WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

# The WMO Global Basic Observing Network (GBON)

*A WIGOS approach to securing observational data for critical global weather and climate applications in Africa and elsewhere*

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WMO OMM
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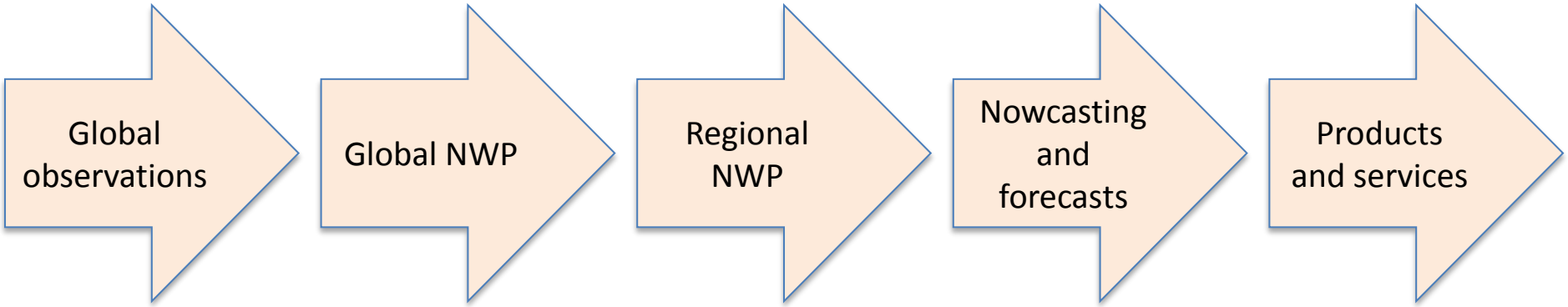
# Overview

1. Why is it important to have weather and climate observations everywhere on the globe?
2. Why and where are we currently missing observations?
3. What is WMO doing about this problem?
4. What is the expected impact of GBON on WMO Members?
5. Summary and conclusions.

# Importance of Global Numerical Weather Prediction (NWP) for all WMO Members




Without **local observations**, both global, regional and mesoscale NWP guidance will be poor;

- Leading in turn to poor basis for weather and climate services at all forecast ranges;

**- This issue affects all WMO Members, but it is particularly serious in the tropics**

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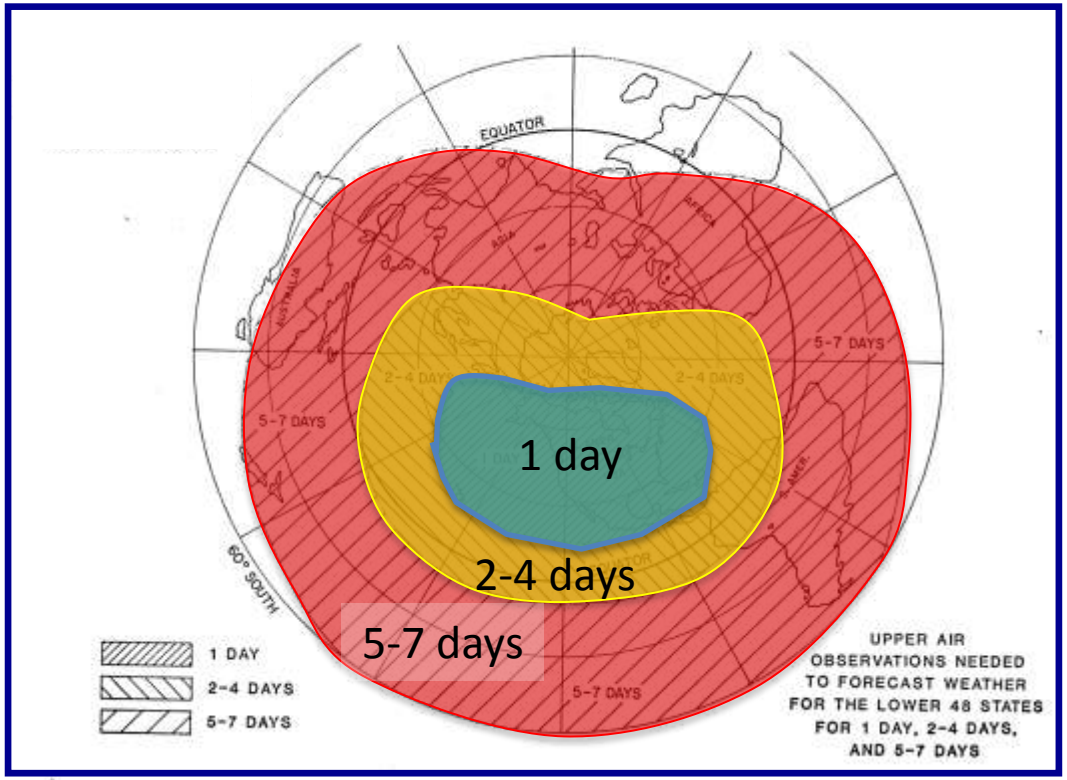
# 1. Why is it important to have observations everywhere?

