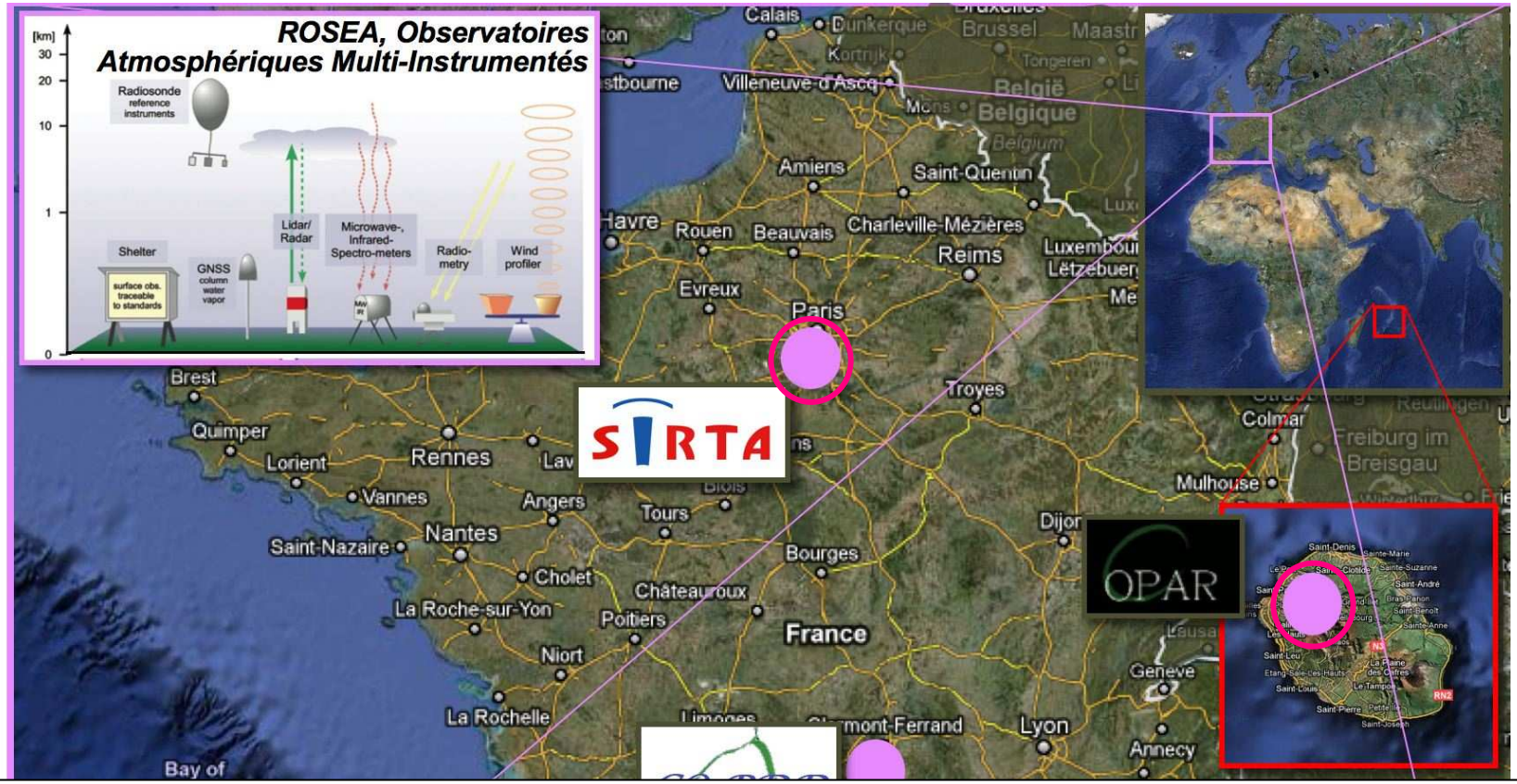
http://opar.univ-reunion.fr

Observatoire de Physique de l'Atmosphère de la Réunion

