



# WMO Integrated Global Observing System WIGOS NEWSLETTER

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## 1. Global Basic Observing Network (GBON)

Global Numerical Weather Prediction (NWP) and climate reanalysis play essential roles as backbones for all products and services provided by the National Meteorological and Hydrological Services (NMHS) of the WMO Members to their constituencies, even at regional and local levels. Within the WMO Rolling Review of Requirements process, all application areas currently listed, with the sole expectation of Space Weather, have some level of dependency on Global NWP and climate reanalysis products.

The global systems delivering these products depend on access to globally consistent sets of observations provided by surface- and space-based observing systems. WMO facilitates, coordinates and monitors the collection and international exchange of such observations. Preliminary reports from the WIGOS Data Quality Monitoring System (WDQMS) NWP pilot show continued poor availability of surface-based observational data over many areas of the global domain (picture).

This limits the ability of all WMO Members to provide high quality weather and climate products and services to their constituencies. In order to substantially increase the observational data exchange to support NWP, the WMO Executive Council decided at its 70th Session to launch a new approach, in which the basic surface-based observing network that is essential to support these applications is designed, defined and monitored at the global level. This network is the Global Basic Observing Network, GBON.

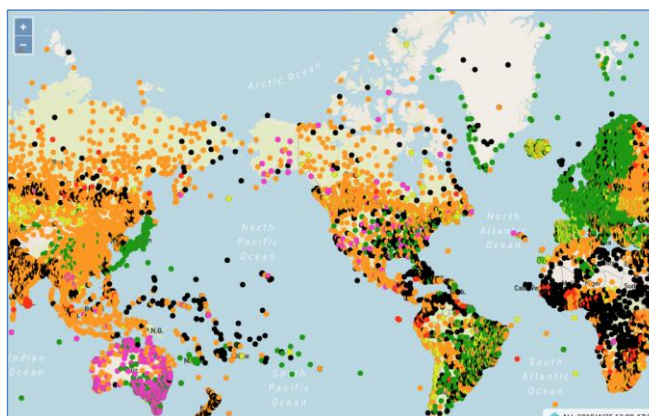
The GBON is a subset of the surface-based subsystem of WIGOS, used in combination with the space-based subsystem and other surface-

based observing systems of WIGOS, to contribute to meeting the requirements of Global NWP, including reanalysis in support of climate monitoring. The GBON responds to Global NWP requirements that cannot currently be met, or fully met, by space-based observing systems alone.

Design, implementation and management of the GBON will be defined in the draft Manual on the WMO Integrated Global Observing System (WMO-No. 1160). GBON provisions will specify the obligations of Members to acquire certain specific observation – in particular surface and upper-air observations – at set minimum spatial and temporal resolutions. The use of clear, quantitative targets in the provisions will be helpful to Members in selecting the stations that will form part of the network, and it will greatly facilitate the monitoring of compliance.

With the implementation of GBON, WMO is poised to take an important step in improving observational support for critical global NWP and climate analysis systems, with substantial benefits to all WMO Members expected as result.

In some parts of the developed world, the GBON requirements are already met. In other parts of the world, observations that would meet the requirements are made, but not currently exchanged internationally. However, in some developing countries, the GBON requirements cannot currently be met using national resources alone. Fortunately, the international community is ready to help, as evidenced by the sheer number of already ongoing or imminent development projects involving observing systems. The GBON provisions will provide a clear focus for the design, implementation and evaluation of such projects, which will help ensure that no country is left behind in the implementation of this new network.