Global Numerical Weather Prediction (NWP):

- is a **foundational capability** for weather forecasting climate reanalysis
- needs observations **everywhere** for accurate predictions **anywhere**




**Weather prediction beyond the 3-4 day range essentially requires observations from the whole world;**

**WMO is the only organization with the mechanisms to provide these observations.**

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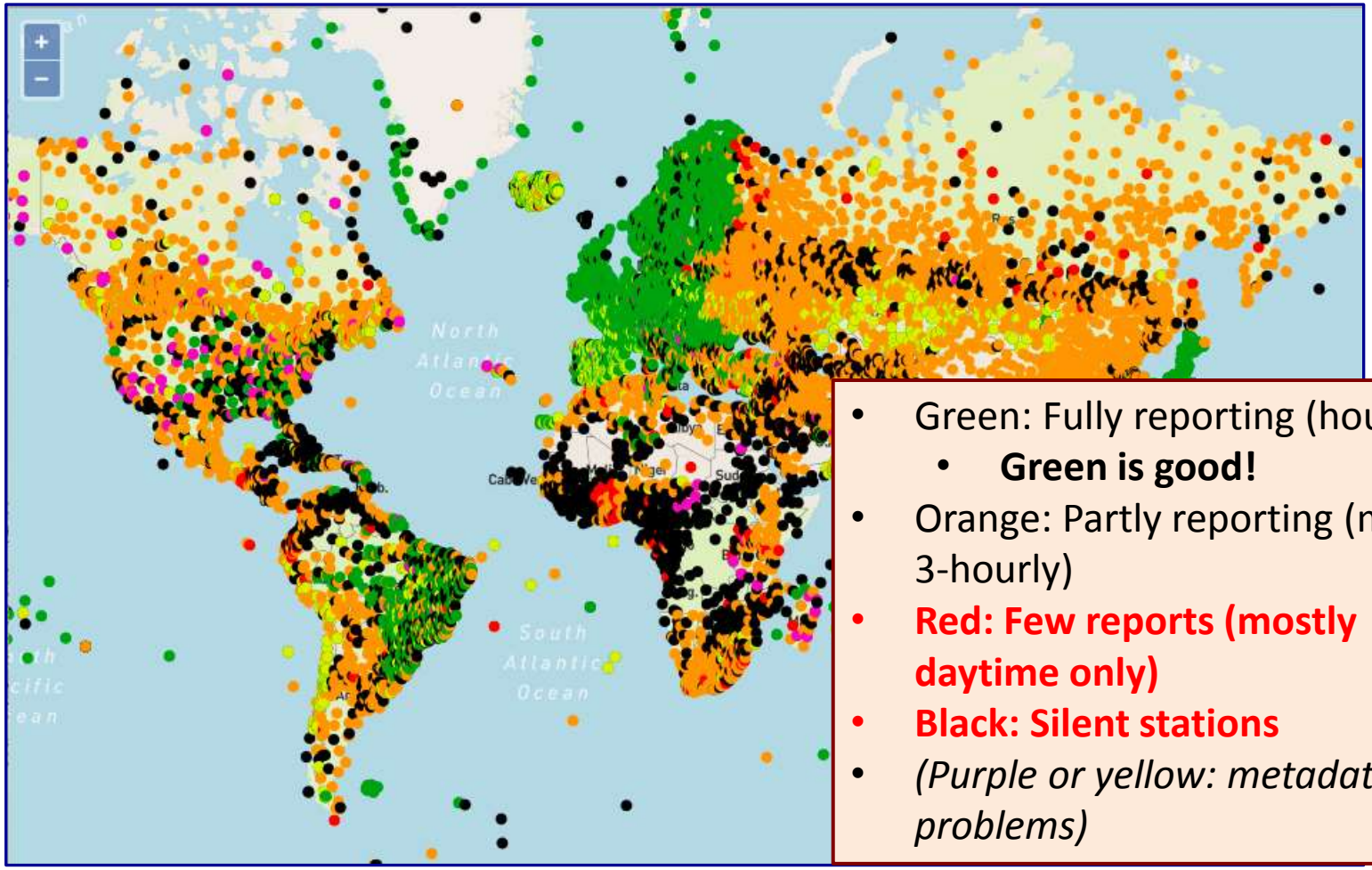
# 2. Where are we currently missing observations?

