

The Status of the Global Climate Observing System: Plans and Progress

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Earth Information Day 2020



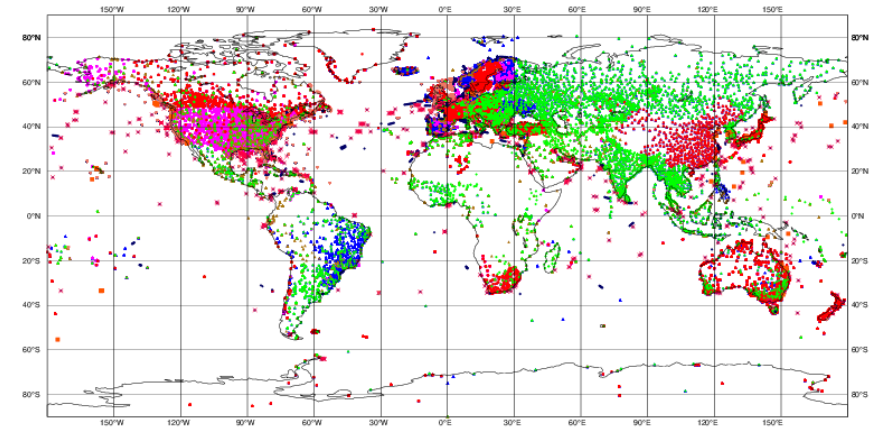
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- There have been significant improvements to the observations of many ECVs,
 - Satellite observations (e.g. Aeolus, TROPOMI), Ocean (e.g. Argo floats and surface drifters)
- There have been significant improvements in the archiving and accessibility of climate data,
 - Including through the Joint CEOS/CGMS ECV Inventory, the EU's Copernicus and the US NCEI
 - Copernicus Climate Change Service (C3S) and NOAA NCEI collaborating on a new database of all meteorological surface parameters measured from standard meteorological stations
- WMO has agreed to support the implementation of the GCOS Surface Reference Network will lead to improved accuracy of in situ observations
- The development of WMO's Global Baseline Observing System (GBON) and its potential funding mechanism (SOFF) should, if fully implemented, lead to significant improvements in short term modelling and reanalysis and hence climate modelling

