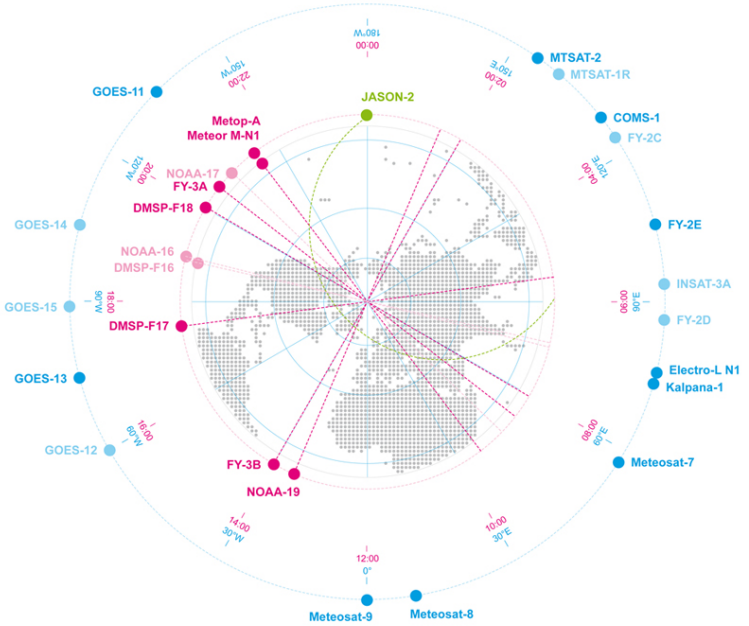

Report on CGMS-46 (2018)

Co-Chairs: Ulrich Foelsche (University of Graz),
Sean Healy (ECMWF)
Rapporteur: Tony Mannucci (NASA/JPL)

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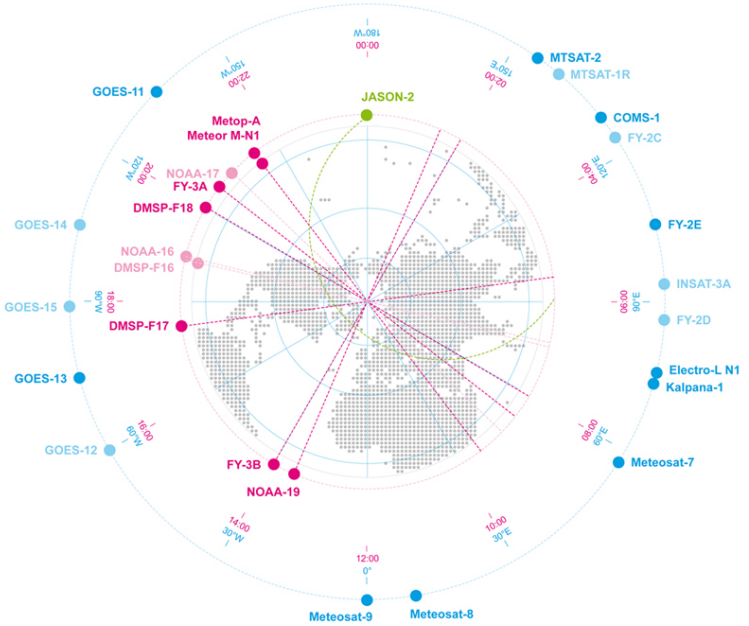
IROWG-6 Results

- Full **minutes** and **recommendations for CGMS** online, under: <http://irowg.org/workshops/irowg-6/>
- IROWG reports to the CGMS, CGMS meets **once per year**, the **2018** meeting – **CGMS 46** – took place in June, in **Bangalore**, **India**
- Main recommendations have also been presented in the **plenary session**
- **Report to IROWG** under <https://irowg.org/workshops/irowg-7/>

CGMS Meeting - Setup

During the plenary session there is only a **short window of attention**, which needs to be **exploited**.

