Review of GOOS and GCOS Requirements for Climatological Datasets

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Outline

- Background
- The user requirements
- Assessments against user requirements
- The role of ETMC
Background

- The Ocean Observation System Development Panel
  - Joint IOC/WCRP/SCOR
  - Developed scientific basis for ocean observing system for climate
The OOSDP Plan (from GOSIC).

- Exchanges with other components of the climate system, and in particular on the surface fields and surface fluxes which help determine the variability of the coupled ocean-atmosphere system. The 5 sub-goals were estimation of (i) sea surface temperature (SST) and sea surface salinity (SSS), (ii) surface wind stress, (iii) surface fluxes of heat and water, (iv) surface sources and sinks of carbon, and (v) the extent, concentration, volume and motion of sea ice.

- Seasonal-to-interannual variability and, in particular on the upper ocean (that part which varied on these time scales). This goal was in turn broken into three sub-goals; (i) monitoring and analysis of monthly upper ocean temperature and salinity changes; (ii) the provision of data for the initialization of models and prediction of the ENSO; and (iii) the provision of data outside the Pacific for monitoring and initialization of models of seasonal to interannual climate variations.

- Longer time scales (e.g., climate change) and, inevitably, involved observations of the deep ocean. The 3 [aims] were (i) inventories of heat, fresh water, and carbon on large space- and time-scales; (ii) description of the ocean circulation and transport of these quantities; and (iii) measurement of long-term sea level changes.

- Processing and management of these data streams, including (i) climatologies (means and variances), (ii) information management, and (iii) modeling and assimilation systems.
GOOS and GCOS

- GCOS is a long-term, user-driven operational system capable of providing the comprehensive observations for:
  - Monitoring the climate system,
  - Detecting and attributing climate change,
  - Assessing impacts of, and supporting adaptation to, climate variability and change,
  - Application to national economic development,
  - Research to improve understanding, modelling and prediction of the climate system.

- The climate module of GOOS is the ocean module of GCOS
GCOS: Climate Observation Needs

- GCOS core tasks:
  - Defining and regular updating of climate requirements for global observing systems, and;
  - Highlighting gaps in global observing systems for climate, and taking remedial action.

- Do the GCOS user requirements make sense for marine climatology?
  - GCOS defines 3 levels of requirements
    - Threshold - below this no benefit for application
    - Breakthrough - significant benefit for application
    - Goal - beyond this no benefits for application
  - "The breakthrough level is expected to be more appropriate than the “goal” from a cost-benefit point of view."
GCOS: Climate Observation Needs

- Example: wind vector over sea surface (horizontal) from WMO/CEOS database
  

  - Threshold: 5 ms\(^{-1}\), 6 hourly, 500km grid
  - Breakthrough: 1 ms\(^{-1}\), 3 hourly, 50km grid
  - Goal: 0.5 ms\(^{-1}\), hourly, 10km grid
  - Also requirements for max. delay (3-12 hours)

- And from GCOS Action Plan (1999)
  
  - 0.5 - 1 ms\(^{-1}\) in components, 1-2 days, 2°, (1-4 samples)

- GCOS does not make statements about:
  
  - length of dataset
  - stability
  - how to assess adequacy of observations
Requirements for long-term and climatological datasets

- Research into long-term variability and trends
- As input to reanalyses (atmosphere and ocean)
- Testing climate models
- Climate change detection and attribution
- Statistical information on likely conditions
- Where information is sparse (e.g. pCO$_2$)
What is the role of ETMC?

- **ToR:** Review the GOOS and GCOS requirements for climatological datasets, taking into account the need for quality and integration.
- The range of parameters of interest to ETMC are split between the GCOS atmospheric and oceanic domains.
- Responsibility for defining requirements is therefore split between AOPC and OOPC.
- Requirements in the WMO database are not relevant for "marine climatology"
- More relevant are those in the GCOS Action Plan
  - Still don't really address all that is needed
  - and in need of revision in light of new observations and research
What is the role of ETMC?

- ETMC has not been set up with the required expertise to make authoritative statements about requirements.
- However, ETMC has strong links to other groups who can do that for individual parameters.
- ETMC is therefore in a position to take a co-ordinating role.

Links to TT-MOCS
- Could act as a resource linking to available datasets and providing information about suitability for applications.
- Produce adequacy assessments (research & metrics required).

Better representation of marine climatology in e.g. the reviews of progress for the GCOS IP.