## 2. Outcomes of the eight Session of the ICG-WIGOS, 24-26 January 2019, Geneva, Switzerland

*SUMMARY: After considerable efforts by regional and technical commission leaders and experts, and excellent guidance and support by the WIGOS Project Office, the WIGOS pre-operational phase concludes by the end of 2019 and WIGOS operational phase is expected to commence in 2020. The work is not yet complete, however, and it is essential to retain momentum on many aspects, not least establishing Regional WIGOS Centres, implementing the Global Basic Observing Network (GBON) and continued integration of observing system components across WMO, as we prepare to enter the eighteenth financial period and, especially, as the organization transitions into the new constituent body structure.*

The Eighth Session of the Inter-Commission Coordination Group on WIGOS was held at the WMO Secretariat in Geneva, Switzerland, from 24 to 26 January 2019. The session was co-chaired by Dr Sue Barrell (Australia) and Prof Bertrand Calpini (Switzerland), Co-Chairs of ICG-WIGOS.

Dr W. Zhang, Assistant Secretary General, highlighted the importance of the meeting as the last opportunity to review the status of WIGOS implementation ahead of the 18th World Meteorological Congress (Cg-18) in June 2019. He stressed the importance of WIGOS for Members and the success of WIGOS as a WMO project, emphasising the effectiveness of ICG-WIGOS as a powerful coordination mechanism. ICG-WIGOS reviewed progress in the five key priority areas of the WIGOS pre-operational phase (2016-2019), and achievements of the ICG-WIGOS Task Teams. It expressed its appreciation for the progress achieved and thanked all involved experts and contributors.

The GBON is a key WIGOS initiative, aimed at securing observational data for critical global weather and climate applications. The meeting addressed the following questions: 1) Why is it important to have weather and climate observations everywhere on the globe? 2) What do we need to measure from the surface? 3) Why and where are we currently missing observations? 4) What is WMO doing about this problem? 5) What is the expected impact of GBON on WMO Members?

The Observing Systems Capability Analysis and Review tool for surface-based observations (OSCAR/Surface) and WIGOS Data Quality Monitoring System (WDQMS) will play an important role in the process of designating GBON stations by Members. ICG-WIGOS recommended that Members should adopt the following approach in nominating stations into GBON and RBON: 1) Members designate stations into GBON by themselves using OSCAR/Surface; 2) OSCAR/Analysis and WDQMS is used to monitor compliance of Members with regard to GBON and RBON requirements; 3) Gaps are identified and communicated to Members, requesting them to take action as needed.

ICG-WIGOS reviewed progress in establishing Regional WIGOS Centres (RWC), which has been slower than hoped, and shared experiences in the approaches adopted by different regional associations. It was agreed that a strong network of RWCs is critical to effective national implementation of WIGOS.

Looking ahead to the outcome of Cg-18 and next steps, ICG-WIGOS considered and agreed on six main priority areas for the initial part of the WIGOS Operational Phase, 2020-2023. They are: (1) National WIGOS implementation; (2) Implementation of the GBON and the RBON; (3) Operational deployment of the WDQMS; (4) Operational deployment of Regional WIGOS Centres; (5) Further development of the OSCAR and integration with other system elements; (6) Fostering a culture of compliance with the WIGOS technical regulations.

## 3. Outcomes from the RA II WIGOS Workshop - Regional WIGOS Centres (RWCs) and its services for Members, 6-9 March 2019, Tokyo, Japan

Japan Meteorological Agency (JMA) hosted the [RA II WIGOS Workshop](#) at its headquarters in Tokyo, Japan, from 6 to 9 March 2019. The workshop was co-organized by the WMO Secretariat. The objectives of the workshop were: (i) to foster mutual understanding of WIGOS key issues and systems, including OSCAR/Surface and the WDQMS; (ii) to facilitate practical discussions on collaboration between RWCs and Members to improve the availability and quality of observations; and (iii) to share information on RWC services with Members in line with appropriate users' requirements.

