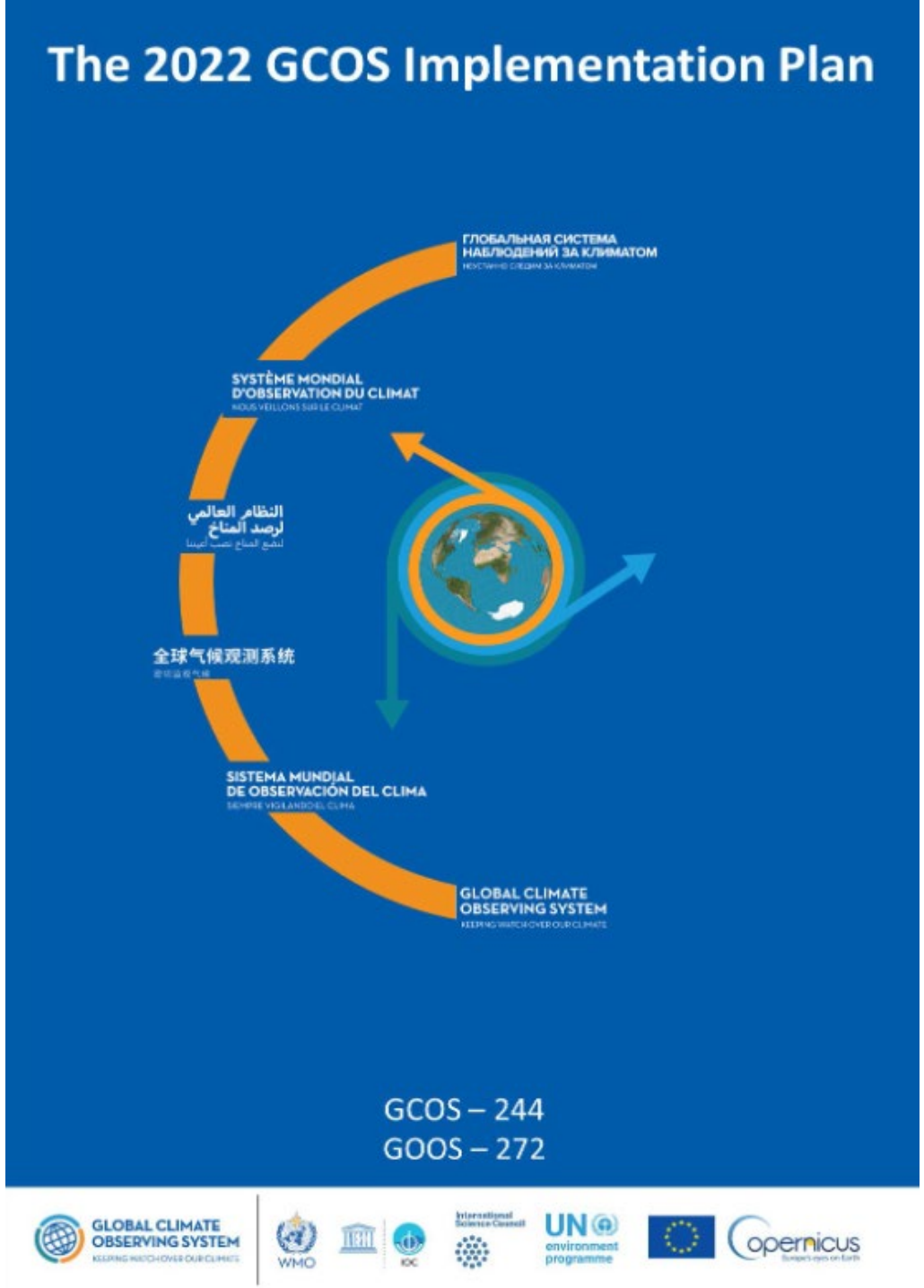

Action C3: General improvements to in situ data products for all ECVs	
Activities	1. Periodically reprocess in situ data products to account for new knowledge, new techniques and improved access to historical data holdings. 2. Improve uncertainty quantification of in situ-based products. 3. Undertake efforts to account for spatio-temporal sparsity of in situ measurements via interpolation. 4. Ensure adequate sampling of the structural uncertainty inherent in in situ product development via supporting the development of multiple methodologically distinct products and their intercomparison.
Issue/Benefits	It is necessary to periodically reassess in situ-based estimates of climate change and to have multiple independently produced estimates for each ECV. Ensuring that datasets produced from in situ holdings reflect the latest availability of access, the latest knowledge, and the latest processing techniques assures the best possible estimates of long-term climate change are available to users. The availability of multiple independent estimates per ECV identifies those ECVs for which the true evolution is well known and thus informs directly assessments undertaken by e.g. IPCC.
Implementers	From 1 to 4: **Research organizations**, Academia, NMHSs.
Means of Assessing Progress	1. New publications of updated in situ datasets and availability of those datasets following FAIR data principles. 2. Increased number of available in situ-based datasets for which a documented and quantified uncertainty assessment is available. 3. Increased spatio-temporal completeness of in situ-based products based upon use of additional data and application of interpolation techniques. 4. Increased number of ECVs for which two or more global in situ datasets exist.