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

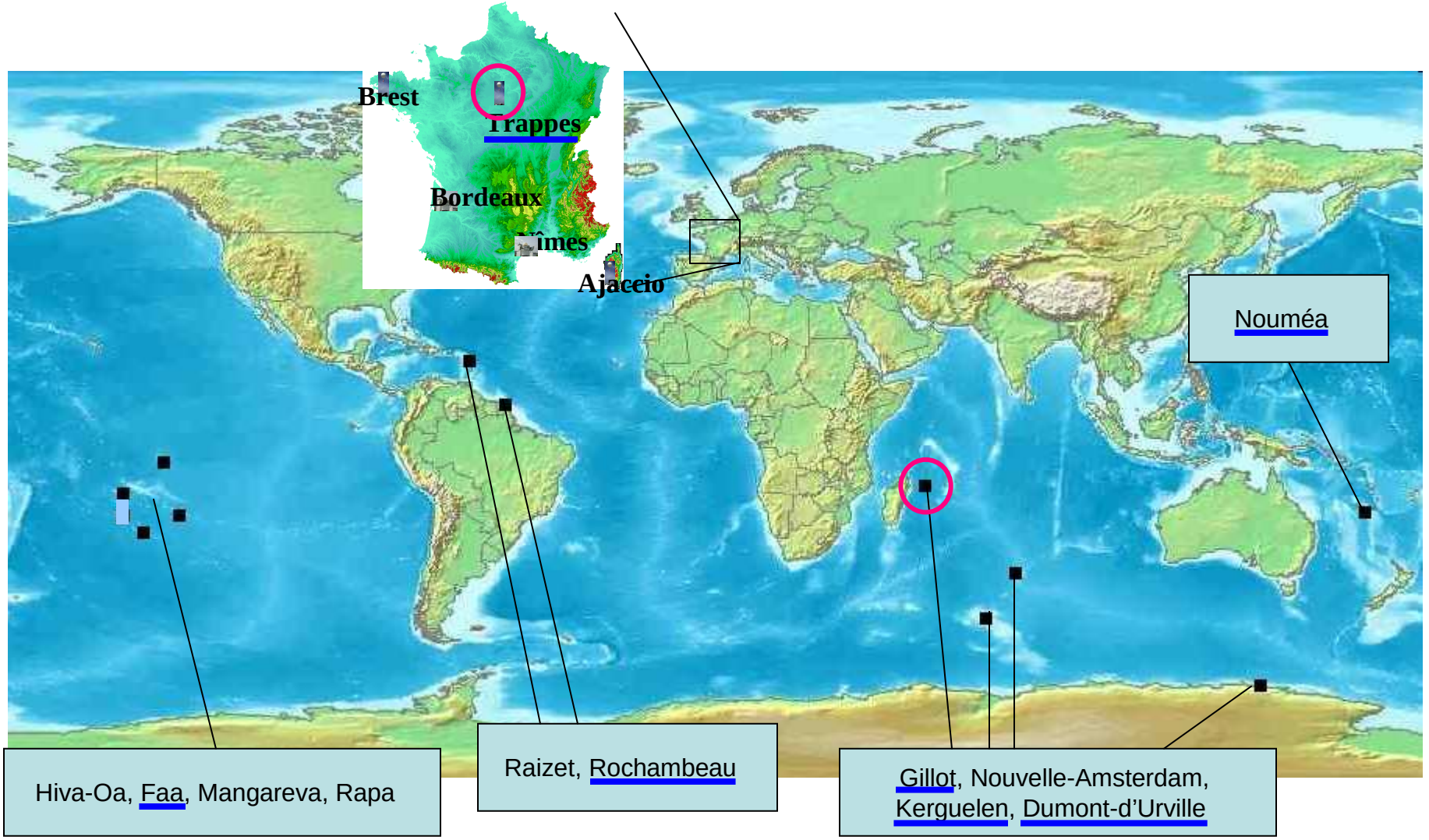
French Observatories for Atmospheric Research