CGMS



IROWG and key issues related to CGMS

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

Co-Chairs: Ulrich Foelsche (University of Graz),
Sean Healy (ECMWF)
Rapporteur: Tony Mannucci (NASA/JPL)

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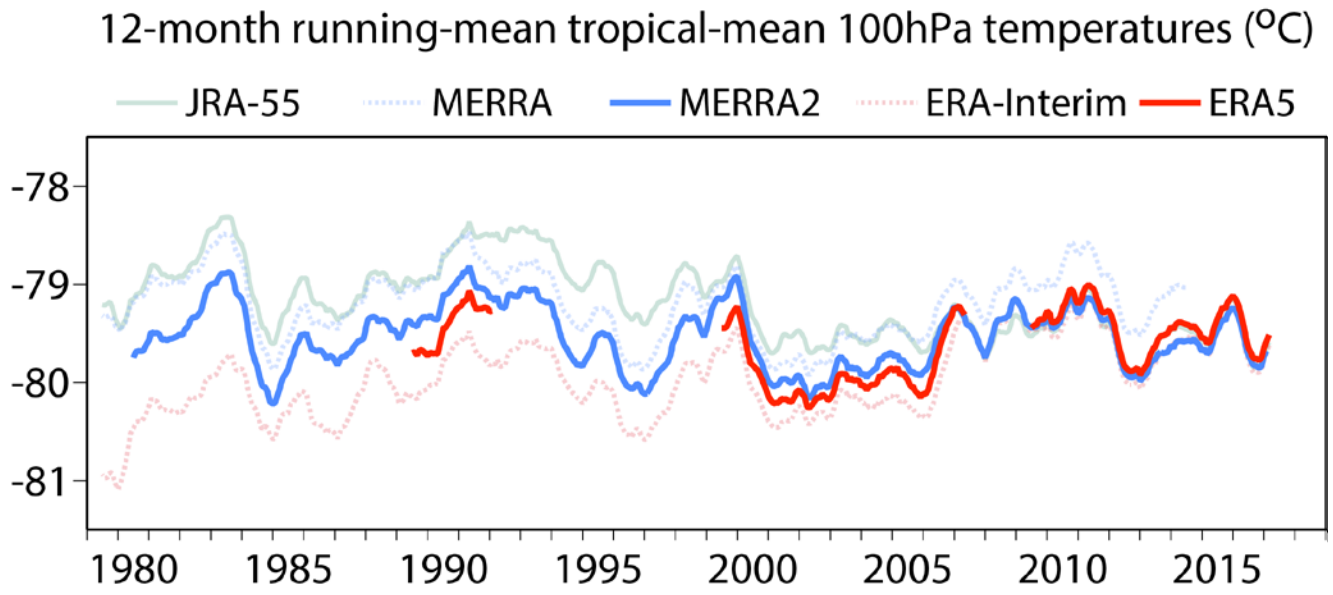
Impact of RO on Reanalyses