*(surface-based; satellite data can help, but cannot do the job alone)*




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

*Surface pressure obs available to global NWP Centres on 17 February 2019, 18Z*

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# 3. What is WMO doing about this problem?

- 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*

- ***By WMO standards, this is an extremely rapid development schedule***
- ***Testament to the EC view of the importance of this issue!***

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# 3.1 Plans for GBON provisions

- Initial focus on surface-based observations acquired by NMHS's;
- Quantitative targets for horizontal and temporal resolution for surface observations (esp. surface pressure) and upper air soundings (radiosondes);
- This will facilitate network design and compliance monitoring.

# Draft GBON provisions: Surface Observations
*(to be submitted to Cg-18 for approval)*

- 3.2.2.4 Members **shall** operate a set of surface land observing stations/platforms that observe atmospheric pressure, air temperature, humidity, horizontal wind, precipitation and snow depth, located such that the GBON has a **horizontal resolution of 500 kilometres or higher** for all of these variables, with an **hourly frequency**.

- 3.2.2.5 Members **should** make available additional surface land observations of atmospheric pressure, air temperature, humidity, horizontal wind, precipitation and snow depth that enable GBON to have a **horizontal resolution of 100 kilometres or higher** for all of these variables, with an **hourly frequency**.

# Draft GBON provisions: Upper air observations
*(to be submitted to Cg-18 for approval)*

- 3.2.2.7 Members **shall** operate a set of upper air stations over land that observe temperature, humidity and horizontal wind profiles, with a vertical resolution of 100 m or higher, **twice a day** or better, up to a level of 30 hPa or higher, located such that GBON has a **horizontal resolution of 500 kilometres or higher** for these observations.

- 3.2.2.8 Members **should** operate a subset of the selected GBON upper air observing stations that observe temperature, humidity and horizontal wind profiles up to 10 hPa or higher, at least once per day, located such that, where geographical constraints allow, GBON has a **horizontal resolution of 1000 kilometres or higher**, for these observations.

# 4.1 What are the benefits of GBON to WMO Members?

- **Better global coverage,  leading to better global NWP output; direct benefits, as well as indirect benefits, thanks to better boundary conditions for regional/mesoscale NWP;**
- Observations are valuable, but single observations have little value in and of themselves;
  - **International data exchange is massive global multiplier on investment in observations;**
  - Like a jigsaw puzzle, the full benefits of a global observing system can be realized only if all (or nearly all) the pieces are made available.

# 4. What is the requirement for individual WMO Members?

- Four categories of implementation (examples):
  1. **Members already complying with the GBON provisions** (e.g. Japan, Western Europe) – *no further action is needed;*
  2. **Members where GBON-compliant observations are made, but not currently exchanged**, (e.g. USA, China) - *new data exchange practices must be adopted;*
  3. **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;*
  4. **Areas where GBON requirements are not met due to geographic constraints;** (e.g. Indian Ocean, North Pacific) – *opportunities for new technologies, satellite remote sensing.*

# Summary and Conclusions

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