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

French Operational Radiosonde Network



METEO FRANCE
Toujours un temps d'avance

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

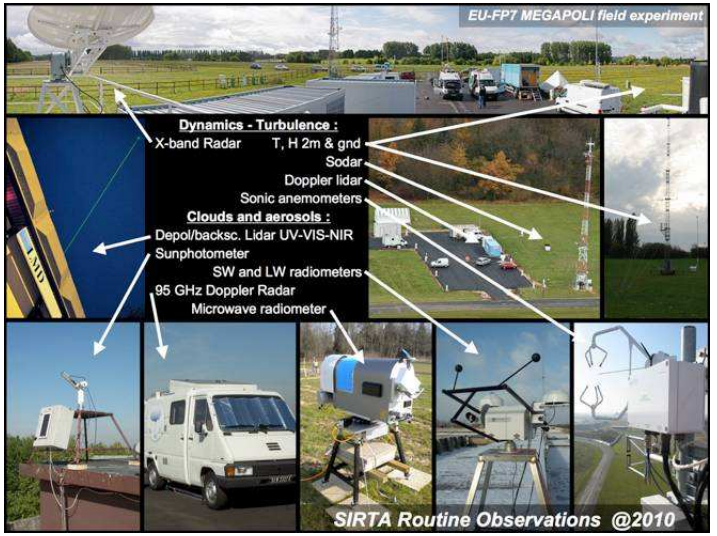
UPMC, UVSQ, X, ENS, Paris-7, EIT

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

Profiles UTLS Troposphere Mixing layer Surface Ground

