Status of GRUAN certification for French sites

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(3) LACy
(4) OSU-R

ICM-10
April 24th
Postdam, Germany

Outline

1. Status for M10 GDP
2. News from Trappes, and more
3. Data stream between Trappes RS site and IPSL
4. Measurement campaigns performed at SIRTA
5. Current corrections
6. Future laboratory tests
7. GRUAN activities @ Reunion island

Status for M10 GDP

- Measurement system ready to be adopted at at least one site: Trappes
- Central processing facility identified: IPSL
- Technical document in 2018
- Peer reviewed paper
- Data stream run as a beta release → sept. 2018

News from Trappes and more

Automatic GRUAN RS have started on a weekly basis in January 2018

News from Trappes and more

Specific preparation protocol for GRUAN

- M10 in SPRH100 TU record during 5 minutes (1file)
- M10 & reference TU probe record during 5 minutes within ventilated meteorological shelter (1file)
- Modem GC (1 file)

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From mid-May, the RS number will progressively increase up to 2 daily GRUAN RS this August .

News from Trappes and **more**

<u>A new site in La Réunion</u>

A robotsonde was installed last week (Chaudron)

Operational RS are automated since April 18th

Hydrogen balloons

April to December 2018 : Meteo-France standard protocol for RS preparation

Early 2019: GRUAN protocol for RS preparation starts

Spring 2019 : first GRUAN RS launches, 1 GRUAN RS / week

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News from Trappes and **more**