The workshop was attended by 21 experts from 17 NMHSs, from RA II (Bangladesh, Bhutan, China, India, Lao People's Democratic Republic, Maldives, Mongolia, Myanmar, Nepal, Pakistan, Russian Federation, Saudi Arabia, Sri Lanka, Thailand, United Arab Emirates, Viet Nam and Japan) and RA V (Philippines). The Workshop programme also included contributions provided by experts from Japan International Cooperation Agency (JICA), Japan Aerospace Exploration Agency (JAXA), Japan Weather Association (JWA), National Institute of Information and Communications Technology (NICT), particularly on satellite-based precipitation dataset (GSMaP), satellite-based air quality monitoring, new remote sensing technology and low-cost instruments and advanced weather analysis map. Alongside the workshop, several meteorological instrument manufacturers exhibited their products.

The Workshop participants developed a number of recommendations. Among others, they highlighted the importance of Siting Classification and Measurement Quality Classification schemes for their services, and expressed proposals and support towards update of the former scheme and finalization of the latter.

The participants also stressed the need for additional training in OSCAR/Surface and for guidance on the assignment of WIGOS Station Identifiers (WSI). It was emphasized that RWCs should align closely with the Global Information System Centres (GISCs) and other WMO centres wherever possible and that they should provide appropriate support in capacity development to Members.

The presence of representatives of China, India, Japan, the Russian Federation and Saudi Arabia, who all are intending to operate RWCs for RA II in pilot mode, allowed for initial discussions on coordinated support and complementary functionalities of RWCs, aiming at maximizing the potential benefits to the Members in the region. This discussion on coordination and harmonization of RWCs in RA II should continue at the next RA II WIGOS Workshop scheduled in Jeddah, Saudi Arabia, from 30 April to 2 May, 2019.



Participants to the RA II Workshop (RWC), Tokyo Japan

## 4. WIGOS Station Identifiers (WSI) transition plan - Actions/timeline

The implementation of the WIGOS Station Identifiers (WSI) is a mandatory action for WMO Members and Regions. It has been approved by Congress-17 (2015) to enter into force from 1st July 2016, to be implemented throughout the WIGOS pre-operational phase (WPP 2016-2019). So, now, taking into account that the end of the WPP is approaching and that other related indicators of WIGOS implementation, such as the OSCAR/Surface being populated and updated with WIGOS metadata, and also taking into account the requirements of the Global Basic Observing Network (GBON draft concept) it is critical that both observations providers and users move from the implementation/pre-operational phase to become operational from 2020 onwards. The actions required to become WIGOS compliant are as follows:

### A) Assigning of WSIs:

WIGOS Identifier Series (number=0)	Issuer of Identifier (number)	Issue Number (number)	Local Identifier (characters)
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- For new stations, i.e. both the ones that didn't exist before 1 July 2016 (or started to operate after this date), as well as stations that existed before July 2016 but were never affiliated with a WMO Programme (so never received a WMO ID),

Members are requested to develop their WSI national schemas – this means using the 3-digits ISO Country code in the Issuer of Identifier (2<sup>nd</sup> block) and defining the national rules for distributing the numbers in the Issue Number (3<sup>rd</sup> block) and in the Local Identifier (4<sup>th</sup> block) for the stations in their territory;

- The observing stations that were registered in WMO-No.9, Volume A prior to July 2016 have been migrated into OSCAR/Surface with WSIs being assigned automatically, using the range 20000-20010 in the 2<sup>nd</sup> block, with “0” in the 2<sup>nd</sup> block and with the traditional WMO ID in the 4<sup>th</sup> block.

B) To allow moving into operational use of WSI, Members are recommended to assess and implement any updates needed in their software/hardware to become compatible with WSI. Their IT systems involved in data encoding and transmission/collection, as well as their observations databases and data visualization systems should be considered.

C) To allow the exchange of observations internationally, Members are requested to include the WSI in the BUFR messages for “new stations”, and are recommended to transmit both, the WMO 5-digit IDs and the WSI for stations that existed in Vol.A by July 2016. Members are also requested to send advance notification to WMO (3-6 months before) about their plans to start exchanging BUFR reports internationally that include the WSI.

