

# GCOS Update for ICM-11

GCOS Secretariat



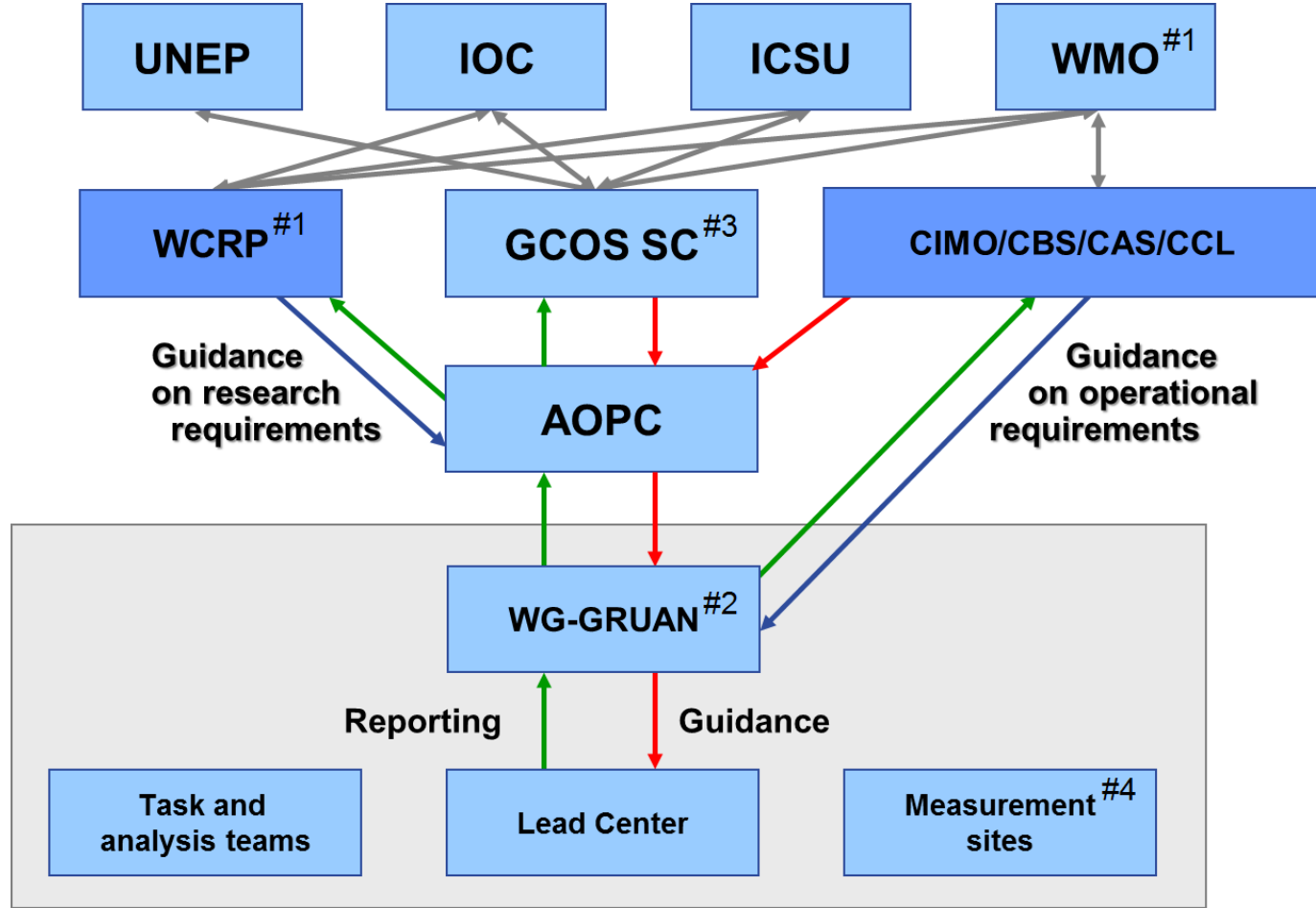
**GLOBAL CLIMATE  
OBSERVING SYSTEM**

KEEPING WATCH OVER OUR CLIMATE



# GCOS – Global Climate Observing System

- **GCOS is a programme** co-sponsored by the World Meteorological Organization (WMO), the Intergovernmental Oceanographic Commission (IOC) of United Nations Educational, the Scientific and Cultural Organization (UNESCO), the United Nations Environment Programme (UNEP) and the International Science Council (ISC).
- **GCOS is a system of system:** It comprises any data and information on the climate system taken by in situ, airborne or space-based techniques and platforms, while the ownership of the observing systems and networks will remain fully with their operating entities. Many of the observing systems contributing to the GCOS network in many cases they also serve other functions, such as weather forecasting or air-quality monitoring
- **It regularly assesses** the status of global climate observations of the atmosphere, land and ocean and produces guidance for its improvement.
- **GCOS works** towards a world where climate observations needed to address climate-related issues are accurate and sustained, and access to climate data is free and open.
- **Three scientific panels**, reporting to the Steering Committee, maintain definitions of Essential Climate Variables (ECVs) which are required to systematically observe Earth`s changing climate: **AOPC – TOPC - OOPC**



**DWD and the GCOS Secretariat** have agreed on a list of task to be carried out by the GCOS Secretariat in support of the Lead Centre, which includes:

- Report for ICM meeting and general contribute to organizing the ICM meeting
- Political aspects of the network expansion
  - [Letter to invite Arrival Heights station \(New Zealand\) as a GRUAN candidate site \(April 2019\)](#)
  - Letter to invite Neumayer station (Germany) as a GRUAN candidate site (November 2018)
  - Letter asking for support for XilinHot station (China) (November 2018)
  - Letter to NZ PR to thank for support for Lauder and Invercargill (November 2018)
  - Letter to Australian PR to thank for supporting nomination of Alice Springs, Darwin, Davis, Macquarie Island and Melbourne to join GRUAN and suggest step forwards (June 2018)
  - [Contact with Italian PR to assign a WMO index to the Potenza site \(June 2018\)](#)

## **Liason with AOPC:**

- Nomination of co-chair
- Updated Composition and terms of reference for the Working Group on GRUAN

# WMO STRATEGIC PLAN 2020-30

VISION 2030