<u>And one more coming in Faa'a, Tahiti</u>

Robotsonde installation is planned in October 2018

For operational reasons GRUAN RS will start at fall 2019

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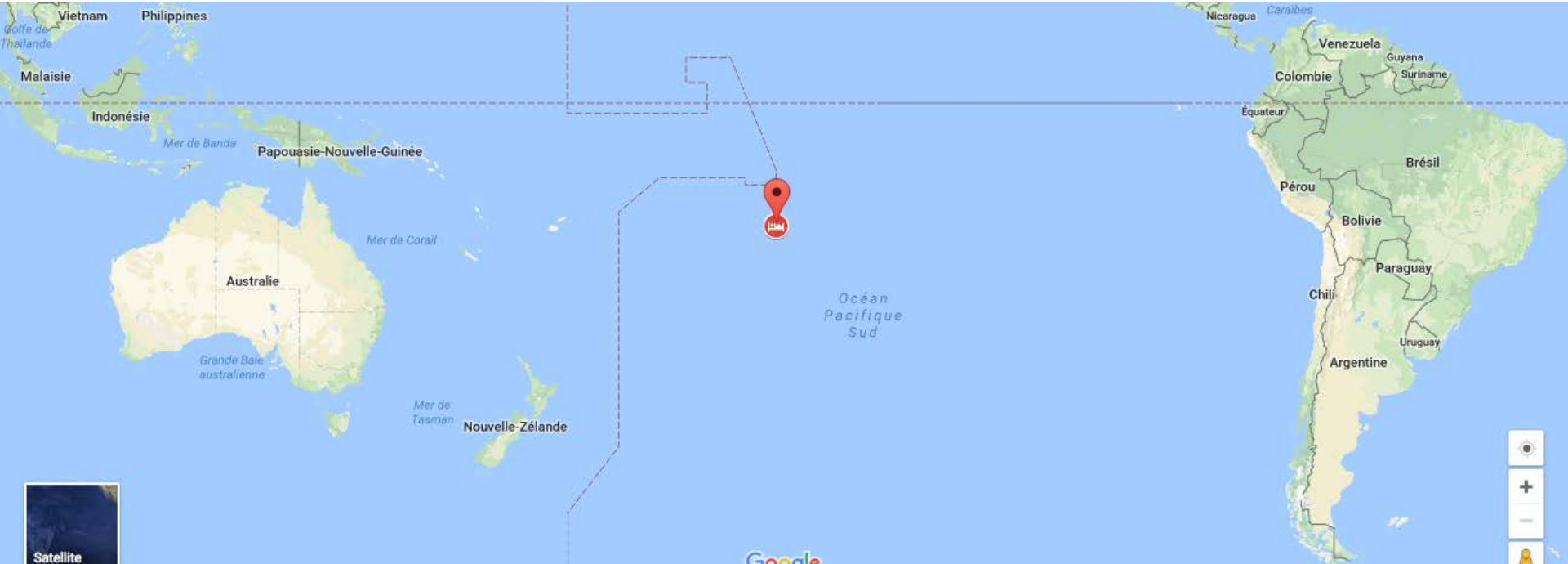
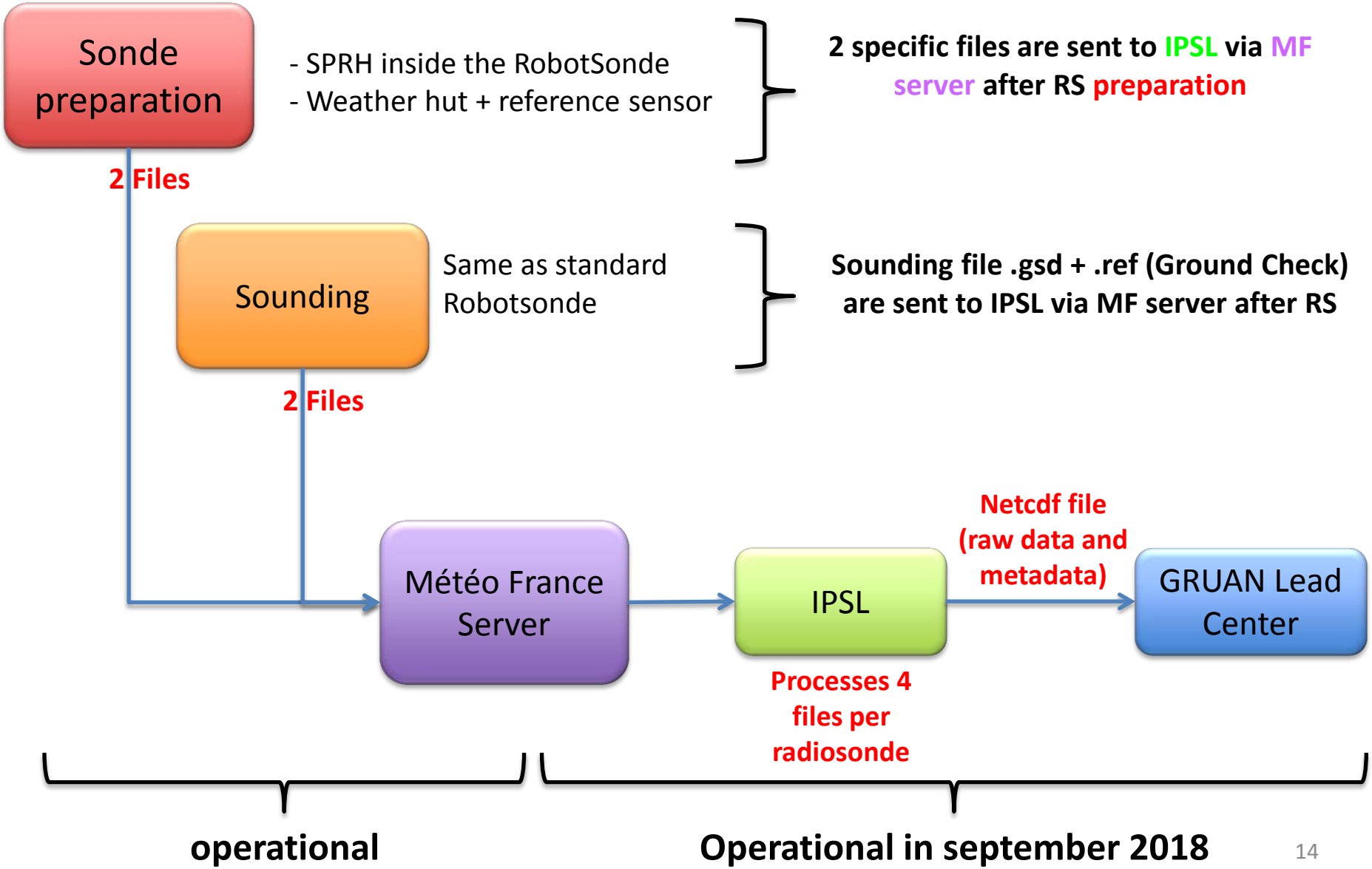
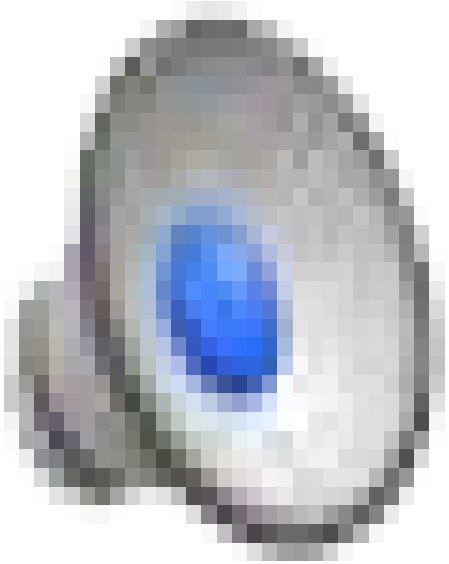


Data stream


Sonde preparation
- SPRH inside the RobotSonde
- Weather hut + reference sensor
2 specific files are sent to IPSL via MF server after RS preparation
2 Files
Sounding
Same as standard Robotsonde
Sounding file .gsd + .ref (Ground Check) are sent to IPSL via MF server after RS
2 Files
Météo France Server
IPSL
Netcdf file (raw data and metadata)
GRUAN Lead Center
Processes 4 files per radiosonde
operational
Operational in september 2018