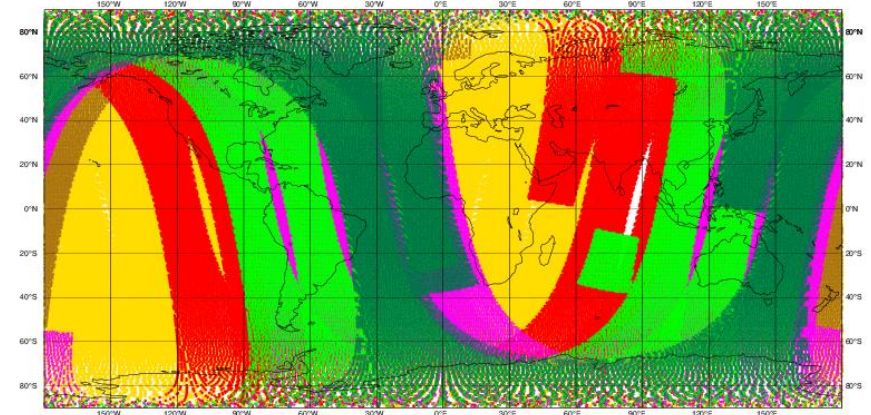
ECMWF Surface Data: 27/11/2020

by type of site



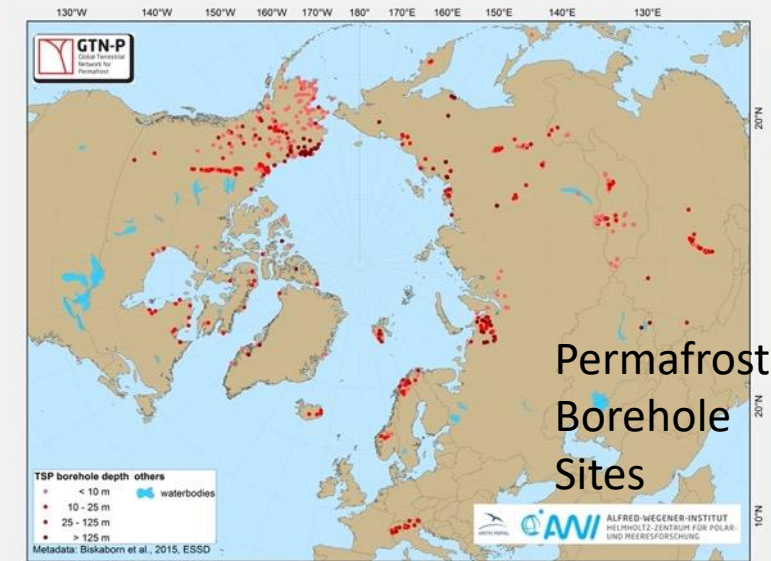
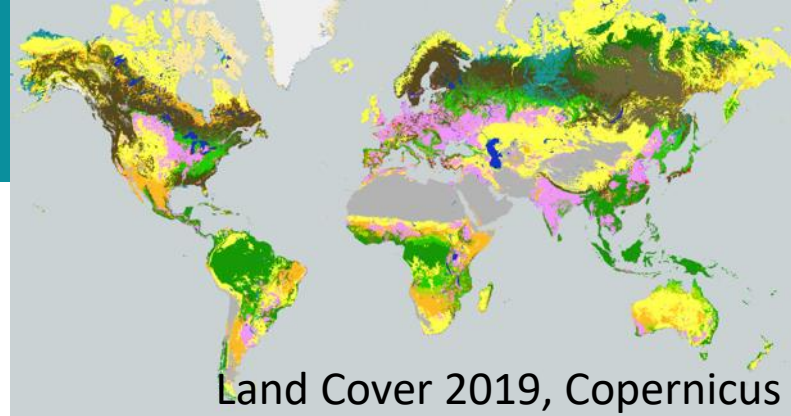
ECMWF Data: Satellite Humidity 27/11/2020

Colours represent different microwave humidity sounders

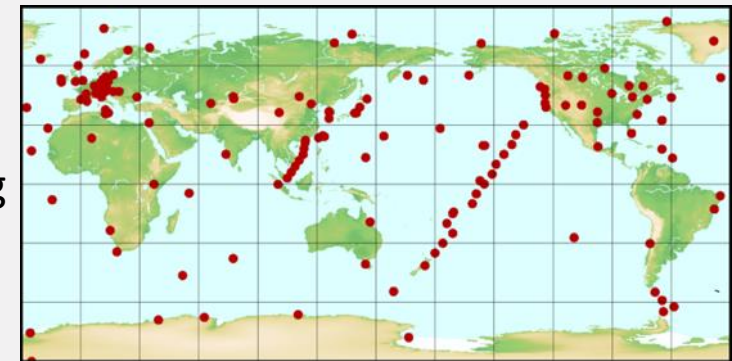


Successes (2)

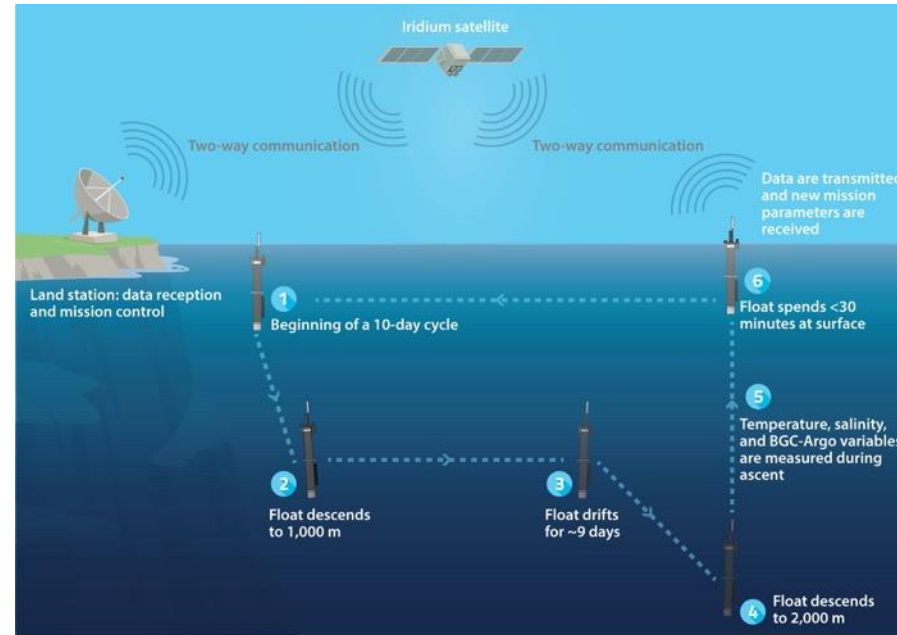
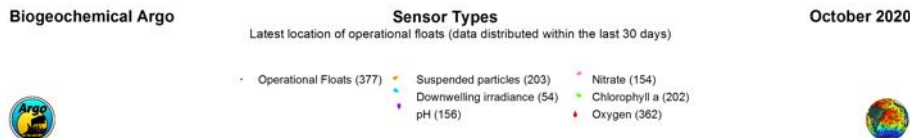
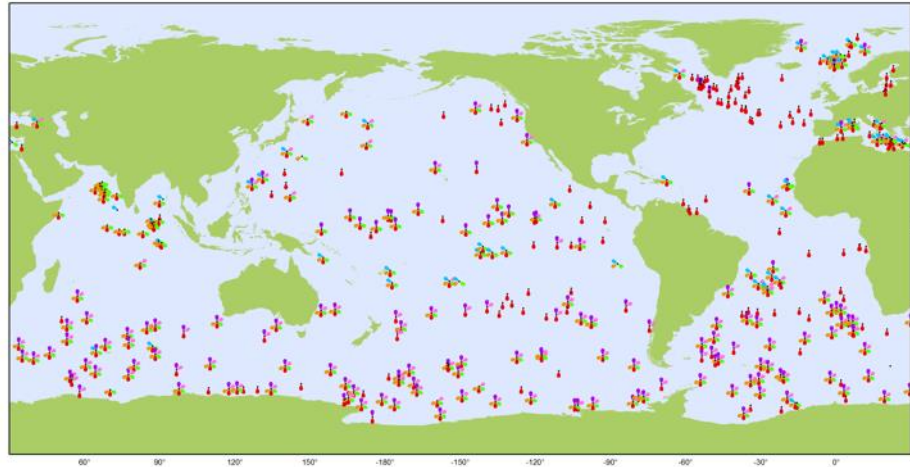
- New methods to assess uncertainty and QA/QC, particularly of satellite observations have been developed and need to be fully implemented.
- Greenhouse gas fluxes derived from atmospheric composition measurements has been demonstrated globally
 - Plans to improve observations of atmospheric composition to allow estimates of greenhouse gas fluxes have been made & EU's Copernicus programme is implementing their plan for the CO2 MVS capacity.
- GCOS has started looking at the climate cycles (energy balance, water and carbon cycles and the biosphere) as a holistic way of integrating observations across the domains, identifying gaps, and improving climate data and understanding.



