

# An update on the Global Basic Observing Network (GBON) and challenges and opportunities in its implementation

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**WMO OMM**

World Meteorological Organization

Organisation météorologique mondiale

# Overview

- Recap; why is GBON necessary?
- Why has it not been implemented already?
- Main obstacles to success, and WMO activities in response
  - Data policy issues;
  - Lack of technical capabilities;
  - Inadequate financial resource;
- GBON at Congress-18
- Next steps

# WMO (RRR) Application Areas supported by WIGOS

1. **Global numerical weather prediction**
2. High-resolution numerical weather prediction
3. Nowcasting and very short range forecasting
4. Seasonal and inter-annual forecasting
5. Aeronautical meteorology
6. Forecasting atmospheric composition
7. Monitoring atmospheric composition
8. Atmospheric composition for urban applications
9. Ocean applications
10. Agricultural meteorology
11. Hydrology
12. **Climate monitoring**
13. **Climate applications**
14. Space weather

**GBON supports these three application areas in particular (Global NWP is an enabler of all other application areas).**

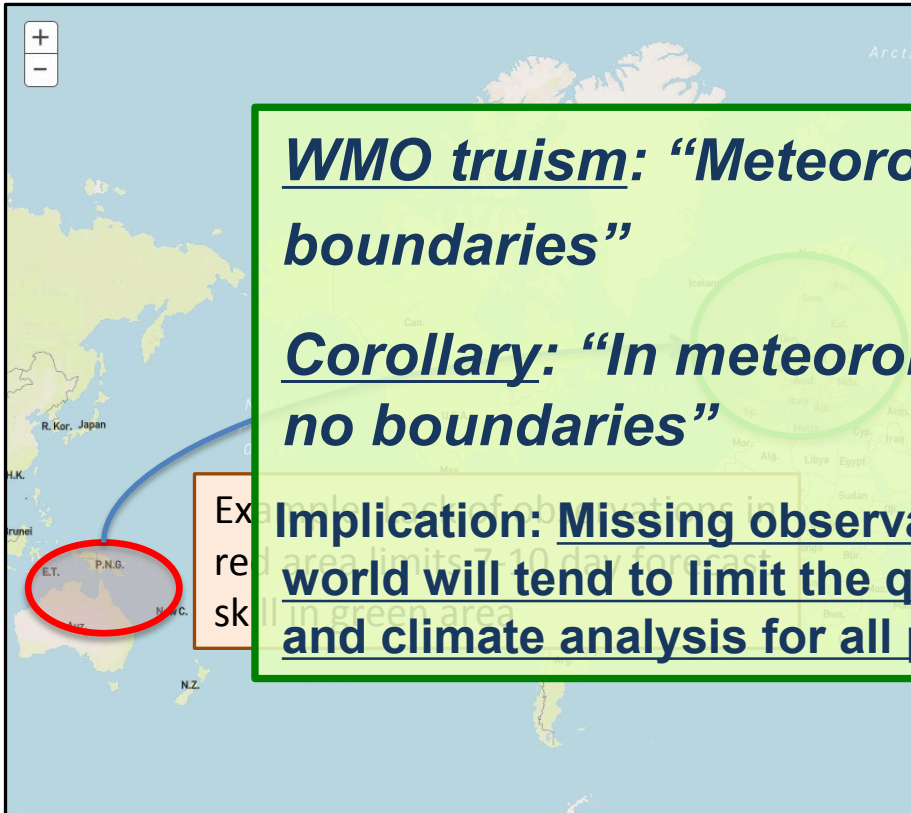
# Role of observations

**WMO truism: “Meteorology knows no boundaries”**

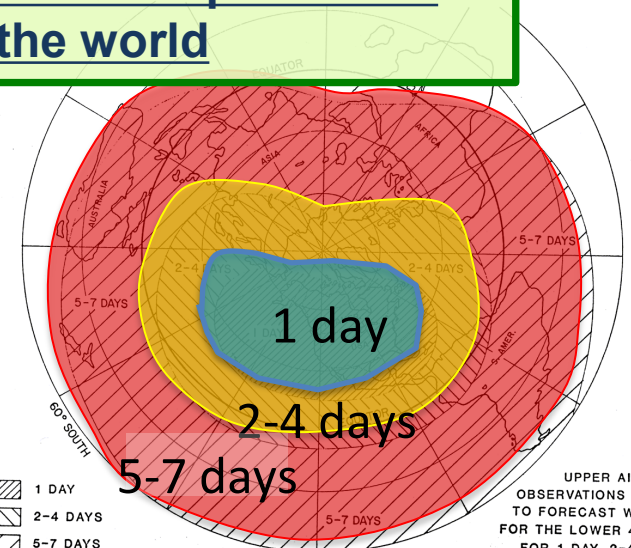