Measurement campaigns at SIRTA observatory



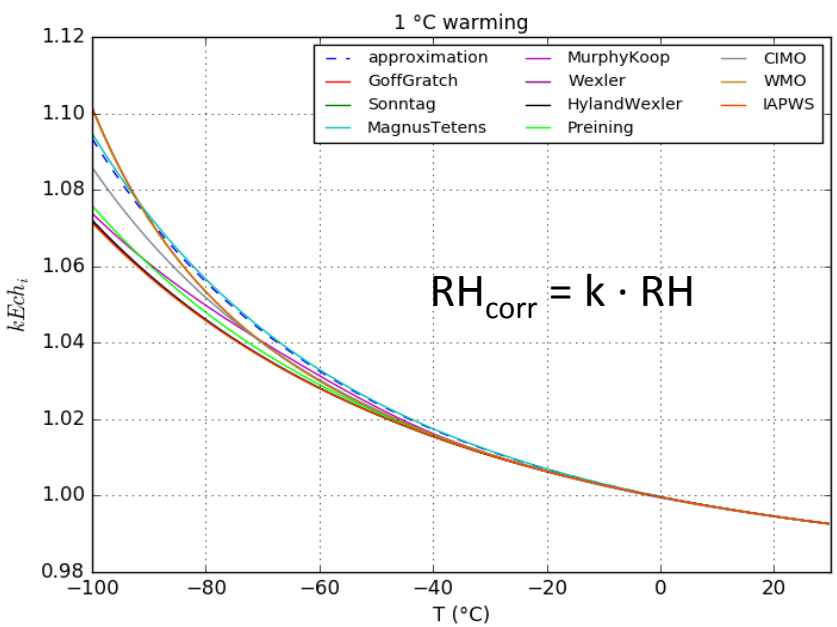
Measurement campaigns at SIRTA observatory

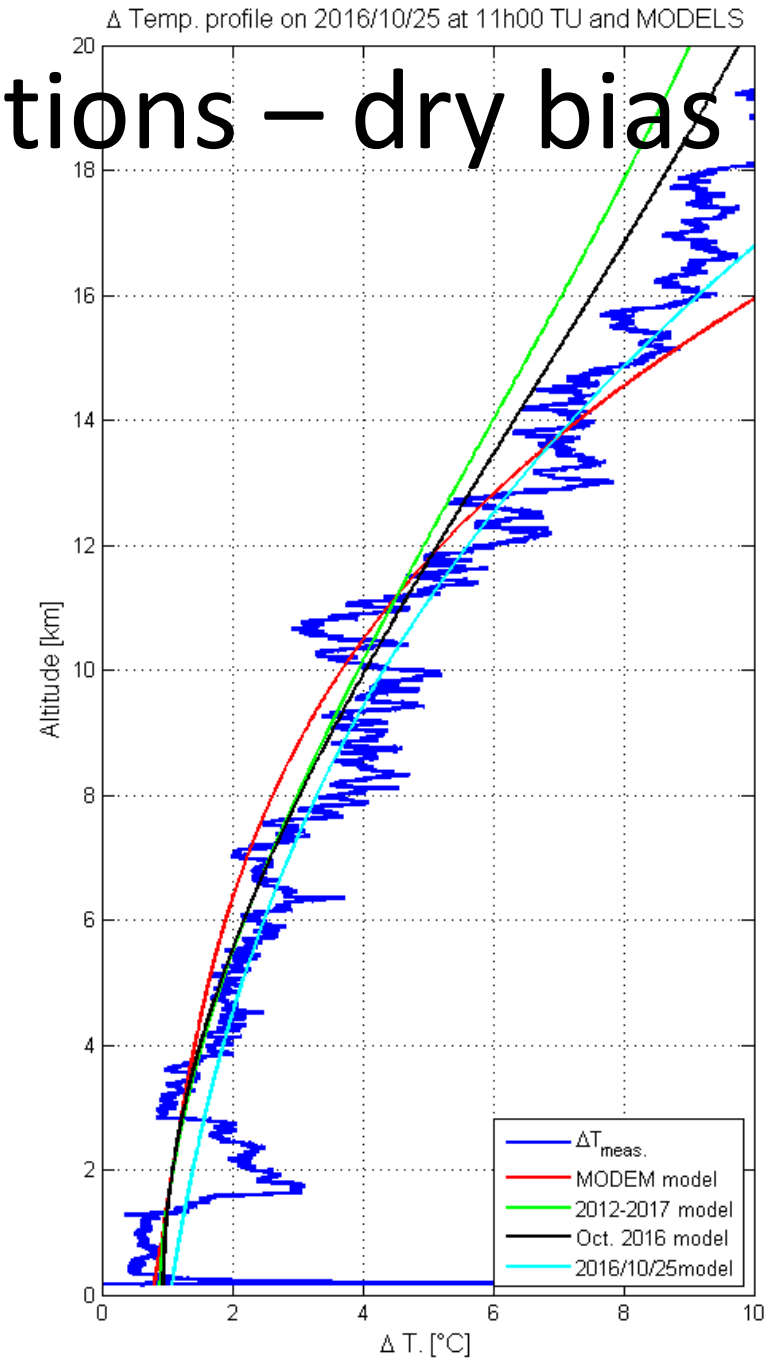
- Last campaign in January 2018
  - 16 day time dual soundings M10 + RS92
- Next campaign planned this spring-summer 2018
  - 10 daytime, 5 nighttime
  - 15 M10 + RS92 or RS41

Current corrections – dry bias

Current correction based on a statistical model for U sensor heating.

