

IROWG and key issues related to CGMS

Presented to CGMS-46, Plenary Results from IROWG-6 (Sep. 21-27, 2017, Estes Park, USA)

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**Coordination Group for
Meteorological Satellites**

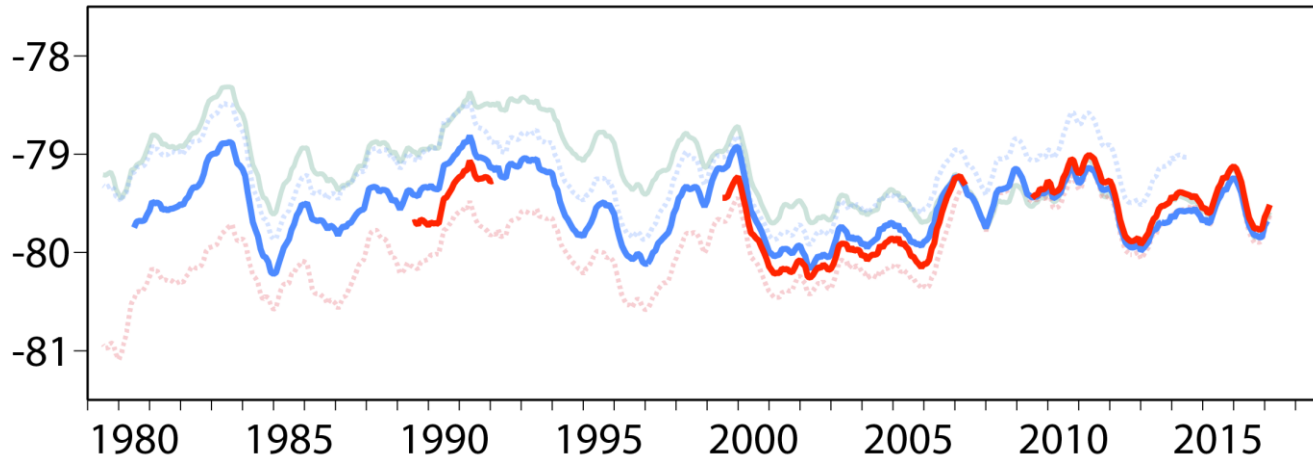


Impact of RO on Reanalyses

Tropical Tropopause Temperature

12-month running-mean tropical-mean 100hPa temperatures (°C)

— JRA-55 ····· MERRA — MERRA2 ····· ERA-Interim — ERA5



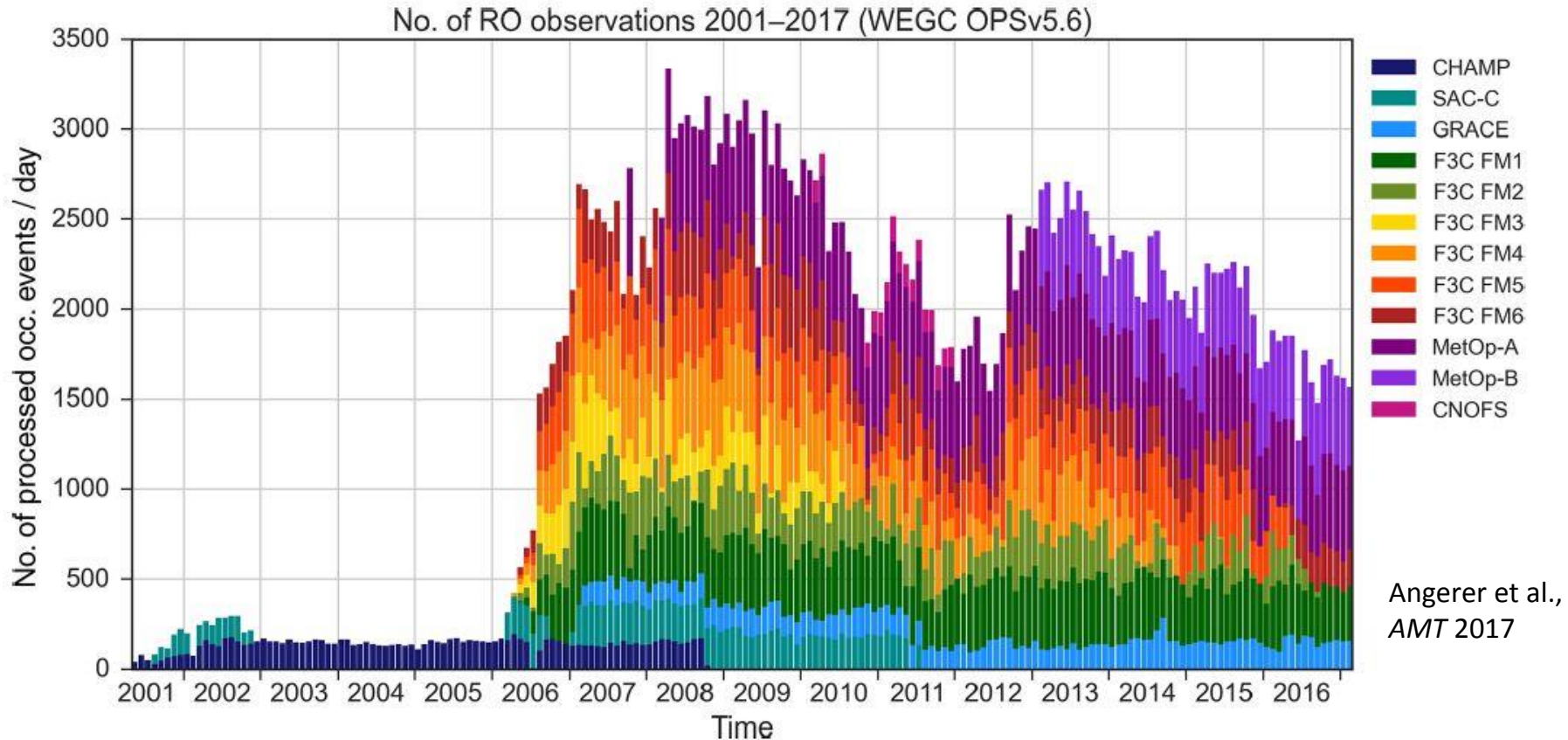
GNSS-RO is now considered an **essential** measurement for climate reanalyses as it is an **anchor** measurement assimilated without bias correction