A world where **all nations**, especially the **most vulnerable**, are **more resilient** to the **socioeconomic impact** of **extreme weather, climate, water** and other **environmental events**, and **empowered** to boost their **sustainable development** through the **best possible weather, climate and water services**

OVERARCHING PRIORITIES

Preparedness for, and reducing losses from hydrometeorological extremes	Climate-smart decision-making to build resilience and adaptation to climate risk	Socioeconomic value of weather, climate, hydrological and related environmental services
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CORE VALUES

Accountability for Results and Transparency	Collaboration and Partnership	Inclusiveness and Diversity
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LONG-TERM GOALS

<p><b>1</b> <b>Services</b></p>  <p>Better serve societal needs</p>	<p><b>2</b> <b>Systems</b></p>  <p>Enhance Earth system observations and predictions</p>	<p><b>3</b> <b>Science</b></p>  <p>Advance targeted research</p>	<p><b>4</b> <b>Support to Members</b></p>  <p>Close the capacity gap</p>	<p><b>5</b> <b>Smart Organization</b></p>  <p>Strategic realignment of structure and programmes</p>
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STRATEGIC OBJECTIVES

FOCUSED ON 2020-23

<ul style="list-style-type: none"> <li>Strengthen <b>national multi-hazard early warning/alert systems</b></li> <li>Broaden provision of <b>policy- and decision-supporting climate, water and weather services</b></li> </ul>	<ul style="list-style-type: none"> <li>Optimize <b>observation data acquisition</b></li> <li>Improve access to, exchange and management of <b>Earth system observation data and products</b></li> <li>Enable access and use of <b>numerical analysis and prediction products</b></li> </ul>	<ul style="list-style-type: none"> <li>Advance <b>scientific knowledge of the Earth system</b></li> <li>Enhance <b>science-for-service value chain</b> to improve predictive capabilities</li> <li>Advance <b>policy-relevant science</b></li> </ul>	<ul style="list-style-type: none"> <li>Enable developing countries to <b>provide and utilize essential weather, climate, hydrological and related environmental services</b></li> <li>Develop and sustain <b>core competencies and expertise</b></li> <li>Scale up <b>partnerships</b></li> </ul>	<ul style="list-style-type: none"> <li>Optimize WMO constituent <b>body structure</b></li> <li>Streamline WMO <b>programmes</b></li> <li>Advance <b>equal, effective and inclusive participation</b></li> </ul>
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# ALIGNMENT OF WMO STRUCTURE