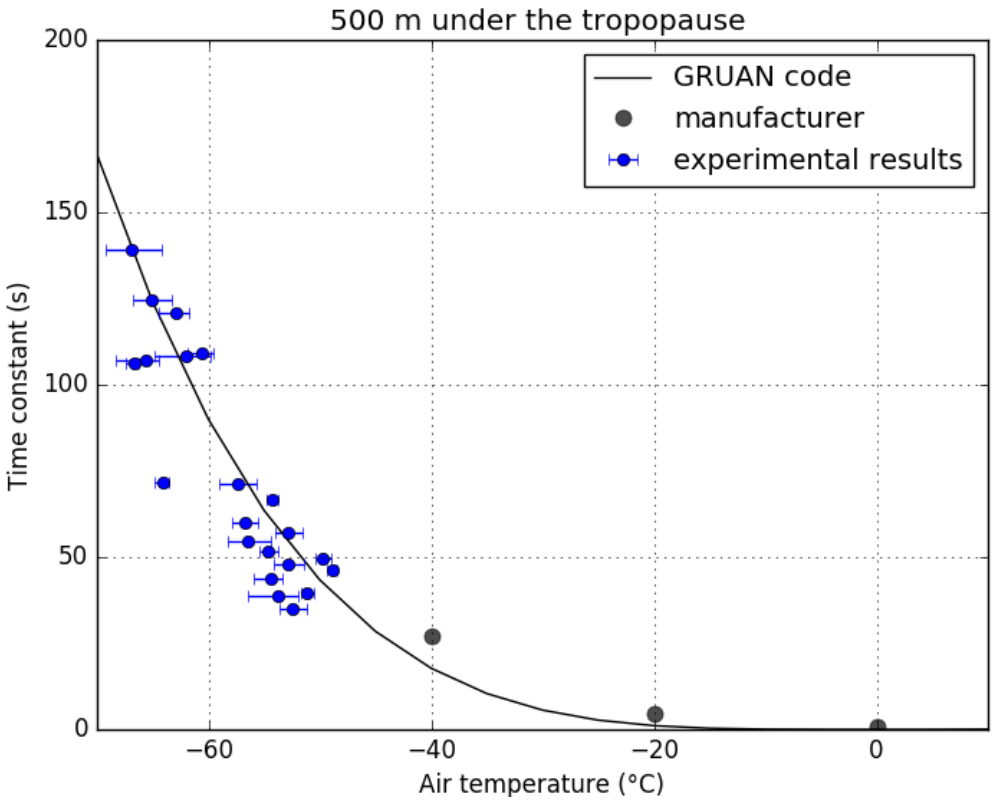
A correction factor is calculated using Magnus Tetens formulation for e_{sat}.





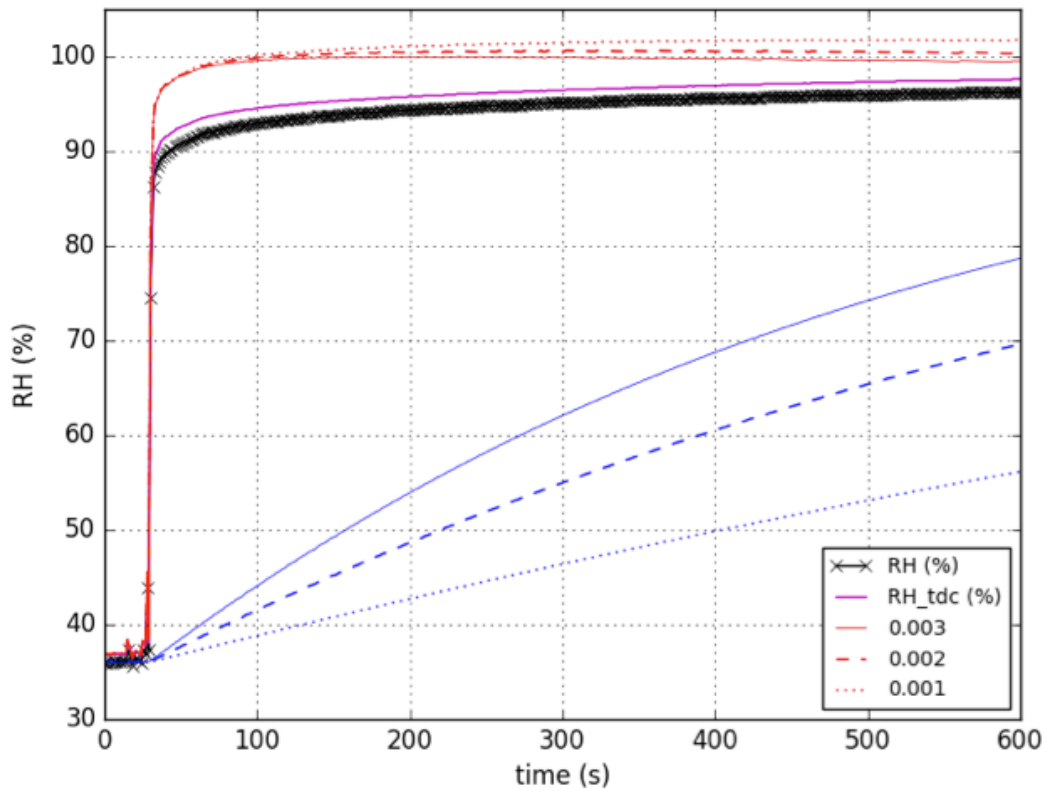
Current corrections – time lag

- Empirical correction curently
- Need for a laboratory experiment in order to characterise the RH sensor time lag and have a robust documentation