Additional Details	In situ data products are not some frozen set of estimates which should remain unchanged. Over time new data, new insights and new and improved computational techniques appear. A high-profile example of this is the recent IPCC WGI report wherein the surface temperature datasets changed their estimates on a like-for-like basis by circa 0.1C. This change in the estimate of warming to date of the order 10-15% of the estimate before arose from a combination of improved understanding of data biases, improved access to historical data, improved interpolation techniques, and the emergence of new estimates.
Links with other IP Actions	B1: Reference observations. B9: Estimation of heat fluxes and wind stress. D5: Data rescue.

IP Action	Activity	Means of assessing progress	Responsibility	IP rapporteur
C3: General Improvements to in situ Data Products for all ECVs	1. Periodically reprocess in situ data products to account for new knowledge, new techniques and improved access to historical data holdings.	1. New publications of updated in situ datasets and availability of those datasets following FAIR data principles.	Research organizations, Academia	Blair, Bernard, Colin

C3.1: AOPC-28 outcomes	
This is an action on all 3 panels, AOPC will only focus on the atmospheric component. ECVs stewards should list the data products that they know of for their ECVs, and then include information on whether the data products are sufficient and regularly updated. After the complete list is produced, it will be circulated to the other panels.	
Liz Kent leading with an example case study and share this with the members of the panel.	
Proposition of producing a best practice paper, highlighting some of the best practice used for in situ data sets creation. This should be peer-reviewed, submitted to BAMS and funders, and then GCOS stamped.	

IP Action	Activity	Means of assessing progress	Responsibility	IP rapporteur
C3: General Improvements to in situ Data Products for all ECVs	1. Periodically reprocess in situ data products to account for new knowledge, new techniques and improved access to historical data holdings.	1. New publications of updated in situ datasets and availability of those datasets following FAIR data principles.	Research organizations, Academia	Blair, Bernard, Colin

C3.1: Scope – Initial Surface Temperature Case Study

Gridded products of surface temperatures generated using in situ observations. Include products for a single domain (ocean or land, there are no in situ gridded products for near surface air temperature over ice) and those combining multiple domains.

Satellite based products where the in-situ data is only used for bias adjustment of satellite products are considered out of scope. Data products considered are only the most recent versions and must be updated to at least the end of 2022.

IP Action	Activity	Means of assessing progress	Responsibility	IP rapporteur
C3: General Improvements to in situ Data Products for all ECVs	1. Periodically reprocess in situ data products to account for new knowledge, new techniques and improved access to historical data holdings.	1. New publications of updated in situ datasets and availability of those datasets following FAIR data principles.	Research organizations, Academia	Blair, Bernard, Colin

C3.1: Queries	
Is the scope definition agreed?	
Are we reviewing data sources or also methods (including bias adjustment)? E.g. for marine there's a backlog of science (bias adjustment, statistical methods for analysis, improved QC) that needs to be pulled into products.	
Presumably, we want to encourage higher resolution products, but these are often regional. Do we want to extend scope to cover regional. This would increase the size of the task.	
What about data sources that aren't being used for data products (and aren't explicitly being withheld)? Proposed approach: start with the input data sources (e.g. ICOADS, GCHNm, ISTI) and critique them (update status, QC, completeness). Then discuss whether the gridded single domain products are using the most up to date products (e.g. HadSST4 using ICOADS R3.0.1).	

IP Action	Activity	Means of assessing progress	Responsibility	IP rapporteur
C3: General Improvements to in situ Data Products for all ECVs	3. Undertake efforts to account for spatio-temporal sparsity of in situ measurements via interpolation.	3. Increased spatio-temporal completeness of in situ-based products based upon use of additional data and application of interpolation techniques.	Research organizations, Academia	Blair, Bernard, Colin

C3.3: Progress under this activity	
Caterina sent a paper from Services to Blair and Bernard to see whether this can be followed (10 August 23). Blair notes that this is a very specific subset of the problem - temporal gap filling in an otherwise complete time series. No specific update at Feb 2024.	
Can Blair & Bernard provide an update on this activity?	

IP Action	Activity	Means of assessing progress	Responsibility	IP rapporteur
C3: General Improvements to in situ Data Products for all ECVs	2. Improve uncertainty quantification of in situ-based products.	2. Increased number of available in situ-based datasets for which a documented and quantified uncertainty assessment is available.	Research organizations, Academia	Blair, Bernard, Colin

C3.2: How to progress?

Sept 2024: After Activity 1? To discuss at AOPC-29

IP Action	Activity	Means of assessing progress	Responsibility	IP rapporteur
C3: General Improvements to in situ Data Products for all ECVs	4. Ensure adequate sampling of the structural uncertainty inherent in in situ product development via supporting the development of multiple methodologically distinct products and their intercomparison.	Increased number of ECVs for which two or more global in situ datasets exists	Research organizations, Academia	Blair, Bernard, Colin

C3.4: How to progress?

Sept 2024: After Activity 1-3? To discuss at AOPC-29.

Agenda check list: Task C3

C3: General Improvements to in situ Data Products for all ECVs	
Introductory presentation on innovations in surface temperatures	
Review actions from AOPC 28 relating to action C3: general improvements to in situ data products for all ECVs	
Review progress on Activities C3.1 and C3.3.	
Agree timeline and way forward for Activities C3.1 and C3.3.	
Review position on Activities C3.2 and C3.4.	