Temperature Humidity Wind Precipitation

Radiation Dynamics Turbulence



Continuous Observations at SIRTA

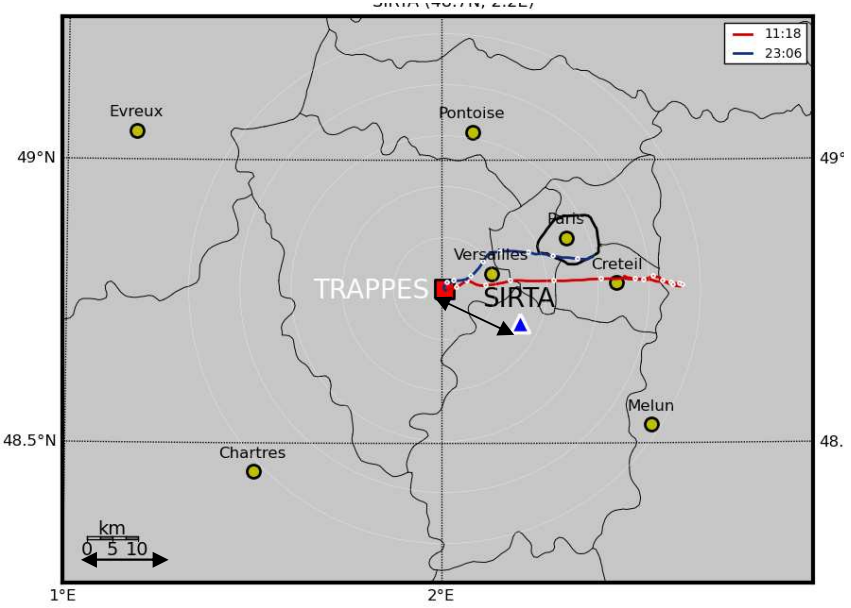
Priority 1
Priority 2

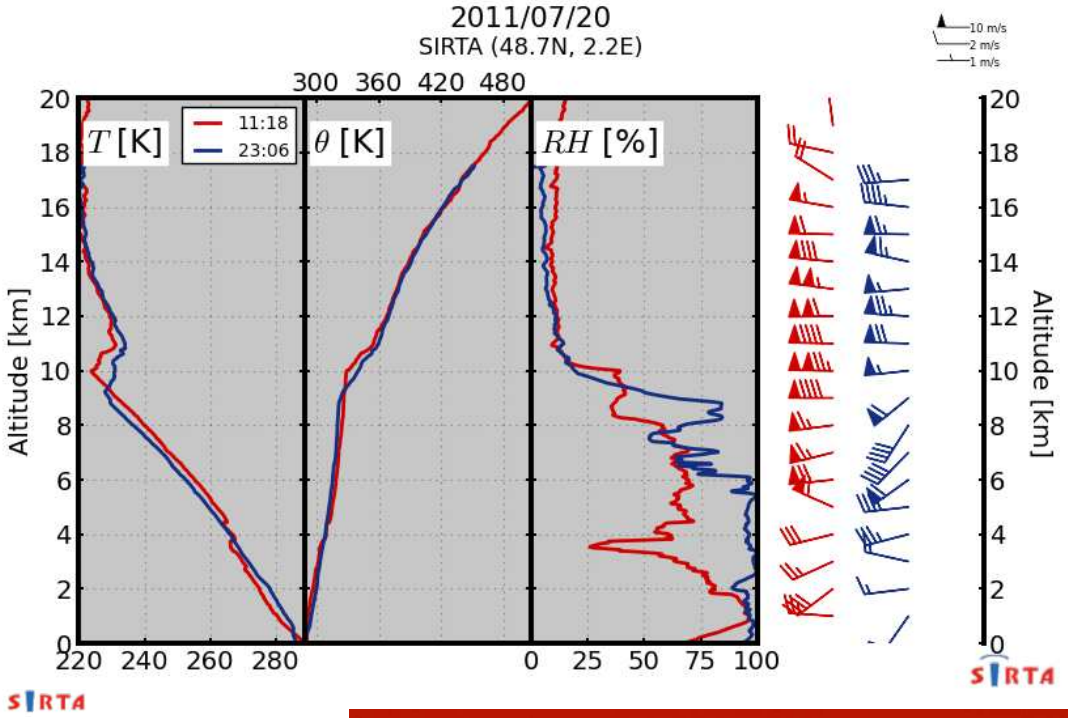
Contribution to international networks

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

Radiosonde observations at SIRTA