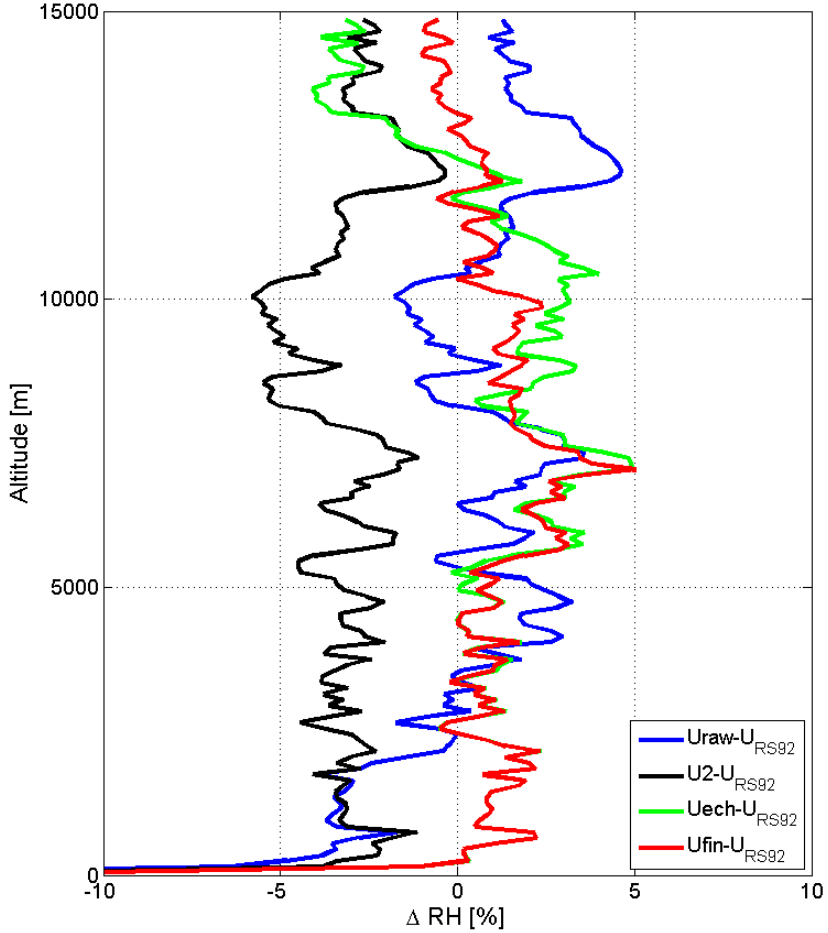


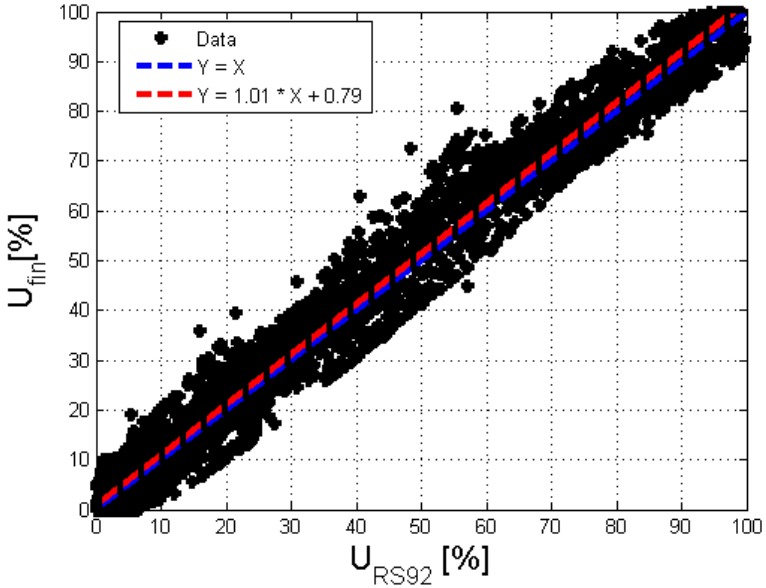
Current corrections – slow regime

- Currently, correction is based on characterisation in SPRH 100 at ambient temperature.
- Need for a laboratory experiment in order to characterise the slow regime behaviour at low temperatures.