For testing purposes Members are strongly encouraged to provide BUFR reports to the experiment area of the European Centre for Medium-range Weather Forecasts (ECMWF), any time before 31 December 2019 – details how to access that area are available at:

<http://www.wmo.int/pages/prog/www/wigos/WSI.html>.

The actions A) to C) are expected to be completed by December 2019, to enable Members to start the operational exchange of observations from new stations, in **BUFR messages containing WSIs, from January 2020 onwards.**

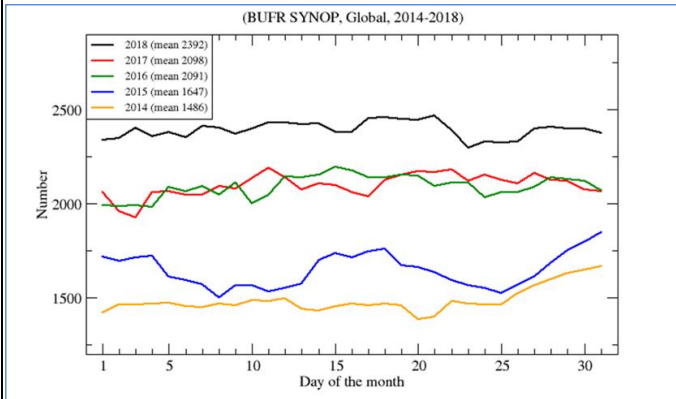
National Focal Points for WIGOS and National Focal Points for OSCAR/Surface are requested to use the WMO regulatory and guidance material available at: <http://www.wmo.int/wigos>.

For further assistance, questions/comments about WSI please kindly contact the WIGOS PO!

## 5. Global Cryosphere Watch: Improvements in the international reporting of Snow Depth

The assimilation of snow-depth data has a demonstrated positive impact on the predictability of numerical weather prediction (NWP) and hydrological forecasting. In recent years, in the context of the normative work of the Global Cryosphere Watch (GCW), the international exchange of snow depth data has been strongly encouraged and supported with the adoption of Resolution 15 (Sixty-ninth Session of WMO's Executive Council - EC-69),

requesting Members to exchange in-situ snow measurements in real time in BUFR through GTS, and to contribute to the derivation of regional cryosphere products, for example, regional snow trackers. The Figure 1 summarises the increase in the number of distinct SYNOP stations reporting snow depth data in BUFR SYNOP in WIS, for the month of December of each year, from 2014 to 2018.



SYNOP Stations reporting snow depth in WIS, in December

Furthermore, recognizing the relevance of snow water equivalent of snow cover (SWE) for data assimilation, as a model prognostic variable for hydrological and NWP applications, an additional BUFR table was adopted in 2018, as a collaborative effort between GCW, the Inter-Programme Expert Team on Code Management (IPET-CM) of the Commission for Basic Systems (CBS), and the European Centre for Medium-Range Weather Forecasts (ECMWF).

This new BUFR Table facilitates the exchange in real time of snow depth, snow water equivalent of snow cover, and of snow density. As many programs and institutions measure these variables, the Snow Watch Team of GCW seeks the cooperation of Members to facilitate the exchange of their data on WIS, from all potential sources.

The discoverability of stations reporting these variables has remained a challenge, thus limiting the use of their data for specific applications, as noted above. This is due to the fact that many of them are not registered in OSCAR/Surface, at all. In other cases, stations are in OSCAR/Surface, however their snow observations are not included in the station Observations/Measurement profile. The registration in OSCAR/Surface of all stations which observe cryosphere variables, e.g. snow depth, is one of the priorities of GCW, as it enters its preoperational phase.

Members are invited to further implement Resolution 15 (EC-69), and increased the availability of snow depth, SWE, and snow density on WIS. Additionally, Members are invited to register in OSCAR/Surface their stations reporting these variables. These contributions are critical to ensuring that the demonstrated positive impacts on NWP and hydrological forecasting are further enhanced.