**Corollary: “In meteorology, ignorance knows no boundaries”**

**Implication: Missing observations in any one part of the world will tend to limit the quality of weather prediction and climate analysis for all parts of the world**

- Lack of observations limits our ability to understand and predict weather and climate patterns, both locally and globally;
- Weather prediction beyond 3-4 days for any location on the globe requires observations from the



Required coverage of observation for weather prediction over the United States.



- 1 DAY
- 2-4 DAYS
- 5-7 DAYS

UPPER AIR OBSERVATIONS NEEDED TO FORECAST WEATHER FOR THE LOWER 48 STATES FOR 1 DAY, 2-4 DAYS, AND 5-7 DAYS

The need for global exchange of weather and climate observations is globally understood, codified in international agreements, and in principle uncontroversial

• **WMO Convention (1947):**

- *(a) To facilitate worldwide cooperation in the establishment of networks of stations for the making of meteorological {...}*
- *(b) To promote the establishment and*

• **Paris Agreement (2015):**

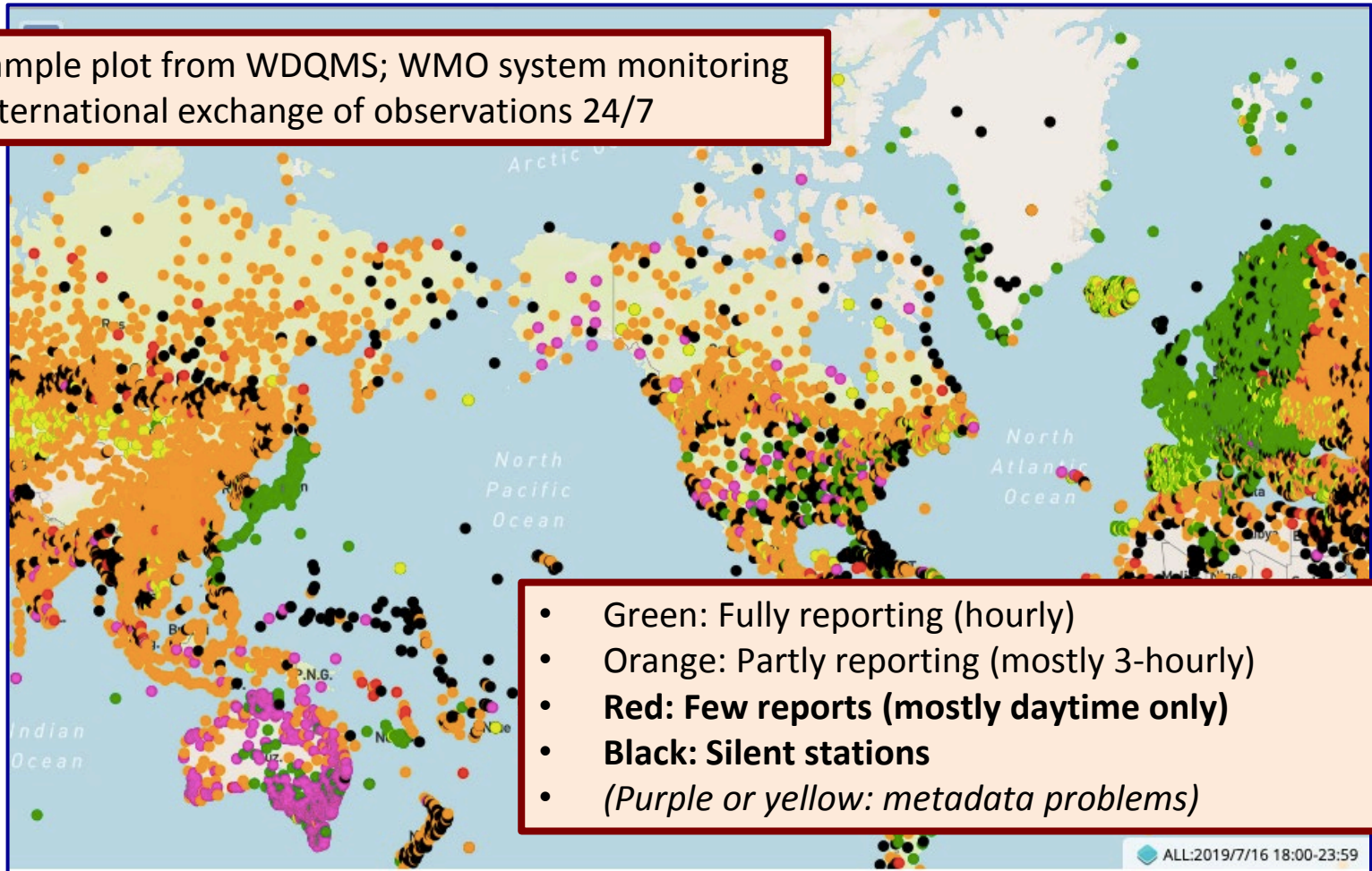
- *Article 7 (Systematic Observation): Parties should strengthen their cooperation on enhancing action on adaptation, taking into account the Cancun Adaptation Framework, including with regard to:*