Current results for RH based on 13 dual sounding M10 vs RS92





Future tests in laboratory

- Time lag
- Slow regime
- Hysteresis
- 3rd party accuracy and precision

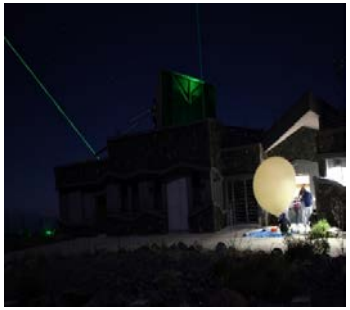
UTLS Water vapor measurements at Maïdo

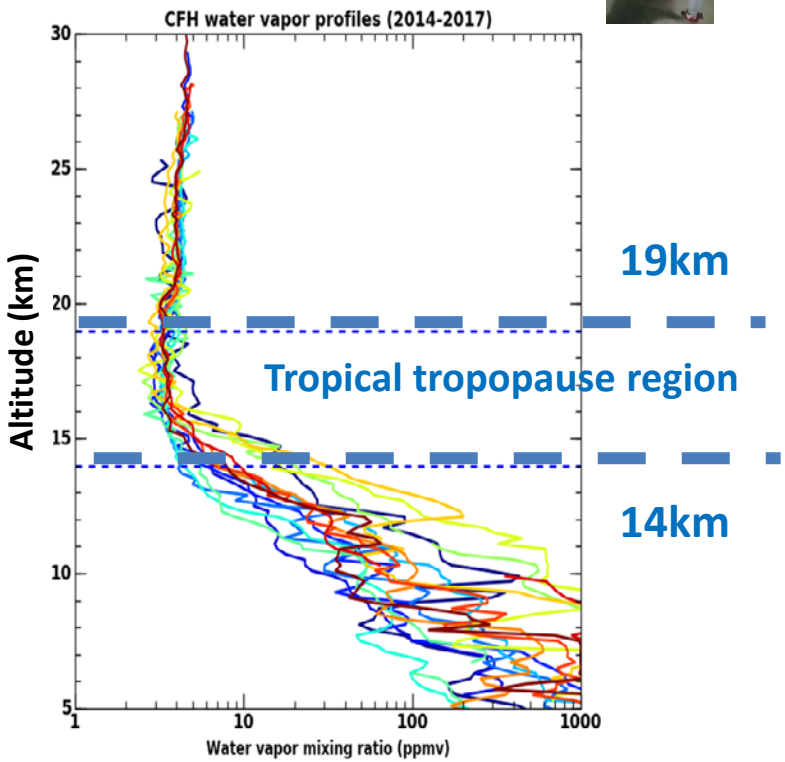
Nov 2014 TNA-ACTRIS
CFH+M10+RS92+Lidar

May 2015: MORGANE campaign
CFH+M10+RS92+Lidar

Jan/Mar 2016 HAIC campaign
+ TNA ACTRIS
CFH+M10+Lidar

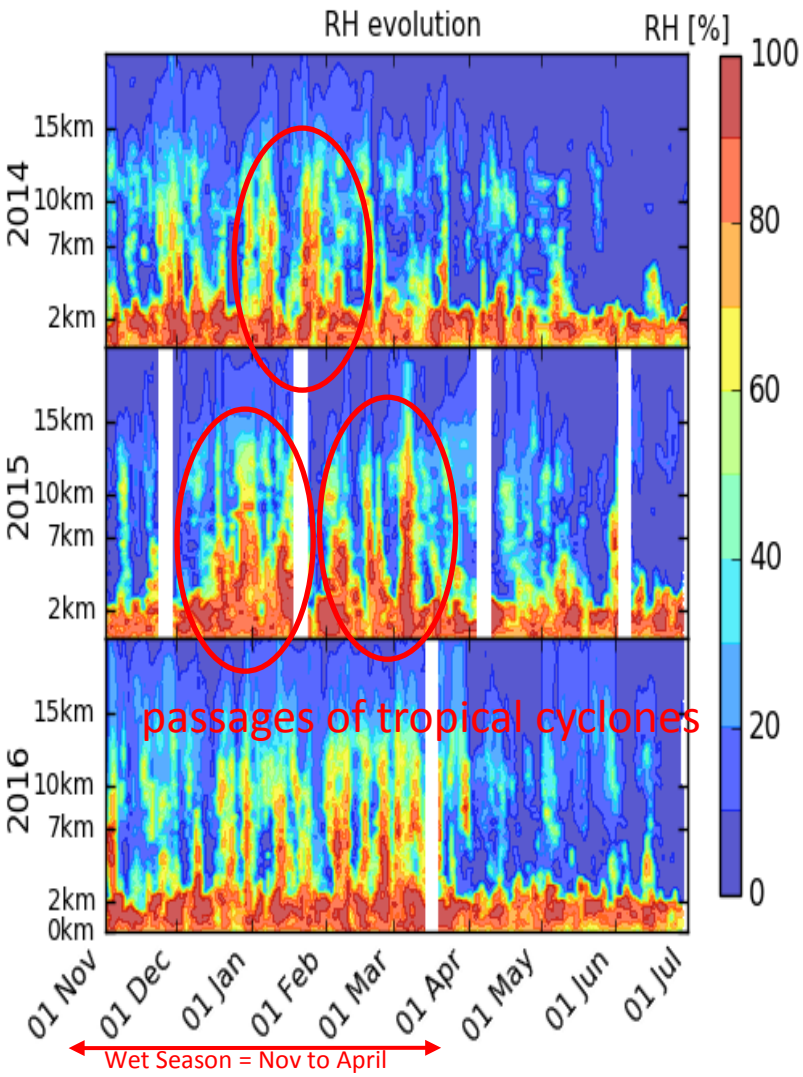
Mar/May 2017 TC Enawo
+ TNA ACTRIS
CFH+M10+Lidar