Tropical Tropopause Temperature



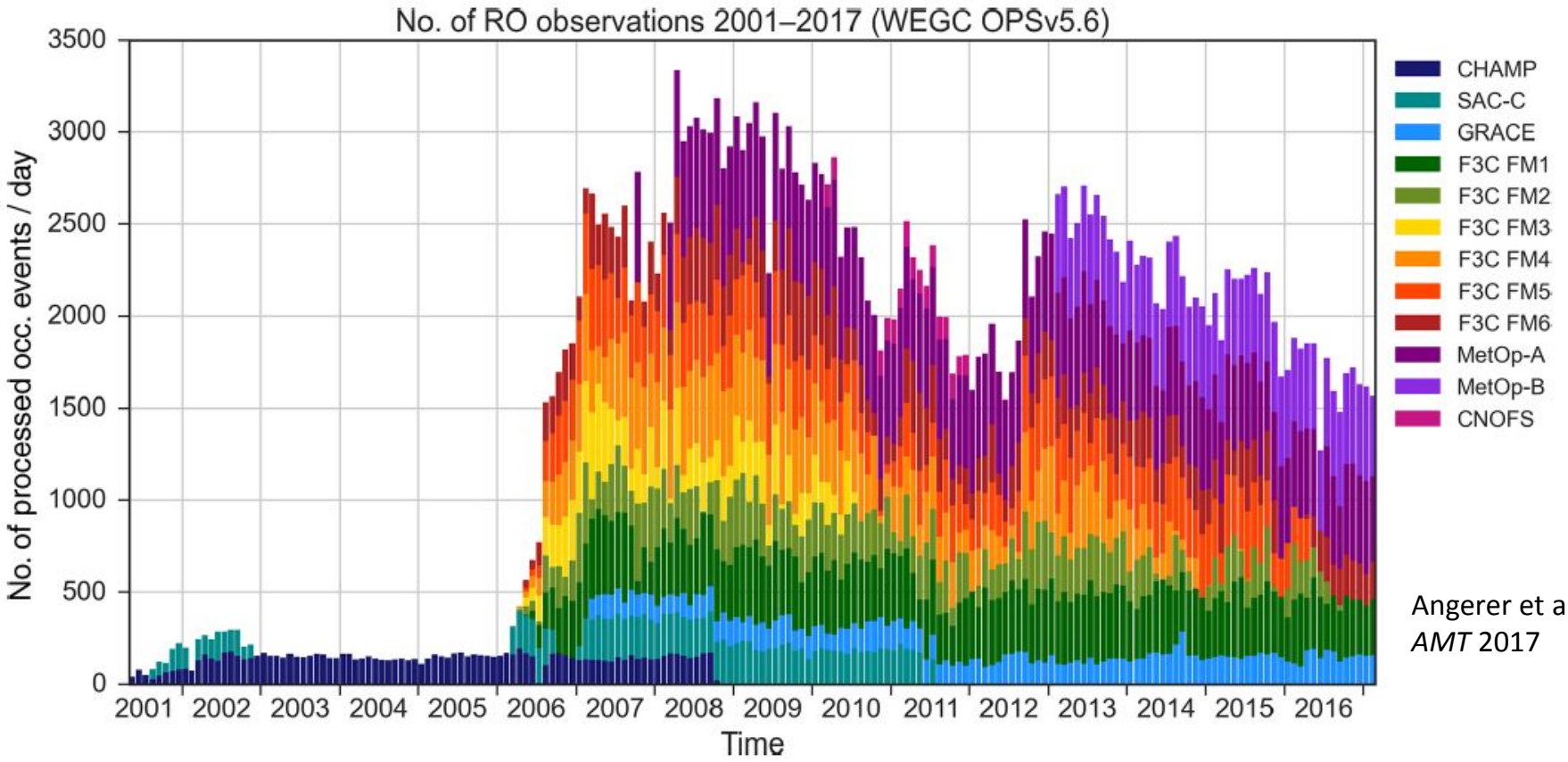
GNSS-RO is now considered an **essential** measurement for climate reanalyses as it is an **anchor** measurement assimilated without bias correction

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.

Credit: Adrian Simmons, ECMWF

RO data availability



Angerer et al., *AMT* 2017

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).

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Past **high impact on NWP** could not be maintained.

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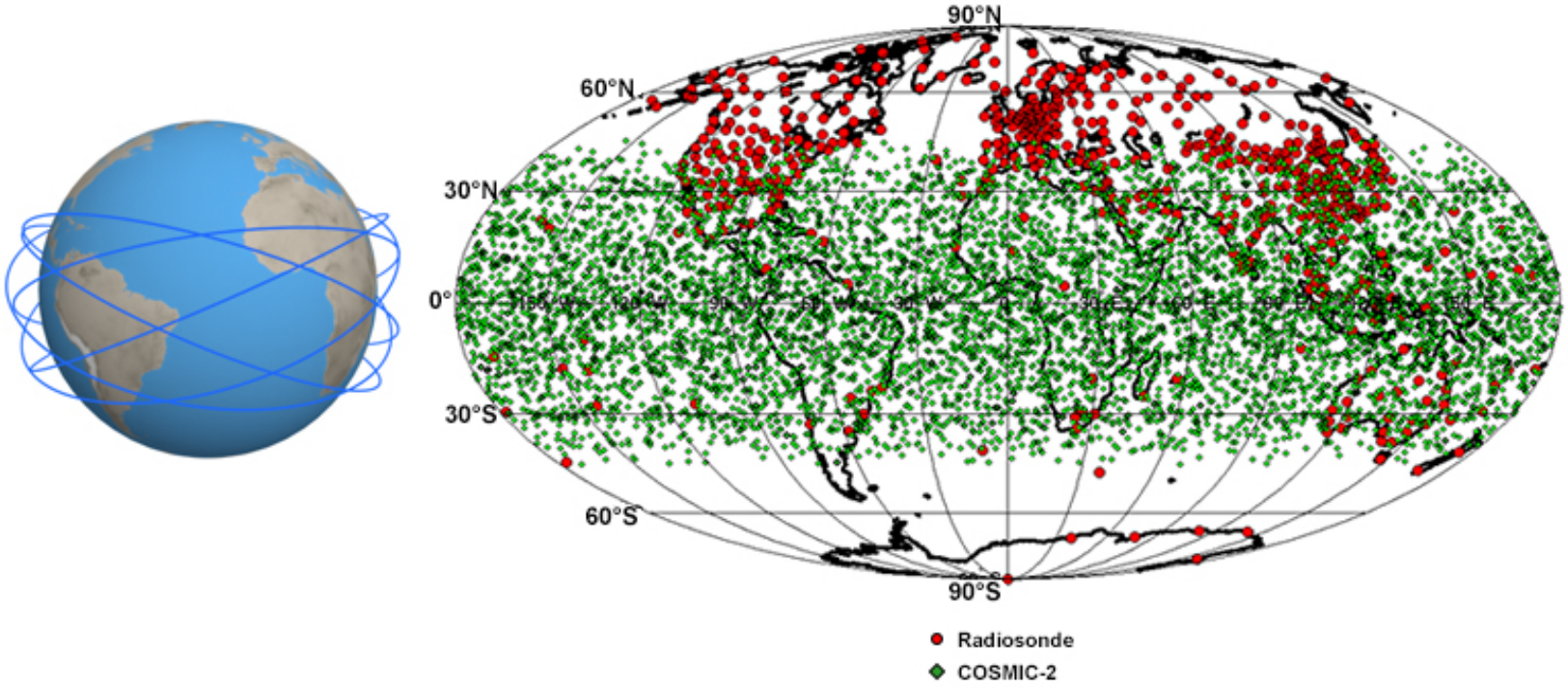
COSMIC-2 equatorial launch: Q3/4 2018