- While not explicitly stated, both the WMO Convention and the Paris Agreement implicitly assume national responsibility for observations;
- **In some parts of the world this is currently not working well (and there is reason to believe that it never will)**



# Which observations are we currently exchanging? (*surface-based data; satellite data can help but cannot do the job alone*)

Sample plot from WDQMS; WMO system monitoring international exchange of observations 24/7



*Current international exchange of data for global NWP less than optimal (Example: Surface pressure observations received by global NWP Centers on July 16 2019, 18Z)*





# Why is observational data exchange falling short, and how do we improve it?

- Current data exchange practice is largely based on WMO Publication System) and on WMO

## Top three causes of missing data, depending on country:

- Data policy;
- Technical capabilities;
- Financial resources.

NWP has made immense

## WMO Response

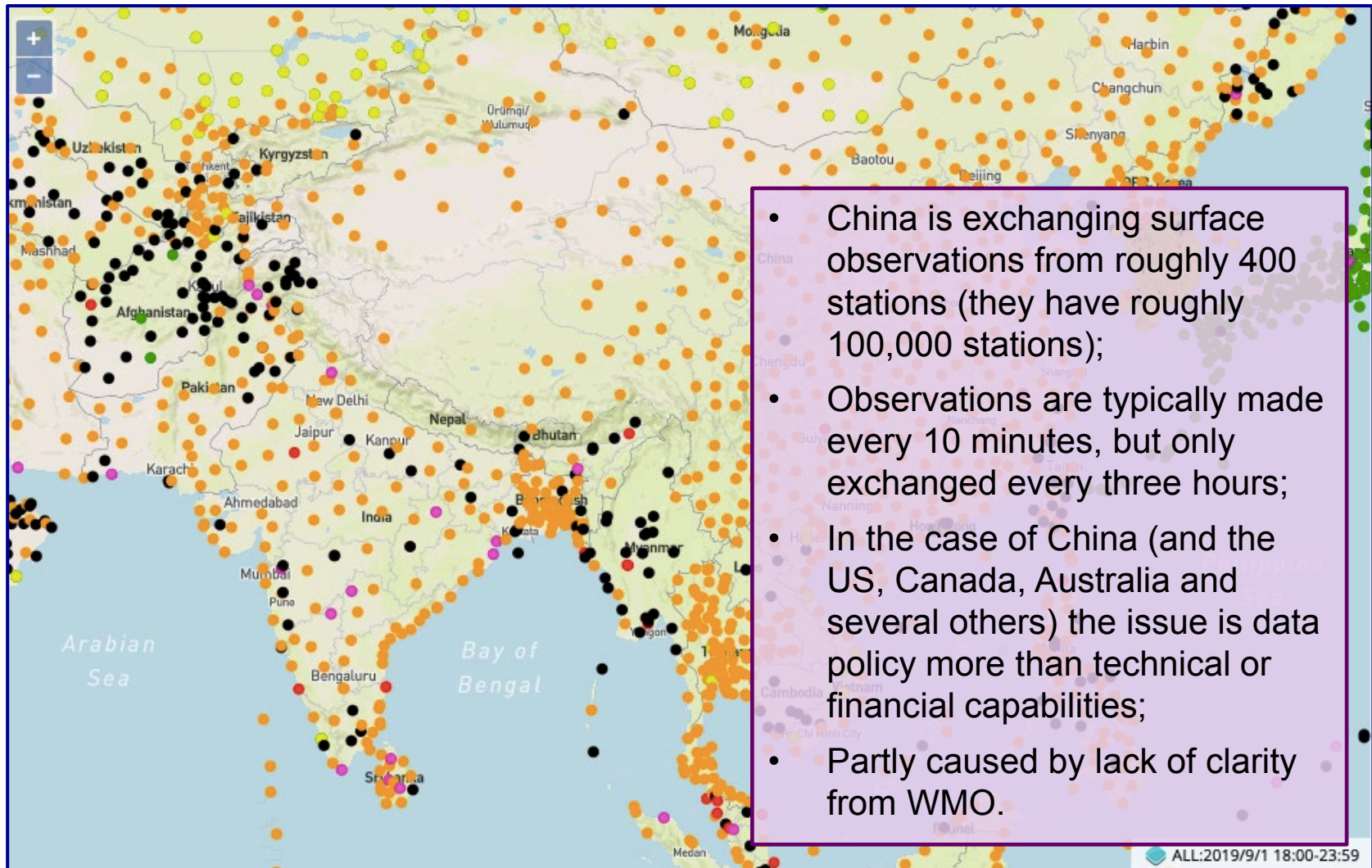
- GBON;
- Country Support Initiative (CSI);
- Systematic Observation Finance Facility.

- Current WIGOS monitoring data show coverage over many areas (previous
  - In many cases additional observations currently exchanged, due to a lack of the obligation of the Members.