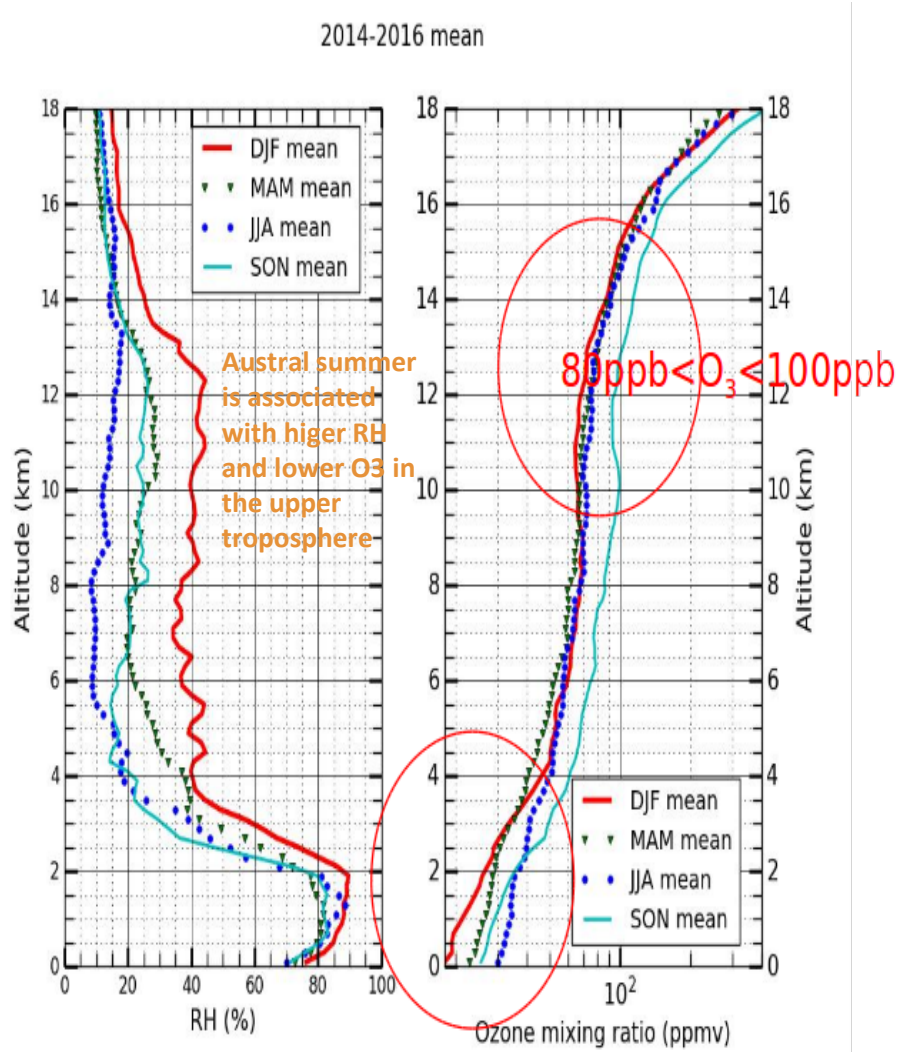


3 years of CFH (13 profiles) and Lidar water vapor data for (2014-2017) are now available at the Maïdo Observatory.

Impact of deep convection on the chemical budget (H_2O/O_3) of the upper troposphere over Réunion Island

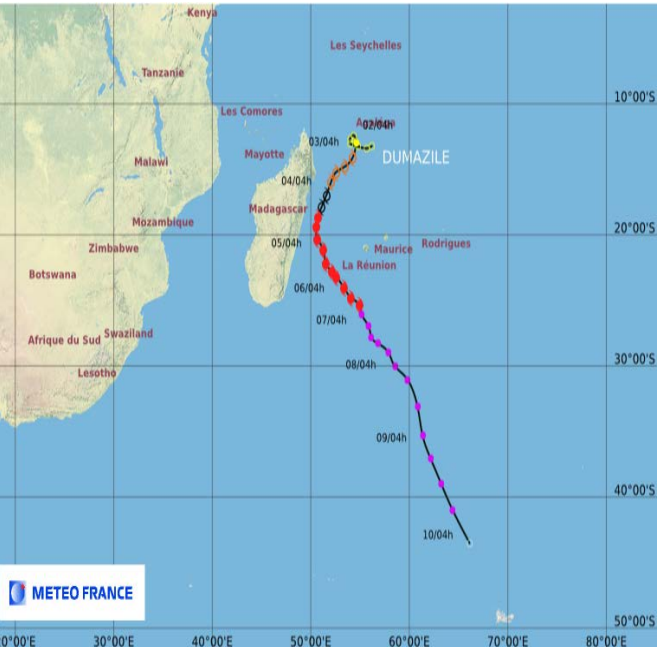


Time series of RH measured by the M10 radiosonde (daily Météo-France launch at 12UTC from the airport)