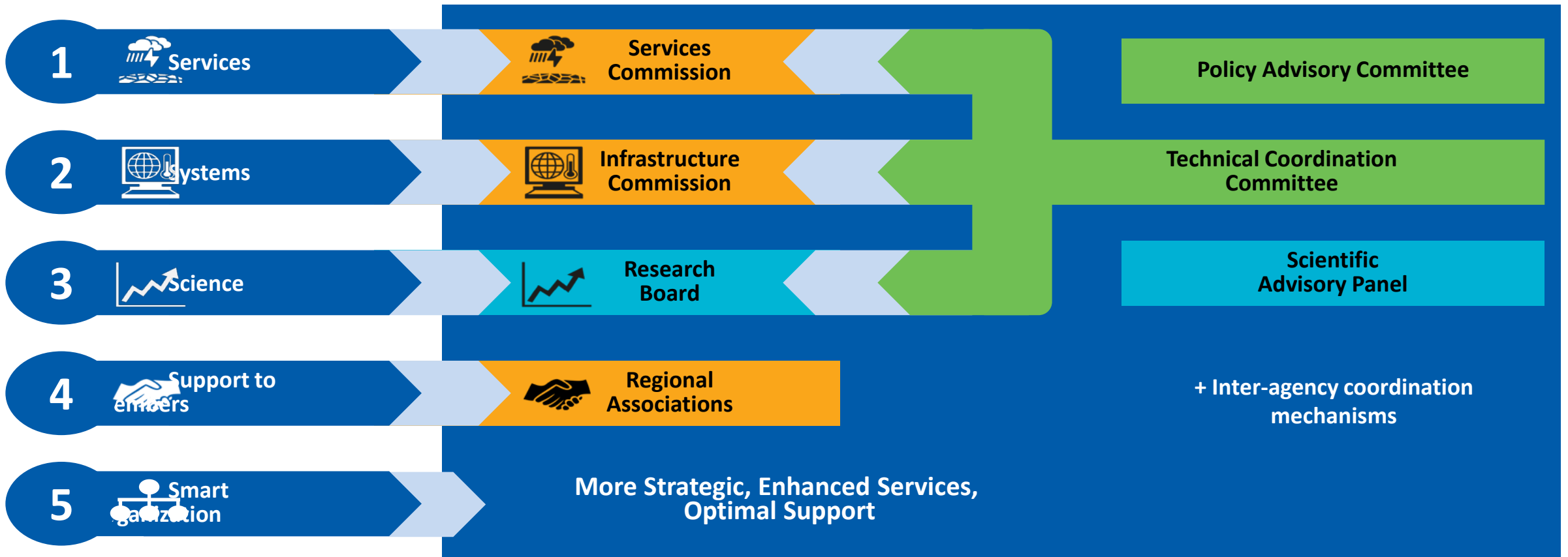
## Strategic Plan

Long-term Goals

## Global Lead/Regional Expertise

## Executive Council

Policy, Coordination, Integration, Foresight



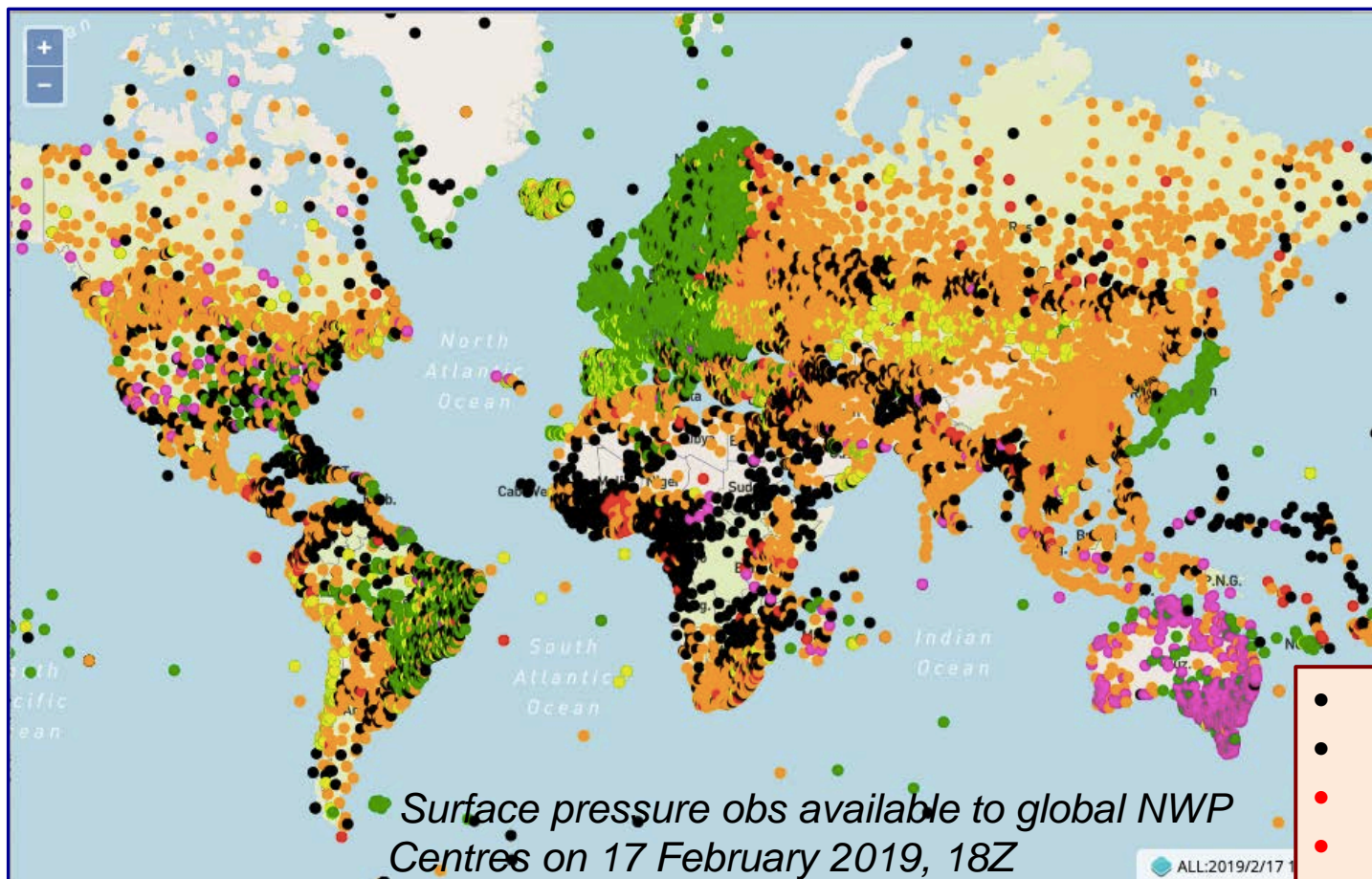
# The WMO Global Basic Observing Network (GBON)

Continuous and timely supply of observational data from the entire globe to global NWP and climate analysis systems is **vital to the product generation and service delivery capabilities of all WMO Members**

Many areas of missing or insufficient data: Lost opportunities to generate better products and services world-wide

The current observational data exchange **falls short of agreed requirements**, this limits the ability of all WMO Members to analyze and predict weather and climate at all time-scales;

- Green: Fully reporting (hourly)
- Orange: Partly reporting (mostly 3-hourly)
- **Red: Few reports (mostly daytime only)**
- **Black: Silent stations**
- (Purple or yellow: metadata problems)



With the aim of improving the exchange of observational data for global NWP, EC-70 (June 2018) requested: *CBS to develop an overarching design and concept for the **Global Basic Observing Network (GBON)** that meets threshold requirements for Global Numerical Weather Prediction and Global Climate Monitoring (Analysis) according to WMO Rolling Review of Requirements*