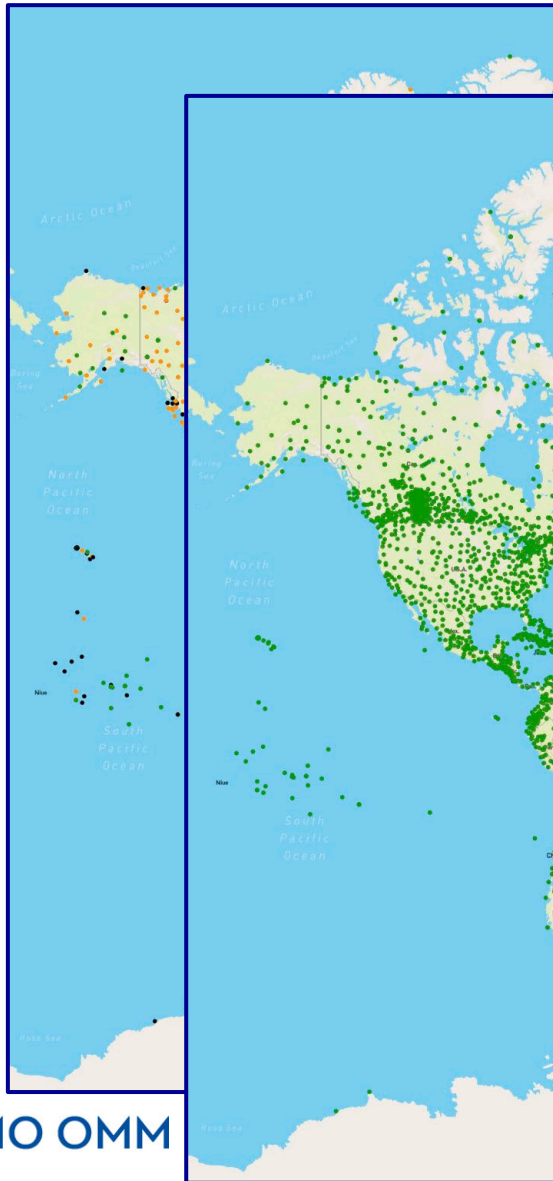


# 1. Data policy issues

*(e.g. China, observations are made, but not all are exchanged)*



# 1.1 Global Basic Observing Network (GBON)



**GBON** is a Congress-approved WMO policy initiative that will help to turn data coverage map green;

- Regulatory material will specify the **obligation of WMO Members to acquire and exchange certain observations at set minimum horizontal resolution and at set minimum frequency;**
- Once regulations are approved, GBON can be implemented immediately in the developed world;
- Developing Members will need help; GBON provides benchmarks against which investment in meteorological infrastructure can be measured.

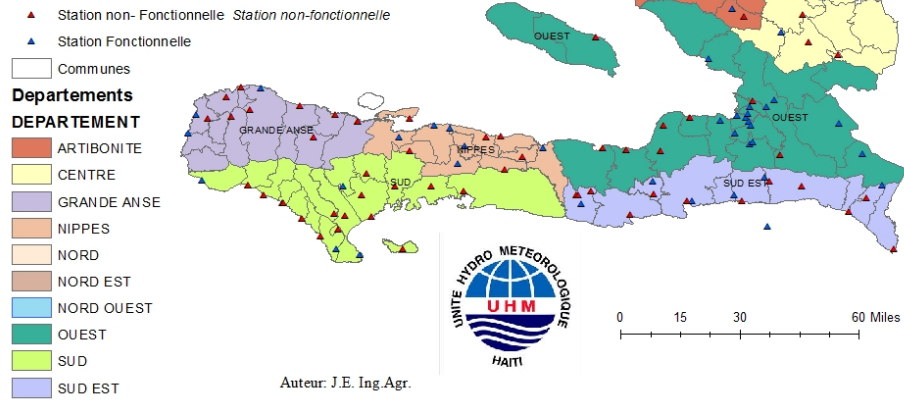


## 2. Lacking technical capabilities (Haiti; an illustration of how not to use project funding)

Surface pressure data exchanged; July 16 2019, 18 Z

Carte de differenciation des stations fonctionnelles des stations non-fonctionnelles

AWSs installed in Haiti according to Hydrometeorological Unit of the National Water Resources Service of Haiti;



- Too many black dots!
- **Haiti**; LDC, candidate for aid; *“Let’s buy them some AWS’s (Automated Weather Stations) to fix that”*;
- Basic assumption: **Lack of observations means lack of stations (this is often not true!)**
- There are already over 100 AWSs in Haiti, all donor-funded;
- Impressive network by most standards, **but:**
- Many AWSs not operating, **only two currently reporting to WMO;**
- **Number of observations exchanged would be much better metric than number of stations purchased or installed!**