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



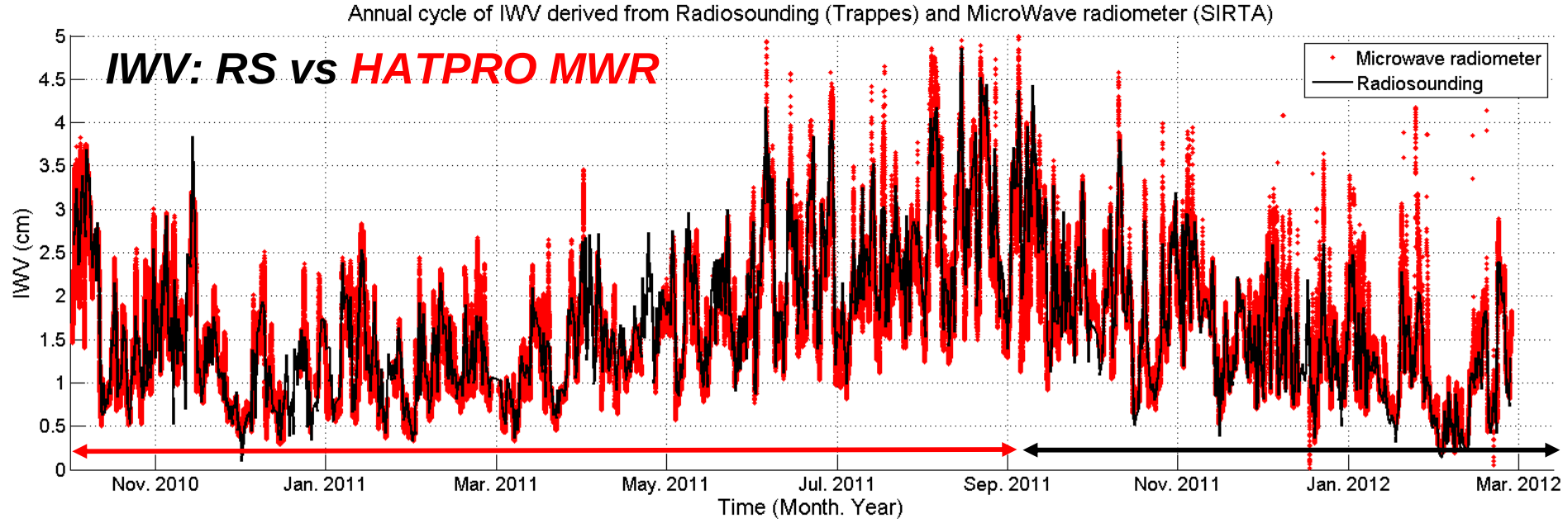


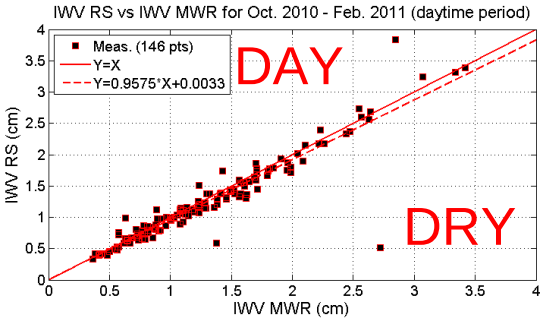
Measurements in Trappes since 1929 (initiated by Robert Bureau 1892-1965)

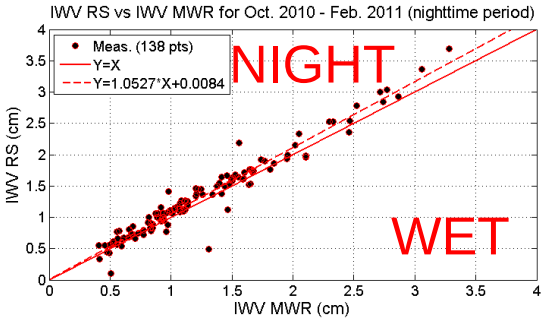
Raw data received twice daily at SIRTA and processed automatically

Intercomparisons with other measurement sources (GPS, HATPRO MWR)