## 6. Joint Meeting of the GCOS Panels, Marrakesh, Morocco, 18-22 March 2019

A joint meeting of the three Global Climate Observing System (GCOS) Panels (Atmospheric Observation Panel for Climate - AOPC, Ocean Observation Panel for Climate - OOPC and Terrestrial Observation Panel for Climate - TOPC) took place in Marrakesh, Morocco, from 18-22 March 2019.

The meeting brought together the three GCOS expert panels, as well as the World Climate Research Programme (WCRP) Data Advisory Council (WDAC) and the Joint group of the Committee on Earth Observation Satellites Agencies (CEOS) and the Coordination Group for Meteorological Satellite (CGMS) Working Group on Climate (WGClimate). Over 80 people attended.

This meeting was the start of the process of revising the GCOS Implementation Plan in 2022. The overall aim was to achieve a common understanding of the needs of stakeholders for climate observations and of how GCOS and WCRP should achieve their strategic goals. Observational data needs arising from the Intergovernmental Panel on Climate Change (IPCC) reports; the earth observations needed to support of the UN Framework Convention on Climate Change (UNFCCC) and its Paris agreement; and the observational needs for the national Green-house gases (GHG) inventories were discussed and considered.

The meeting also focused on the climate observations needed to fully monitor the Earth's water and carbon cycles, energy balance and biosphere, identifying gaps and improvements.

The main overarching conclusions were the need for commitment to long-term, sustained climate observation systems, the need for open access to climate observations, irrespective of source, and for high-quality, traceable, observations for accurate long-term monitoring, which are all aligned with the WIGOS principles.

The GCOS panels, WDAC and WGClimate subsequently met separately to work on their individual agenda. A report will be available soon.



Participants to the Joint Meeting of the GCOS Panels, Marrakesh, Morocco

## 7. School of Atmospheric Measurements in Latin America and the Caribbean: Atmospheric Particles and Reactive Gases (SAMLAC) San Juan, Puerto Rico, 12-17 November 2018

The School of Atmospheric Measurements in Latin America and the Caribbean: Atmospheric Particles and Reactive Gases (SAMLAC) took place in San Juan, Puerto Rico, from 12 to 17 November 2018. Students from the Latin American and Caribbean regions came together to learn about aerosols and reactive gases measurements techniques. The school was organized by the International Global Atmospheric Chemistry (IGAC) Project Americas Group, the International Commission on Atmospheric Chemistry and Global Pollution (ICACGP) and WMO's Global Atmosphere Watch Programme (GAW). SAMLAC goals were to:

- Improve regional capacity and stimulate the development of aerosol and reactive gases monitoring programs (regional and national) that can contribute with their data to regional and international projects and networks.
- Foster the building of a community of atmospheric scientists in the Latin America and the Caribbean (LAC) region in order to provide expertise on topics related to atmospheric composition and its relation to anthropogenic emissions and natural variability to government agencies and international research.
- Educate early career scientists from the LAC region on global and regional aspects of atmospheric composition change and atmospheric composition monitoring.
- Promote best practices of open data sharing and open access publication within the LAC region.

The 6-day training school included: (1) 17 classes on topics related to atmospheric particles and reactive gases, (2) 11 short talks on studies and opportunities related to atmospheric particles and reactive gases in the LAC region, (3) a poster session that included 34 excellent presentations, (4) a session on collaborative proposals, (5) three side meetings (IGAC Americas Working Group AWG, WMO's Sand and Dust Storm Warning Advisory and Assessment System - SDS WAS, and the Caribbean Aerosol Health Network - CAHN), and (6) a field trip to the GAW station Cape San Juan Atmospheric Observatory (CSJAO).

SAMLAC brought together internationally recognized lecturers and speakers in atmospheric measurements to give lectures and present studies and opportunities in the LAC region, representing many diverse organizations including scientists from GAW Aerosols and Reactive Gases Scientific Advisory Groups.