## 2.1 Country Support Initiative (CSI)

- What is it?
  - WMO advisory services mechanism for developing Members, using the extensive knowledge and expertise from the WMO institutional network in a structured and efficient manner;
  - Advice to Members and development partners to help guide investments and increase national capacity in all areas of meteorology (GBON is one of the areas of technical);
  - Funded through a multi-donor trust fund as well as through development partners paying for services (fee-for-service);
- Where do we stand?
  - Approved by World Meteorological Congress June 2019
  - Close to 30 NMHSs committed to join as delivery (=advisory) partners;
  - Initial funding secured (soft commitment), but additional partners needed to unlock this.
  - WMO SG has written to Danish Minister of Foreign Developing(see letter) seeking support
- What is next?
  - 9-10 Sep CSI workshop Vienna, 45+ participants from NMHSs, World Bank; DMI to attend;
  - Governance arrangements finalized by the end of 2019;
  - Open for business Q2 2020
- Potential involvement of Denmark?
  - 3-5 mio USD contribution to multi-donor trust fund
  - Danish Meteorological Institute to join as delivery partner on cost-recovery basis



### 3. Insufficient national (local) financial resources (Kiribati example; who pays where there are no people to pay?)



#### Switzerland

- 41,000 km<sup>2</sup>
- GDP \$ 700 B
- Annual cost of observations: \$20 million