Radiosonde quality monitoring at SIRTA

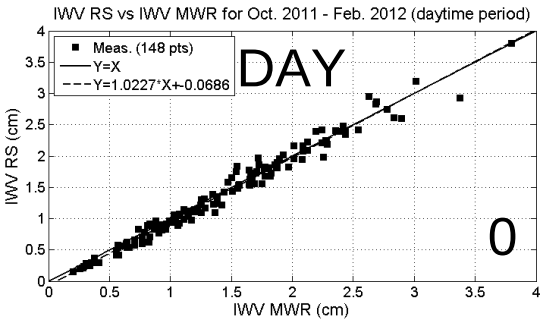


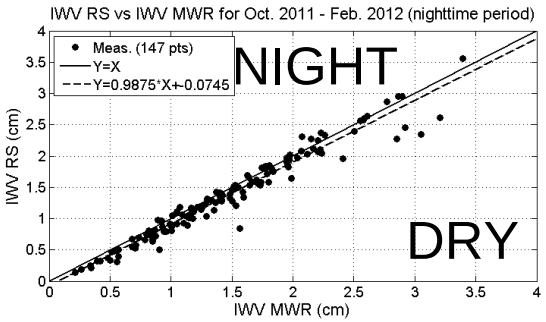




MODEM M2K2 radiosonde until mid Sept 2011

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

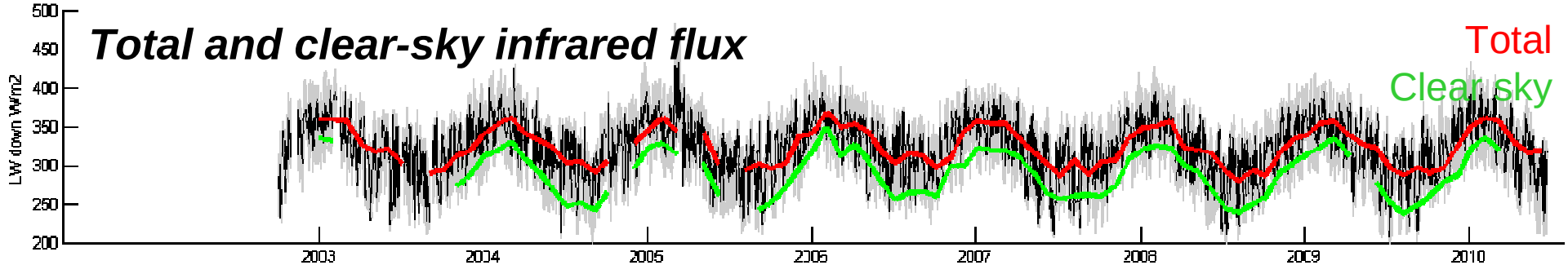
Heat fluxes: hfls, hfss

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

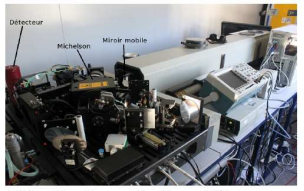


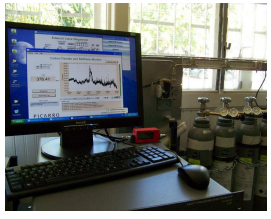
The OPAR Observatory (La Réunion)

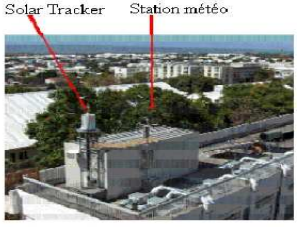
Subtropical Site of the Southern Hemisphere (Indian Ocean, 21 °S, 55 °E)

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

Priority 1
Priority 2

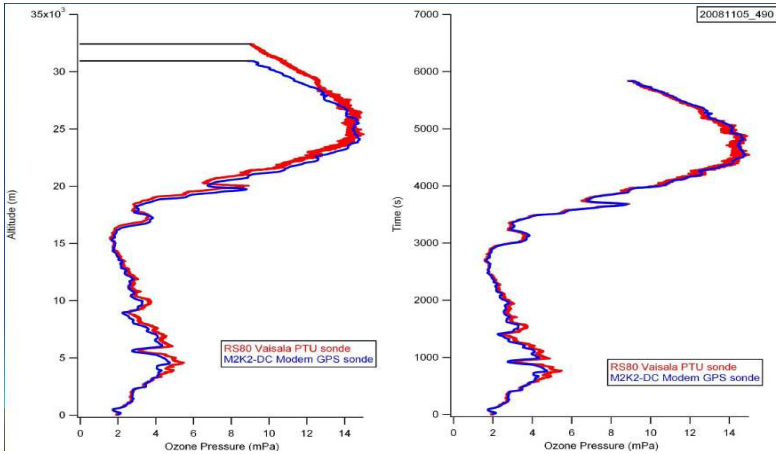
LIDAR (Y. COURCOUX)	O3	289-316nm and 308-355 nm	NDACC	J.L. BARAY T. PORTAFAIX G. ANCELLET S. G.BEEKMANN
	T	532/1064nm	NDACC	P. KECKHUT
	WV	532nm	NDACC	P. KECKHUT J.L. BARAY
RADAR (Y. COURCOUX)	WIND, TURBULENCE, PRECIPITATION	DEGREANE DOPPLER	CWINDE	B. CAMPISTRON
SPECTRO AND RADIO-METER (J.M. METZGER)	O3-NO2	SAOZ	NDACC	A. PAZMINO
	CO & TRACE GASES	FTIR	NDACC	M. DE MAZIERE
	UV	SPECTRO	NDACC	C. BROGNIEZ
	AEROSOLS	PHOTOMETER	AERONET	P. GOLOUB
IN SITU	PTU-WIND O3	RADIOSONDES	NDACC-SHADOZ	F.POSNY
	CO2-CH4-H2O	PICARRO	RAMCES	M. RAMONET
	CO	HORIBA	RAMCES	M. RAMONET
	PTUV prof	RS at 12UT	MétéoF	F. BESSON