- *This will be discussed at Cg-18, and provisions will be developed by new Infrastructure Commission and submitted to EC-72 for approval*

**Initial focus:** for surface-based observations, especially surface pressure and upper-air soundings (radiosondes)

GBON provisions proposed to Congress-18 will **clarify obligations of WMO Members** and will help significantly improve the service delivery capabilities of all Members:

- Better global coverage, leading to better global NWP output
- Ensuring international data exchange leads to massive global multiplier on investment in observations



## Four categories of implementation (examples):

- Members already complying with the GBON provisions - (e.g. Japan, Western Europe) – no further action is needed;
- Members where GBON-compliant observations are made, but not currently exchanged, (e.g. USA, China) - new data exchange practices must be adopted;
- Members with insufficient national resources, (e.g. parts of Africa, Caribbean, South Pacific); use GBON to help steer internationally funded development projects toward integrated observing systems set up for international data exchange;
- Areas where GBON requirements are not met due to geographic constraints; (e.g. Indian Ocean, North Pacific) – opportunities for new technologies, satellite remote sensing.

## GCOS Steering Committee

Number	Action	Responsibility
SC-26/10	Ensure consistency between GBON and GUAN...	AOPC
SC-26/25	GCOS Secretariat to ensure that panels will be informed about the GBON concept . Panels to consider GBON in related network designs. Recognise the support of GCOS Cooperation Mechanism to GBON.	GCOS Secretariat Panels GCOS Network Manager

## Part 1 - Information on gaps and needs:

### Quality, traceability and consistency of observations:

- Traceability is important, both for the observations themselves and for derived information. It is important to ensure high quality observations for climate change detection, projection and services.
- Observations of different ECV need to be consistent with each other.

### Sustainable Observing Systems:

- Sustained observing systems are needed to ensure long-term climate records and support climate change detection. Funding should support observations, data archiving and distribution.
- In particular, sustained funding is needed for reference networks.

### Open Data:

- There is a need to develop organized access to the large number of datasets. This is already being done by COPERNICUS (organizing data and its QA/QC for Europe) and the ECV Inventory for satellite data.
- Free and open data is also needed for services. GCOS may need to distinguish between the downstream data that may be more commercial and the core datasets with open access.

## Part 2 - Studying:

- **Observations to fully monitor the Earth's water and carbon cycles, energy balance and biosphere.** Ensure that climate observations are enhanced and continued into the future
  - Work in progress – in many cases science needs to progress further before GCOS can respond
- **Observations for adaptation**
  - Panels were encouraged to review if their ECVs were fit for purpose of contributing to adaptation monitoring
- **Cross-Panel discussions**
  - **Air/sea energy fluxes:** workshop on surface radiation, with the objective to ensure consistency for the radiation products between ocean and land; need of high resolution vertical profile of temperature and humidity
  - **Coastal-Land-Ocean-Water Fluxes**
  - **Extremes:** GCOS to monitor frequency and intensity of extremes. Next status report to consider the capacity of the global climate observing system to monitor extremes

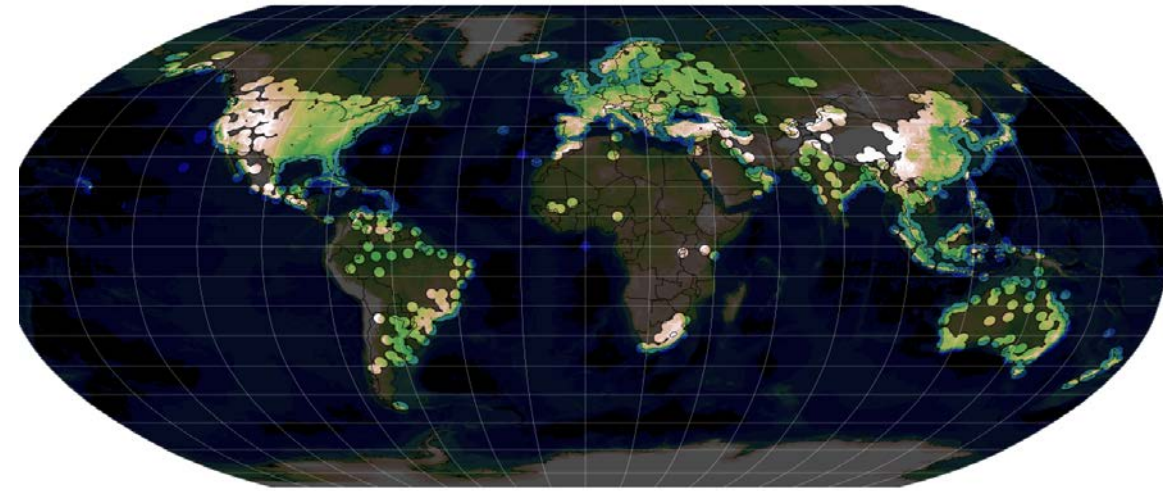
### Part 3 – Individual Panels - AOPC-24