GAW GHG
Monitoring
Sites



Ocean Observing Successes: *Biogeochemical Argo*

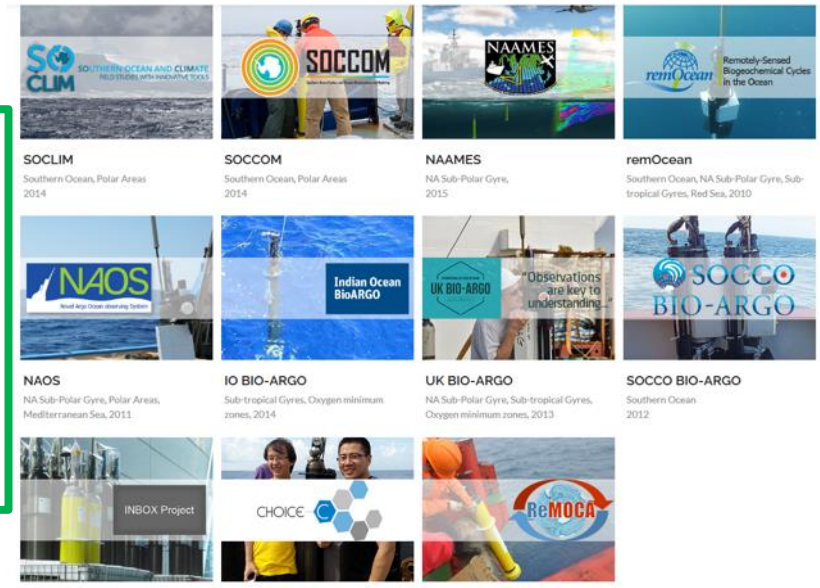


Claustre H, et al. 2020. *Annu. Rev. Mar. Sci.* 12:23–48

Claustre et al., 2020

Although only marginally more BGC Argo floats in the water 2020 compared to 2019, several commitments and programs indicate this will change soon.

- Up to six essential biogeochemical and bio-optical variables: *oxygen, nitrate, pH, chlorophyll a, suspended particles, and downwelling irradiance.*
- This sensor network represents today's most promising strategy for collecting temporally and vertically resolved observations of biogeochemical properties throughout the ocean.
- All data are freely available within 24 hours of transmission.



Review of ECV, New Status Report and Implementation Plan

- On-going review of ECV review. Assessment of public consultation is underway
 - Results will be included in next GCOS Implementation Plan
- The latest GCOS Status report reviewing the adequacy of observations of each ECV and progress implementation actions from the GCOS Implementation Plan (2016) is being drafted.
 - There will be a **Public Review in February 2021**
 - The report should be published in summer 2021 in time for the UNFCCC COP
- There will be a **GCOS-WCRP Climate Observations Conference**
 - 12-14 October 2021
 - The location is, provisionally Darmstadt Germany, and a final decision on the format of the conference (in person v virtual) will be taken on May 2021.
 - The aim is to assess how well the current global climate observing system supports current and near-term user needs for climate information. An input into the next GCOS implementation plan.
- An update to the **GCOS Implementation Plan** will be drafted in 2021. It will be partly based on the GCOS Status Report, GCOS-WCRP Climate Observations Conference and the IPCC findings.
 - open for public review in early 2022.
 - It will be published in mid-2022 in time for the UNFCCC COP.