Radiosonde observations at OPAR

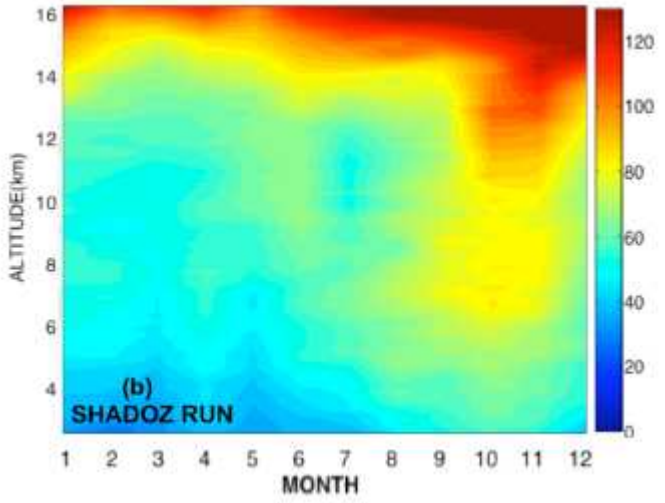
(F. Posny, J.M. Metzger)

- **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



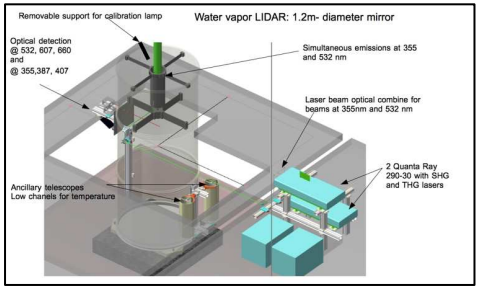
Dual Flight Vaisala - Modem on 5 November 2008