#### ECV requirements (user requirements)

- Name of ECV Products – Definition - measurement units in SI units
- Resolution: temporal sampling, minimum temporal resolution, horizontal and vertical resolution, timeliness needed by users
- Measurement uncertainty (includes both random and systematic components).
- Stability: The maximum permissible cumulative effect of systematic changes of the measurement system to allow long-term climate records compiled from assorted measurement systems/satellites etc.
- References, Standards and notes

### Radar for Climate

- In collaboration with WMO, requirements for radar data for use in climate monitoring have been defined.
- Recommendations include an international portal to allow harmonized access to radar data, metadata and documentation. Formulate the correct terms for this recommendation need to be formulated, submitted to WMO and worked together with the Inter-Programme Expert Team on Operational Weather Radars (IPET-OWR)



### Lightning Observations for climate



With WMO, current observation requirements were reviewed. Metadata standards and global standards for data management were defined.

- Engage the expert team on Surface Based Observations (ET-SBO) and form a joint task team.
- Continue to support the collaboration between the TTLOCA and GRUAN on the Global Electric Circuit  
1 additional year

## The GCOS Surface Reference Network (GSRN):



GSRN will support WMO Integrated Global Observing System aiming to meet the “goal” requirements in the WMO OSCAR requirements database. It is proposed that the GSRN be sponsored by WMO and the Bureau International des Poids et Mesures (BIPM).

- approval of the proposed GSRN by relevant WMO programmes, the GCOS programme and other sponsors;
- an offer to host and staff appropriately a Lead Centre;
- offers of suitable sites for an initial GSRN.
- 2 additional years