Significant amounts of GPSRO data assimilated in ERA-Interim, JRA-55 and MERRA-2

MERRA (no RO) is warmer than ERA-Interim. ERA-Interim and JRA-55 assimilate RO data, and come together in 2006. ERA-Interim warms and JRA-55 cools when significant amounts of RO data start to be assimilated. ERA5 and MERRA2 assimilate RO data. They come together in 2006 along with ERA-Interim and JRA-55, but are much closer throughout.

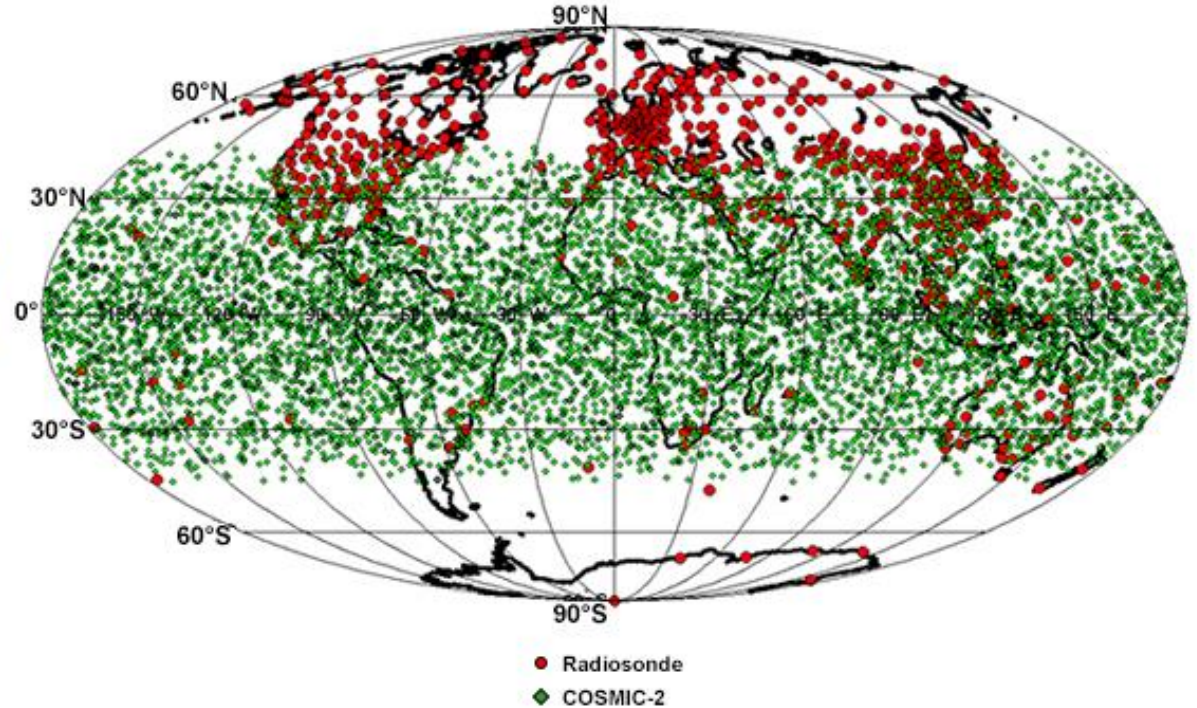
RO data availability



Daily number of high-quality RO profiles, processed at Wegener Center until early 2017: **Decline of COSMIC 1** could not be compensated by other missions (FY-3D data 2018, but loss of last COSMICs imminent).

