



SESSION 6: Evolving Requirements I - GCOS
Discussion On Implementation Of Evolving Requirements

CRYOSPHERE BREAKOUT

Big Room

Seed questions

1. What are the **major challenges** posed by the evolution in your respective domain in the GCOS updated implementation plan by comparison to 2016 in terms of
 - Additional variables per ECV
 - Threshold, breakthrough and goal
 - Uncertainty characterization
2. How could you address these challenges in future projects and/or CLIMATE-SPACE?
3. How could you contribute to the **six implementation themes** (page 20-70)?

Our mission: Please summarise your views in 1-3 slides for the feedback in the plenary session

“additional variables per ECV” (aka *ECV Products*)

| | | |
|----------------------------|---------------------------------------|---------------------------------------|
| Sea Ice | Sea Ice Concentration | Sea Ice Concentration |
| | Sea Ice Thickness | Sea Ice Thickness |
| | Sea Ice Drift | Sea Ice Drift |
| | Sea Ice Extent/Edge | Sea Ice Age |
| | | Sea Ice Surface Temperature (IST) |
| | Sea ice Surface Albedo | |
| | Snow Depth on Sea Ice | |
| Snow | Area Covered by Snow | Area Covered by Snow |
| | Snow Depth | Snow Depth |
| | Snow-Water Equivalent | Snow-Water Equivalent |
| Glaciers | Glacier Area | Glacier Area |
| | Glacier Elevation Change | Glacier Elevation Change |
| | Glacier Mass Change | Glacier Mass Change |
| Ice Sheets and Ice Shelves | Surface Elevation Change | Surface Elevation Change |
| | Ice Velocity | Ice Velocity |
| | Ice Mass Change | Ice Volume Change |
| | Grounding Line Location and Thickness | Grounding Line Location and Thickness |
| Permafrost | Thermal State of Permafrost | Permafrost Temperature (PT) |
| | Active Layer Thickness | Active Layer Thickness (ALT) |
| | | Rock Glacier Velocity (RGV) |

4 new ECV Products

same ECV Products

same ECV Products

Ice “Mass” -> “Volume” Change

1 new, 1 rename (?)

“additional variables per ECV” (aka *ECV Products*)

- Some of the recommendations from Cryosphere CCI teams did not make it to GCOS IP-22 (not in time?). The CCI teams will liaise with the panels to see what can still be done. Some variables are possible (and interesting) but not ECV Products.
- Experience from Sea Ice ECV are that this interaction was welcomed by GCOS panel, but take time and need to start long advance.
- Sea Ice has more ECV products now. More work to be done. But a gap-analysis will have to include other (European) services to find out where CCI contribution would be most cost-effective.
- All the cryosphere ECVs have several (4 to 7) ECV products to cover, involving different EO techniques (radiometry, altimetry, gravitometry, SARs, etc...). The R&D efforts should scale accordingly.

“six implementation themes (page 20-70)”

| | |
|--|--|
| A: ENSURING SUSTAINABILITY | A1. Ensure necessary levels of long-term funding support for in situ networks, from observations to data delivery |
| | A2. Address gaps in satellite observations likely to occur in the near future |
| | A3. Prepare follow-on plans for critical satellite missions |
| B: FILLING DATA GAPS | B1. Development of reference networks (in situ and satellite Fiducial Reference Measurement (FRM) programs) |
| | B2. Development and implementation of the Global Basic Observing Network (GBON) |
| | B3. New Earth observing satellite missions to fill gaps in the observing systems |
| | B4. Expand surface and in situ monitoring of trace gas composition and aerosol properties |
| | B5. Implementing global hydrological networks |
| | B6. Expand and build a fully integrated global ocean observing system |
| | B7. Augmenting ship-based hydrography and fixed-point observations with biological and biogeochemical parameters |
| | B8. Coordinate observations and data product development for ocean CO ₂ and N ₂ O |
| | B9. Improve estimates of latent and sensible heat fluxes and wind stress |
| | B10. Identify gaps in the climate observing system to monitor the global energy, water and carbon cycles |
| C: IMPROVING DATA QUALITY, AVAILABILITY AND UTILITY, INCLUDING REPROCESSING | C1. Develop monitoring standards, guidance and best practices for each ECV |
| | C2. General improvements to satellite data processing methods |
| | C3. General improvements to in situ data products for all ECVs |
| | C4. New and improved reanalysis products |
| | C5. ECV-specific satellite data processing method improvements |
| D: MANAGING DATA | D1. Define governance and requirements for Global Climate Data Centres |
| | D2. Ensure Global Data Centres exist for all in situ observations of ECVs |
| | D3. Improving discovery and access to data and metadata in Global Data Centres |
| | D4. Create a facility to access co-located in situ cal/val observations and satellite data for quality assurance of satellite products |
| | D5. Undertake additional in situ data rescue activities |
| E: ENGAGING WITH COUNTRIES | E1. Foster regional engagement in GCOS |
| | E2. Promote national engagement in GCOS |
| | E3. Enhance support to national climate observations |
| F: OTHER EMERGING NEEDS | F1. Responding to user needs for higher resolution, real time data |
| | F2. Improved ECV satellite observations in polar regions |
| | F3. Improve monitoring of coastal and Exclusive Economic Zones |
| | F4. Improve climate monitoring of urban areas |
| | F5. Develop an Integrated Operational Global GHG Monitoring System |



7th October 2022

“six implementation themes (page 20-70)”

- B1 and D4: “In-situ reference data”. We (EO community) can also benefit from these in-situ reference datasets, and collocated with satellites. The CCI RRDPs were a start. If someone builds a full collocated dataset, CCI teams should contribute User Requirements.
- B3: “new satellite missions”. Some relevant for Cryosphere. We support but no difference in the short term.
- F1 : “High-resolution and near-real-time data”. These can be shorter (1-2 decades and still have value). Action triggered by the concept of Climatic-Impact-Driver (CID) from IPCC AR6 WG1 (SPM), linked to adaptation and extremes. Should ESA CO look at these CIDs, and see if specific gaps and actions should be triggered in CLIMATE-SPACE?
- F2: “Improved CDRs in polar regions”. We note the requirement for “all-surface” temperature (land ice, ocean, sea ice) and “all-surface” albedo (land-ice and sea-ice). The two new Sea Ice ECV products help. There should be room for all domains to contribute in a future integrated CDR-series (SST and SIST share the sea-ice MIZ).

Questions *still to be answered*

1. What are the **major challenges** posed by the evolution in your respective domain in the GCOS updated implementation plan by comparison to 2016 in terms of
 - Additional variables per ECV
 - *Threshold, breakthrough and goal*
 - Uncertainty characterization
2. *How could you address these challenges in future projects and/or CLIMATE-SPACE?*
CCI teams can conduct their gap-analysis over the next few months (including X-ECV) and communicate them to ESA in view of CLIMATE-SPACE.
3. How could you contribute to the **six implementation themes** (page 20-70)?