24-hour occultation locations for COSMIC-2 equatorial constellation



©UCAR, The COMET Program

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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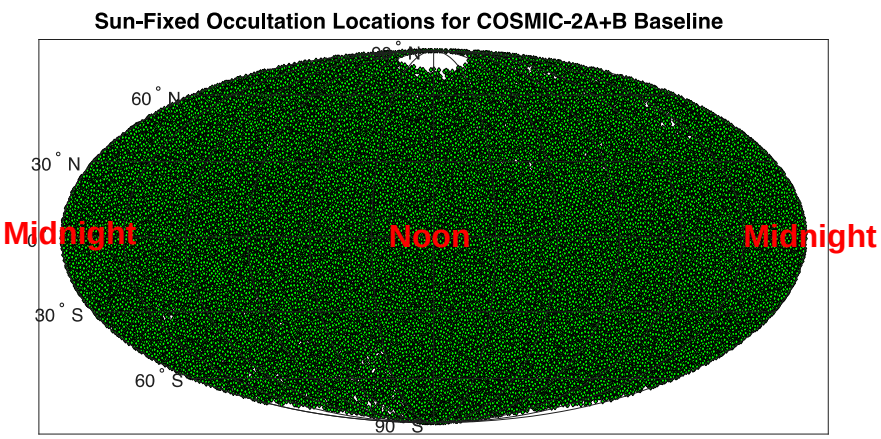
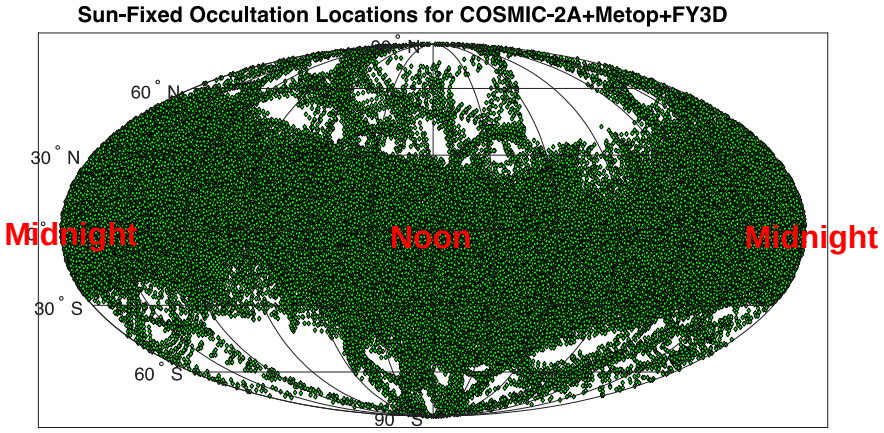
Local Time Coverage

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

COSMIC-2AB



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



Significant **gaps in local time coverage** poleward of ±40° latitude.