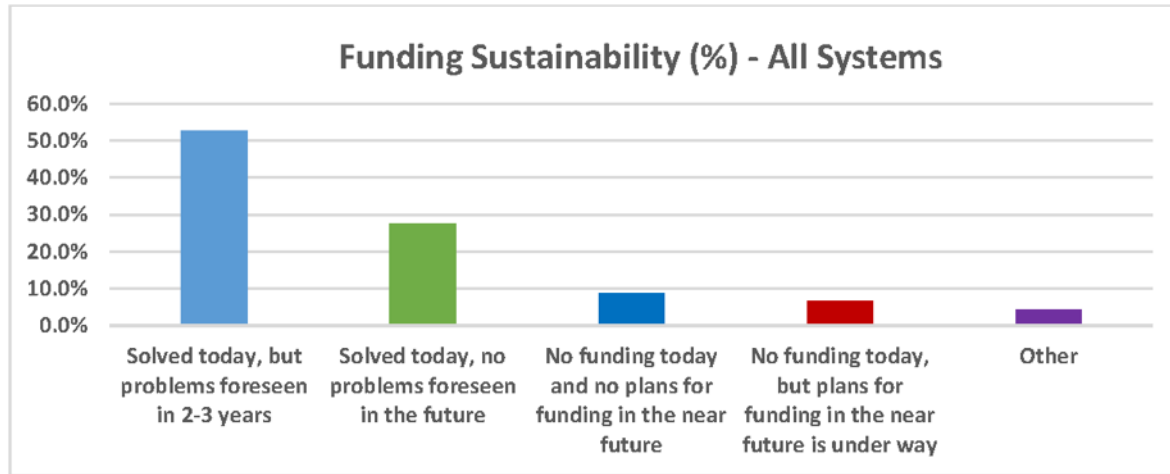
Significant on-going areas of GCOS work

- Inputting climate needs into WMO's Global Baseline Observing Networks (GBON) (e.g. time series, accuracy)
 - Need to consider the relationship with existing GCOS networks
- Improving data on Lightning and Thunder days to monitor changes in convection (storminess)
- Reference networks to improve understanding of uncertainty and network operation
 - Currently establishing a GCOS surface reference network (GSRN) Initially covering atmospheric and terrestrial variables
- Improvements to data centres and data access
- Adaptation and Mitigation
 - Considering which observations made globally are useful for adaptation and mitigation and how well the existing ECV requirements meets this need - In many cases monitoring the extremes is important
- Biosphere Indicator
 - it is not straightforward to identify an indicator at the global level that monitors systematic changes occurring in the biosphere – currently considering phenology
- Network operation and coordination
 - Especially GCOS atmospheric networks and Global Terrestrial Networks

- Observations are sparse in some areas such as Africa, South America, SE Asia, the Pacific and Southern Oceans and coastal areas.
- Enhanced Data rescue, with outputs open and freely available, is needed to make historic archives available in some parts of the world
- Some parts of the system remain fragile:
 - There remain concerns over the sustainability and long-term continuity of some satellite missions such as AURA and Aeolus.
 - Cloud radar and lidar are on research satellites and no continuity is assured
 - Ocean observations and some terrestrial are based on research funding not sustained operational budgets and so are vulnerable
 - Some global data centres do not have long-term funding – for some ECV these are essential to assemble long-term time series, and QA/QC of data sets put together from a wide range of sources.
- Not all data is freely exchanged and available.
- Despite many improvements the long-term viability of some global data archives of in situ data needs to be assured.
 - Particularly those based in research settings

Ocean Observing key gaps:

Sustainability of ocean observing



A recent report by Copernicus and EEA found:

Ocean Observing Systems are to ~70% funded by short-term research grants, with potential issues for sustaining the observations.

- R/D funders tend to fund „science for solutions“ rather than towards „monitoring and understanding“ the climate issue.
- Essential to understand and predict the ocean and climate systems across scales
- Essential to assess risks, develop adaptation measures and track effect of mitigation
- Ocean Observations for climate is insufficiently supported to be systematic and sustained
- Ocean Observations are overly dependent on R&D funding agencies with poorly aligned motivation to support sustained observations



Thank you



**GLOBAL CLIMATE
OBSERVING SYSTEM**

KEEPING WATCH OVER OUR CLIMATE



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