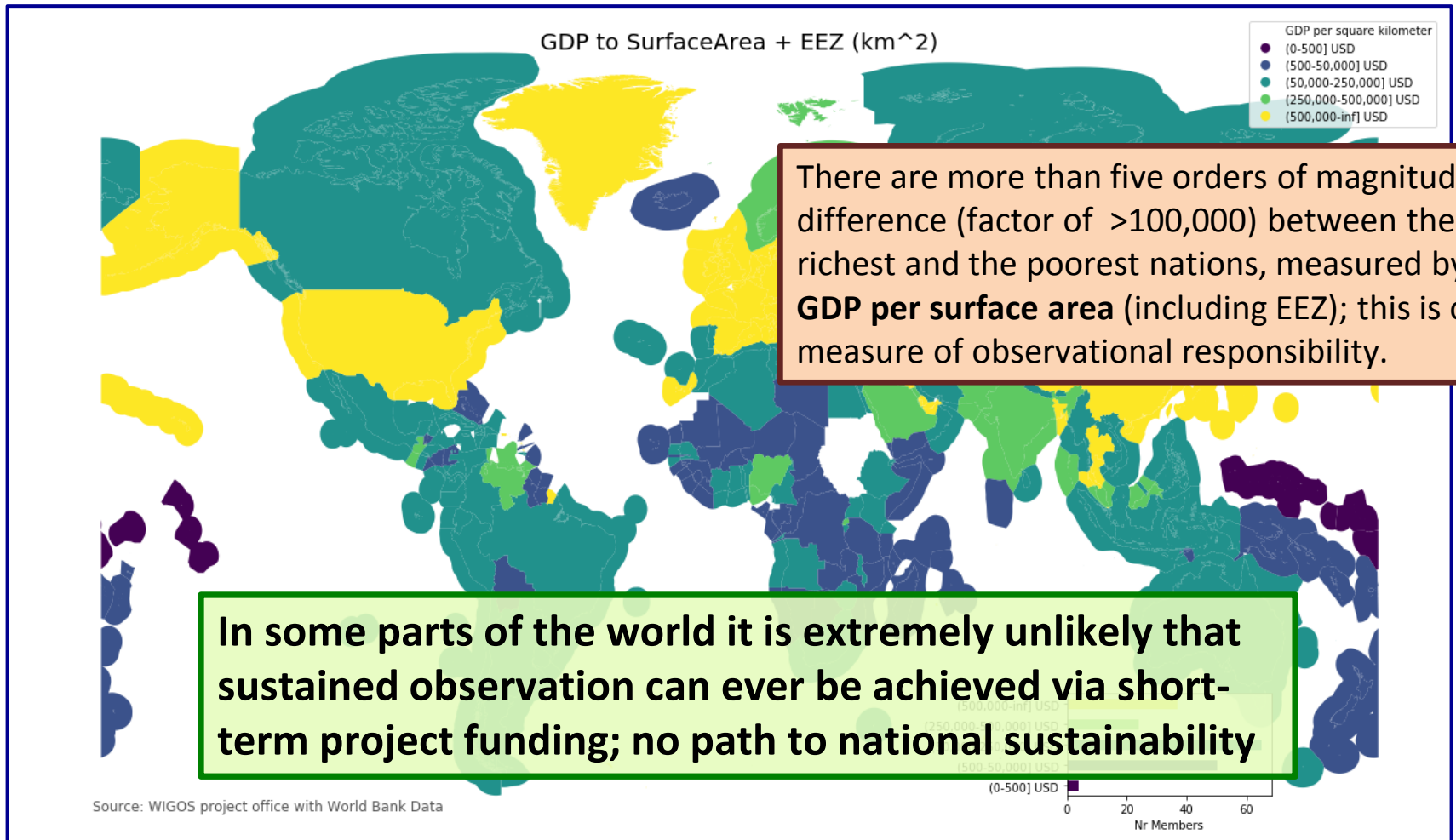
#### Kiribati

- 3,500,000 km<sup>2</sup>, including EEZ (for comparison, combined area of EU Members 4,400,000 km<sup>2</sup>):

**A similar fraction to Switzerland's, 0.003%) of GDP, spent on observations in Kiribati would amount to less than \$6,000, less than the cost of a single Automated Weather Station; a fully functioning observing system might cost 3-5% of annual GDP.**

**Capital investment will not solve this problem. There simply are not enough available resources locally to sustain the system!**

# A different look at available resources



*GDP (World Bank numbers) per surface area (land surface + EEZ)*



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## 3.2 Systematic Observation Finance Facility

- What is it?
  - Current financing of observations is inequitable and unsustainable – resources are wasted trying to patch this via project funding;
  - The Facility will deliver on the Paris Agreement call for cooperation and enhanced action on systematic observation of the climate system. It is uniquely dedicated to sustaining systematic observation where resources are inadequate; **it will link resources directly with performance (results-based payments)**;
- Where do we stand?
  - Initial scoping workshop held in Geneva in July 2019
  - Concept being developed jointly by WMO, World Bank, Green Climate Fund, CREWS, ...
- What is next?
  - Draft concept note distributed to Workshop participants and other stakeholders mid-Oct 2019
  - Planned information event at COP 2019; ideally facility to be launched at the COP in 2020;



## 4.6 Impact on Members and cost of GBON

- Access to better NWP model guidance and climate analysis products for all WMO Members