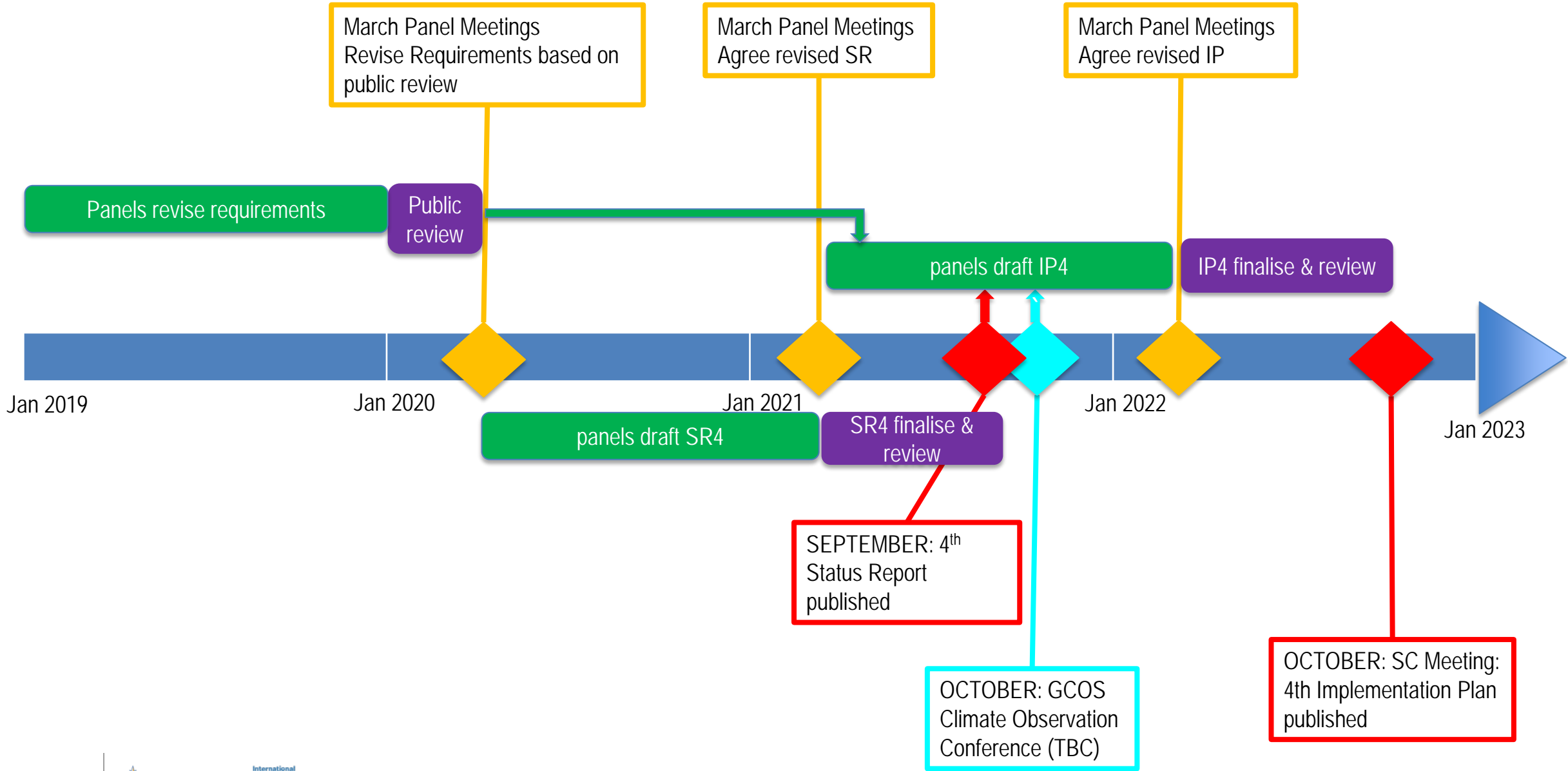
## The GCOS Upper-Air Network Task Team (GUAN TT)

The ongoing value of the GUAN was supported by the Global Basic Observation Network meeting (July 2018). WMO reinforced the benefits of GUAN.

- GCOS will work on an updated GUAN in collaboration with the GBON proposal:
- GUAN should either be a baseline component of GBON or it should be replaced with GBON



# Timeline



## Relevant IP actions for GRUAN

Action A15:	Implementation of GRUAN
Action	Continue implementation of the GCOS Reference Upper-Air Network of metrologically traceable observations, including operational requirements and data management, archiving and analysis and give priority to implementation of sites in the Tropics.
Benefit	Reference quality measurements for other networks, in particular GUAN, process understanding and satellite cal/val.
Who	Working Group GRUAN, National Meteorological Services and research agencies, in cooperation with AOPC, WMO CBS, and the Lead Centre for GRUAN.
Time-frame	Implementation largely complete by 2025.
Performance Indicator	Number of sites contributing reference-quality data-streams for archive and analysis and number of data streams with metrological traceability and uncertainty characterisation. Better integration with WMO activities and inclusion in the WIGOS manual.
Annual Cost	10-30M US\$



Action A22: Measure of water vapour in the UT/LS	
Action	Promote the development of more economical and environmentally friendly instrumentation for measuring accurate water vapour concentrations in the UT/LS.
Benefit	Improved UT/LS water vapour characterisation, water vapour CDRs.
Who	NMSs, NMIs, HMEI and GRUAN.
Time-frame	Ongoing.
Performance Indicator	Number of sites providing higher quality data to archives.
Annual Cost	10-30M US\$

**GRUAN to deliver against these actions by 2022**

Thank you



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