The lectures covered topics such as: Measurements of reactive gases (O<sub>3</sub>, CO, NO<sub>x</sub>, VOCs), quality control of trace gas observations, aerosol's mechanical properties & filters, aerosol artefact-free sampling & online mass monitors, particle counter & particle size spectrometer, data analysis, requirements for global networks for short-lived atmospheric species, and data submission procedures (WMO/EBAS database hosted by the Norwegian Institute for Air Research – NILU).

In the field trip to CSJAO, in the Fajardo municipality, the participants visited the reconstructed station that was devastated by Hurricane Maria on 20 September 2017. CSJAO also hosts the Atmospheric Chemistry and Aerosols Research group (ACAR) of the University of Puerto Rico - Rio Piedras where they perform their research studies.



Participants at the SAMLAC San Juan, Puerto Rico, 12-17 November 2018

## 8. OSCAR/Surface related activities

In April 2019 two OSCAR/Surface training courses took place: one in Dakar, Senegal, for French speaking countries of Regional Association I (Africa) with 35 participants from 17 Member states, and another one in Muscat, Oman for West Asia countries of RA II with 17 participants from 6 Member states. Both training courses followed a more practical approach compared to earlier courses, using the online learning platform Moodle. We are currently extending the interactive learning material available on Moodle. In the near future there will be a *self-learning* Moodle online course to train staff in OSCAR/Surface or refresh knowledge on OSCAR/Surface including videos, online quizzes and other interactive material. Some information material, such as presentations, a recording of the OSCAR/Surface webinars, which take place once a month, our blog and the forum can already be found at the [OSCAR/Surface Resources Portal](#).



Participants to the OSCAR/Surface training course, Dakar, Senegal



Participants to the OSCAR/Surface training course, Muscat, Oman

The ICG-WIGOS Task Team on OSCAR Development (TT-OD) launched on March 25<sup>th</sup> a user survey to assess the functionality and usability of OSCAR/Surface. The survey is available in all WMO languages and users of OSCAR/Surface are encouraged to participate in the survey to share their opinion on current features as well as functions that could be added in the future. Completing the survey takes around 25 minutes. The survey can be accessed [here](#) until middle of May 2019 (Arabic, Chinese, English, French, Russian, Spanish).

## 9. WIGOS Related Events/Meetings

### 9.1 Recent Events/Meetings

- 👉 Technical Workshop on Enhancing ocean observations and research, and the free exchange of data, to foster services for the safety of life and property, 5-6 February 2019, Geneva, Switzerland
- 👉 WMO Role in the Architecture for Climate Monitoring from Space, 6 February 2019, and 14th Meeting of the Sustained, Coordinated Processing of Environmental Satellite Data for Climate Monitoring Executive Panel (SCOPE-CM-14), 7-8 February, Geneva, Switzerland
- 👉 The fifth meeting of the Inter-Programme Expert Team on Satellite Utilization and Products (IPET-SUP-5), 11-13 February 2019, Geneva, Switzerland
- 👉 Meeting of the Expert Team on Telecommunications Infrastructure (ET-CTS), 11-15 February 2019, Buenos Aires, Argentina
- 👉 Extraordinary Session of the Commission for Hydrology (CHy-Ext.(2019)), 13-14 February 2019, Geneva, Switzerland
- 👉 TOPC Task Team Global Climate Observations for Adaptation, 13-21 Feb. 2019, Geneva, Switzerland
- 👉 Planning meeting for the Upper Air Instrument Intercomparison 2021, 19-21 Feb. Payerne, Switzerland