  - **However, GBON comes at a cost;** World is divided in four broad categories, by levels of difficulty of implementation:
    1. Members already complying with the GBON provisions (e.g. Japan, Western Europe); no further action is needed;
    2. Observations complying with the GBON requirements are made, but not currently exchanged (e.g. USA, China); new data exchange practices need to be adopted;
    3. Insufficient local (national) resources available to meet GBON requirements (e.g. Africa, South Pacific, Caribbean,...); use GBON
    4. GBON con new
- Estimated additional funding needs for item 3 globally, (USD):**
- Capital investment: **350 M**
  - Annual operating costs: **150 M**
- (estimated cost of existing Global Observing System: 2-5 B/yr)*

## Current status; summary

- **The Global Basic Observing System (GBON):** Major new WMO initiative developed in collaboration with GCOS (Joint Regional Workshops instrumental) aimed ensuring adequate supply of observations to global NWP systems providing basis for weather and climate services to all WMO Members;
- Concept approved by Congress-18 in June 2019; Member expressions generally highly favorable, several requests for GBON to be extended, e.g. into ocean observations, greenhouse gas monitoring;
- Regulatory material to be finalized (drafting meeting Nov 19-21) and submitted to first session of new Infrastructure Commission for its recommendation; will be submitted to Executive Council (June 2020) for its approval;
- Implementation of GBON will be challenging in some parts of the world, however, Climate Finance and development partners are ready to help WMO and its Members with this!