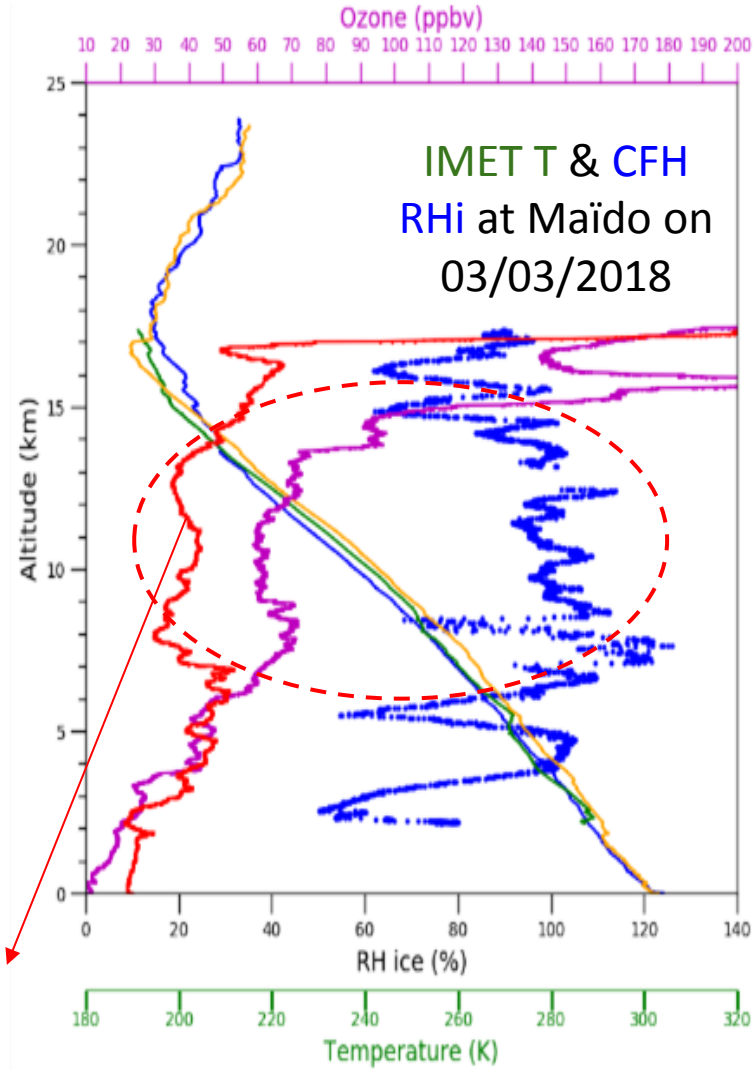
Tropical cyclone Dumazile: 03 March, 2018

Météo-France best-track of TC Dumazile, March 2018



CFH/COBALD/IMET & ECC O3/M10 sondes were launched from the Maïdo observatory on 03/03/2018 at ~17UTC to sample the convective outfow from TC Dumazile:
We quickly lost contact with the ozonesonde and the balloon burst at ~17km because of icing (thick cloud can been seen in the RH profile)

SHADOZ ozone profiles (from the airport) on 26/02/2018 and 07/03/2018



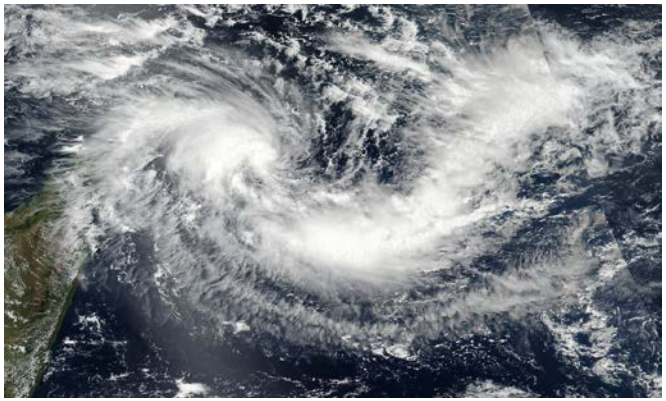
Low O3, High humidity = Convective outflow

ANR CONCIRTO project: Effects of convection and cirrus clouds on the Tropical Tropopause Layer over the Indian Ocean

- **Scientific objectives:**

1) **Acquire in situ and remotely sensed dataset that will help improve the represention of UTLS water vapor, cirrus clouds, deep convection effects in models.**
2) **Understand cirrus cloud formation over the Indian Ocean and tropical SH**
3) **Determine the mechanism by which deep convection affects the TTL over the Indian Ocean**

An Intensive Operation Period is scheduled for Nov 2018 to April 2019 with a cloud radar from the University of Leeds, balloon-borne instruments (CFH, COBALD, ozone, M10, and possibly RS41&RS92) and lidars at the Maïdo Observatory



Conclusions/Plans for 2018-2019

- A Standard Humidity Chamber has been ordered and will arrive in May: start ground-check procedure for weekly NDACC/SHADOZ M10/Ozone launch.
- 3 year of CFH&Lidar data available (2014-2017)
- CONCIRTO campaign Nov 2018 to April 2018
- Long term funding for CFH or other water vapor instrument needs to be established to meet the GRUAN monthly water vapor profile requirement.

Thank you