- 👉 Regional Conference of RA I-17 (RECO), 18-19 February 2019 and Fourth Session of the African Ministerial Conference on Meteorology (AMCOMET-4), 20-21 February 2019, Cairo, Egypt
- 👉 The Seventeenth session of the Regional Association I (RAI-17), 21-23 Feb. 2019, Cairo, Egypt
- 👉 Regional 2019 Latin American Dobson Intercomparison Campaign, 4-22 March 2019, Buenos Aires, Argentina
- 👉 Steering Group on Radio Frequency Coordination (SG-RFC), 5-7 March 2019, Toulouse, France
- 👉 RA II WIGOS Workshop – Regional WIGOS Centres (RWCs) and its services for Members, 6-9 March 2019, Tokyo, Japan
- 👉 MOXXI 2019 International Conference "Innovation in Hydrometry: Overcoming Barriers to Operationalization", 11-13 March 2019, New York City, US
- 👉 Joint meeting of the CBS Expert Team on WMO Information System Centres (ET-WISC) and Task Team on Data Centres (TT-DC), (2019 Joint ET-WISC-TT-DC), 12-15 March 2019, Beijing, China
- 👉 GCOS Joint Panels Meeting, 8th Session of the WCRP Data Advisory Council, WG Climate, 18-22 March 2019, Marrakesh, Morocco
- 👉 Symposium on "The Unexpected Increase in Emissions of Ozone-Depleting CFC-11", 25-27 March 2019, Vienna, Austria
- 👉 10<sup>th</sup> Meeting of the Ship Observations Team (SOT-10), 1-4 April 2019, Hong Kong, China
- 👉 Thirty-sixth training session of the Global Atmosphere Watch Training and Education Centre (GAWTEC 36), 1-12 April 2019, Zugspitze, Germany
- 👉 Tenth session of the JCOMM Observations Coordination Group (OCG-10), 8-11 April 2019, Jakarta, Indonesia
- 👉 OSCAR/Surface training course for French speaking countries of RA I, 9-11 April 2019, Dakar, Senegal
- 👉 Third Meeting of the Inter-Programme Expert Team on Codes Maintenance (IPET-CM-3), 15-19 April 2019, Marrakech, Morocco
- 👉 OSCAR/Surface training course for RA II/West Asia, 16-18 April 2019, Muscat, Oman
- 👉 RA II Workshop on Regional WIGOS Centres for West Asia, 30 April-2 May 2019, Jeddah, Saudi Arabia

### 9.2 Coming Events/Meetings

- 👉 Meeting of the Scientific Advisory Group for Ozone and Solar UV Radiation 6-9 May 2019, Geneva, Switzerland
- 👉 19<sup>th</sup> Meeting of the Commission for Basic Systems Management Group (CBS-MG-19), 13-16 May 2019, Geneva, Switzerland
- 👉 47<sup>th</sup> Session of the Coordination Group for Meteorological Satellites (CGMS-47), 19-24 May 2019, Sochi, Russian Federation

- ☞ 11<sup>th</sup> GRUAN annual Implementation and Coordination Meeting ICM-11, 20-24 May 2019, Singapore
- ☞ Eighteenth World Meteorological Congress (Cg-18), 3-14 June 2019, Geneva, Switzerland
- ☞ Seventy-first session of the Executive Council (EC-71), 17-19 June 2019, Geneva, Switzerland
- ☞ UAV Workshop, 2-4 July 2019, Toulouse, France
- ☞ GCW Snow Watch Team Third meeting, 17-19 July 2019, Montreal Canada
- ☞ Steering Group on Radio Frequency Coordination (SG-RFC) meeting, July 2019, TBD
- ☞ OceanObs'19 Conference, 16-20 September 2019, Honolulu, Hawaii, USA
- ☞ XIV Intercomparison campaign of the Regional Brewer Calibration Center-Europe, 17-28 June 2019, and 17th WMO-GAW Brewer operator course, 17-21 June 2019, Huelva, Spain
- ☞ Training on Air Quality Observation, 21-23 May 2019, Dakar, Senegal

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### Thanks to:

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Dr Patricia de Rosnay

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