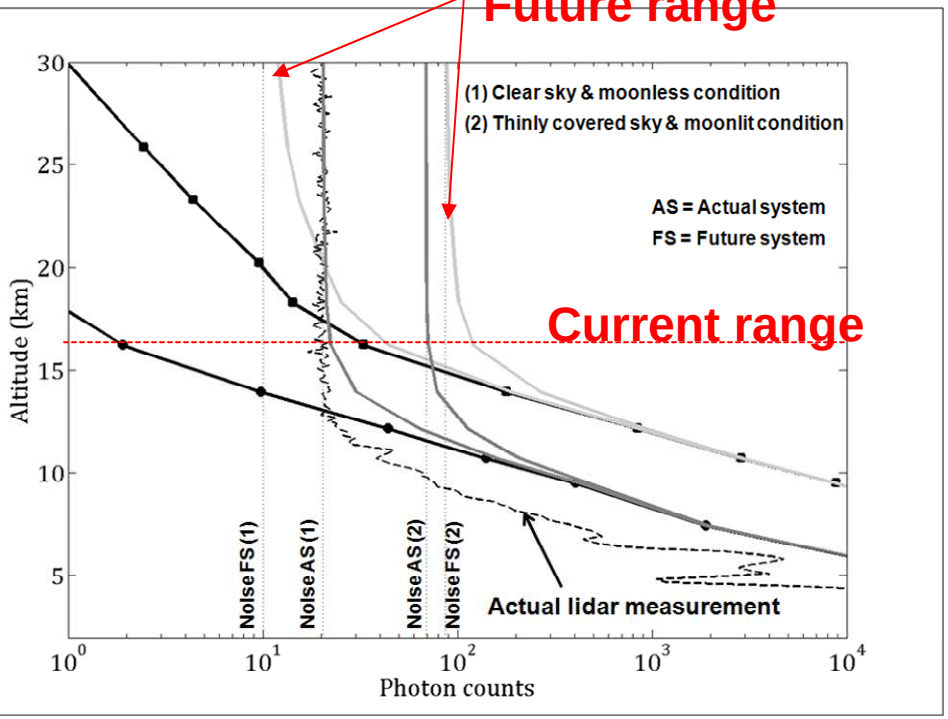


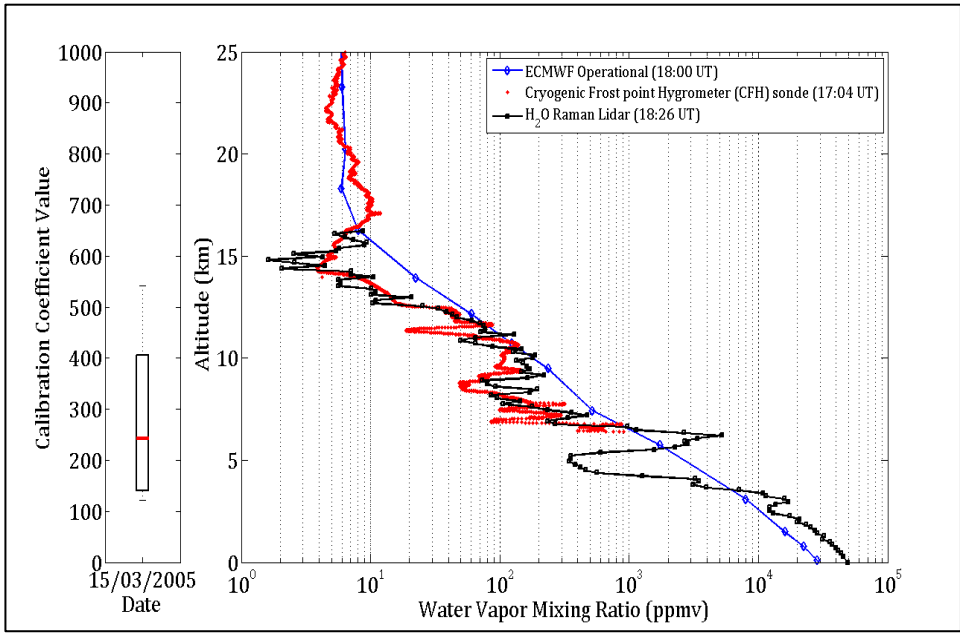
Tropospheric Ozone annual cycle from Reunion radiosondes 1998-2008. From Clain et al., ACP 2009

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)
- 2 PhD, 3 publications in Appl. Opt.







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 bundary 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:
- Firsts 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
- Commissionning of the facility: June 2012

Facility capacity:
- Surface of the project: 6600 sqm including access road acces, container areas,parkings , building, electrical substation, outsides
- 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

Institutional motivation for GRUAN

"CNRS-INSU expresses interest in contributing to the GRUAN international climate network through its existing observation services (SIRTA, OPAR, contributions to NDACC, BSRN, EG-VAP) and existing climate data quality management efforts"

"Météo-France expresses its wish to contribute to the GRUAN international climate network, in collaboration with CNRS-INSU, through the operation of its operational radiosounding sites in Trappes and Gillot. The final decision will depend on the compatibility of GRUAN requirements with the Météo-France operational procedures…"

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?