COSMIC-2 equatorial launch: Q3/4 2018

24-hour occultation locations for COSMIC-2 equatorial constellation



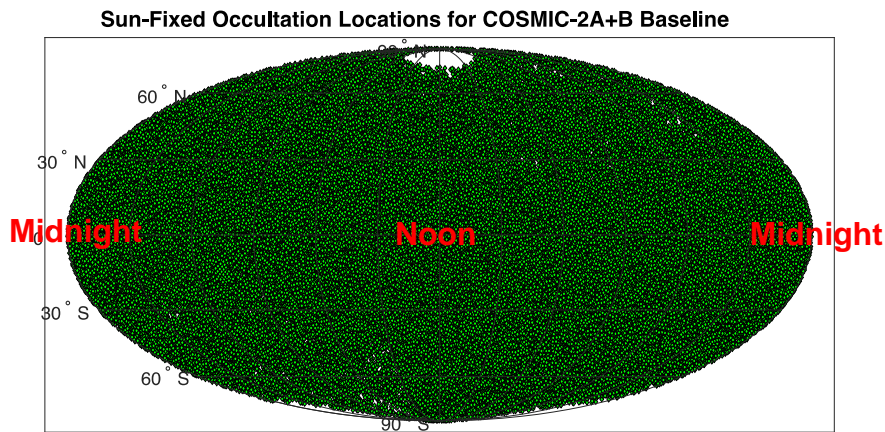
COSMIC-2 **polar** has been **cancelled**: Very few COSMIC-2 profiles beyond **40° latitude**. There will be additional RO profiles from **Metop** and **FengYun**), but ..

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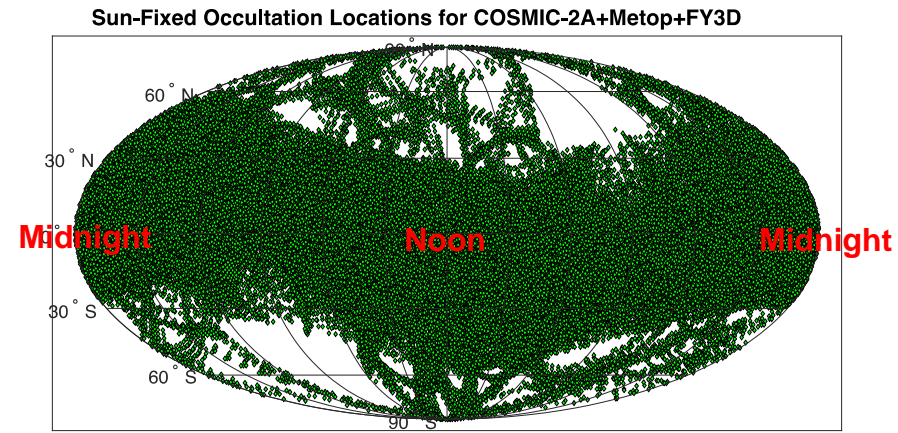
Local Time Coverage

Neutral Atmospheric Soundings (input by W. Schreiner, UCAR)

COSMIC-2AB



COSMIC-2A + **Metop** + **FY-3D**



Significant **gaps in local time coverage** poleward of $\pm 40^\circ$ latitude.
Note: Without C2B, **ionospheric** LT coverage is even **worse**, since Metop does **not** collect ionospheric soundings.

IROWG-6 Results (1)

- IROWG's main aim is to ***ensure long-term measurement continuity*** and maximise the number of ***high quality RO observations that can be freely exchanged***.
- Need for a reliable, long-term ***“backbone” constellation*** (with COSMIC-2 or Metop quality).
- Occultation target confirmed as 20,000 profiles per day with ***good spatial and local time coverage*** (as endorsed by past CGMSs). Current and upcoming operational missions are unlikely to provide > 10,000.

IROWG-6 Results (2)

- RO in the forefront of **commercial data discussions**. IROWG strongly supports the NOAA **Commercial Weather Data Pilot** (CWDP) study. It is crucial to determine the **actual capabilities** of the various options.
- Commercial RO missions make progress. IROWG does, however, **not** feel that commercial missions can provide the required “backbone” in the near future.

IROWG-6 Results (3)

- Reference: “The Risks of Contracting the Acquisition and Processing of the Nation’s Weather and Climate Data to the Private Sector”, Letter to the Editor, BAMS May 2018
- Concern about ***Level 0 data availability***, access to all relevant ***meta data***, and ***long term archiving***.
- Needs to be secured for both the agency-led and “commercial” missions.
- These ***long term costs*** should be ***included in mission budgets***.

Main Recommendations IROWG-6

- Ensure that both, **equatorial and polar components of COSMIC-2 are fully funded and launched**;
- IROWG recommends targeting at least **20,000 occultations/day** providing **good spatial and local time coverage**, to be made **freely available** to the **operational and research communities** of Numerical Weather Prediction, Climate, and Space Weather.;
- International space agencies (in particular NASA, ESA and CNSA, where LEO-LEO and GNSS-RO&-Reflectometry proposals are pending) to support mission preparation and implementation projects towards **LEO-LEO microwave occultation and GNSS-RO&-Reflectometry demonstration missions**. This should include recommending new OSSEs for the LEO-LEO observations.
- IROWG stresses the importance of **long-term archiving** of the **Level0 data** – and all the relevant **meta data** – from both the agency-led and “commercial” missions. **These long term costs should be included in mission budgets**.