Note: Without C2B, **Ionospheric** LT coverage is even **worse**, since Metop does **not** collect ionospheric soundings.

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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***.

Thank you!

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**.

Main Outcome 1

- Main Recommendation # 1 (**long-term archiving** of the **Level0 data** ..) received considerable attention and was lifted to a general (plenary) recommendation:

CGMS-46 recommendation – PLENARY			
Actionee	**AGN item**	**Rec #**	**Description**
CGMS space agencies	E.10	R46.01	**Report from IROWG (CGMS-46-IROWG-WP-02):** IROWG recommends to CGMS: - that raw data and level 1 data (including meta data) be made available for reprocessing/reanalysis of climate data records and for data validation - the long-term archiving of such data (incl. meta data)

More on Main Outcome 1

- .. and even to an **action** for WG IV (*Data access and end user support*), with help from GCOS:

CGMS-46 actions - WGIV					
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**	**Status**
WGIV	(plen E.10)	A46.06	Following CGMS-46 plenary discussions related to IROWG and GCOS IP: CGMS WGIV to consider the GCOS IP actions on long-term data preservation (LTDP). Ref. GCOS IP action G 26.	CGMS-47	**OPEN**

Main Outcome 2

- Main Recommendation # 4 could not be fulfilled (**polar component** of the **COSMIC-2**), but it resulted at least in a WGII recommendation:

CGMS-46 recommendation - WGII			
Actionee	**AGN item**	**Rec #**	**Description**
CGMS members	WGII/5	R46.06	CGMS members should consider hosting radio occultation payloads on future missions. (Ref. CGMS-46-IROWG-WP-01)

Lessons learned

- IROWG main recommendations need to be **short** and **concise**.
- They need to be formulated in a way, that they can result in a CGMS **recommendation** or **action**.
- **But** such an action can come back as an **IROWG action**, like:

CGMS-46 actions – WGII

Actionee	AGN item	Action #	Description	Deadline	Status
IROWG	WGII/5	A46.08	IROWG to develop process and principles for RO data quality control to ease intercomparison of data from different providers.	2019	**OPEN**

More things to do

- The OSSE action is still around:

IROWG	4	A45.02	IROWG to develop a detailed proposal for OSSEs regarding LEO-LEO MW occultation and GNSS-RO&-reflectometry.	CGMS-46: Action remains open following WGII discussions.	CGMS-47 (1 Nov 2017, CGMS-46)	**OPEN**

- See the complete list of actions at:

  <https://irowg.org/workshops/irowg-7/>

More things to do

- Formulate **recommendations** of the **subgroups** (**Saturday morning**, Sunday – if needed ?)
- **Next IROWG workshop** – Q2 2021, **where**?
- Coordination with other planned workshops.

Thank you!

New actions from CGMS-47 (from draft report)

CGMS-47 ACTIONS - WGII					
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**	**Status**
CGMS	WGII 4	A47.03	Agencies assessing commercial radio occultation data are requested to present their efforts at IROWG-7 to facilitate community planning.	Sep 2019	**OPEN**
IROWG	WGII 4	A47.04	IROWG to provide recommendation on orbital planes in order to improve coverage.	??	**OPEN**
IROWG	WGII 4	A47.05	IRWOG to evaluate outcome of agency funded commercial weather data pilot following IROWG-7 and report to CGMS-48.	CGMS-48	**OPEN**
ROSHYDROMET	WGII 4	A47.06	Roshydromet to report on future plans for RO missions at WG II.	CGMS-48	**OPEN**
IROWG, WMO	WGII/4 (from WGIII)	A47.31	CGMS baseline and RO: IROWG and 7th WMO Impact Workshop needs to validate the current Baseline in terms of the coverage, number, quality and sampling of RO.	2020, CGMS-48	**OPEN**
IROWG	WGII/4 (from WGIII)	A47.32	IROWG to review the CGMS Baseline and validate wording that captures CGMS Member contribution to RO data in terms of coverage, number, quality and sampling; and share impact studies of RO data between the CGMS Baseline and WIGOS 2040 vision observing targets.	2019/ 2020	**OPEN**

CGMS