GCOS: ECV Requirements and Status Report 2021

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GLOBAL CLIMATE OBSERVING SYSTEM
KEEPING WATCH OVER OUR CLIMATE

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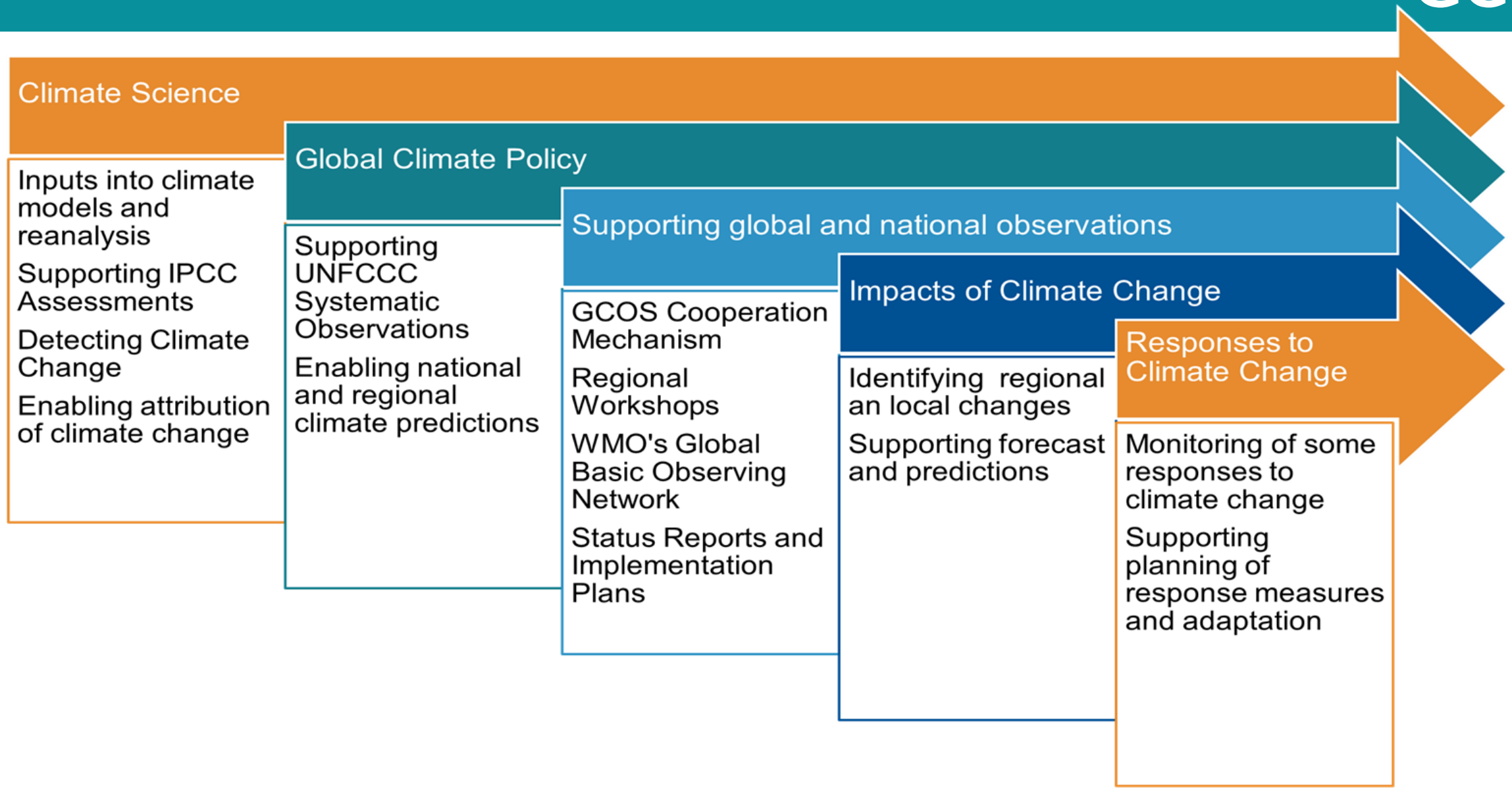
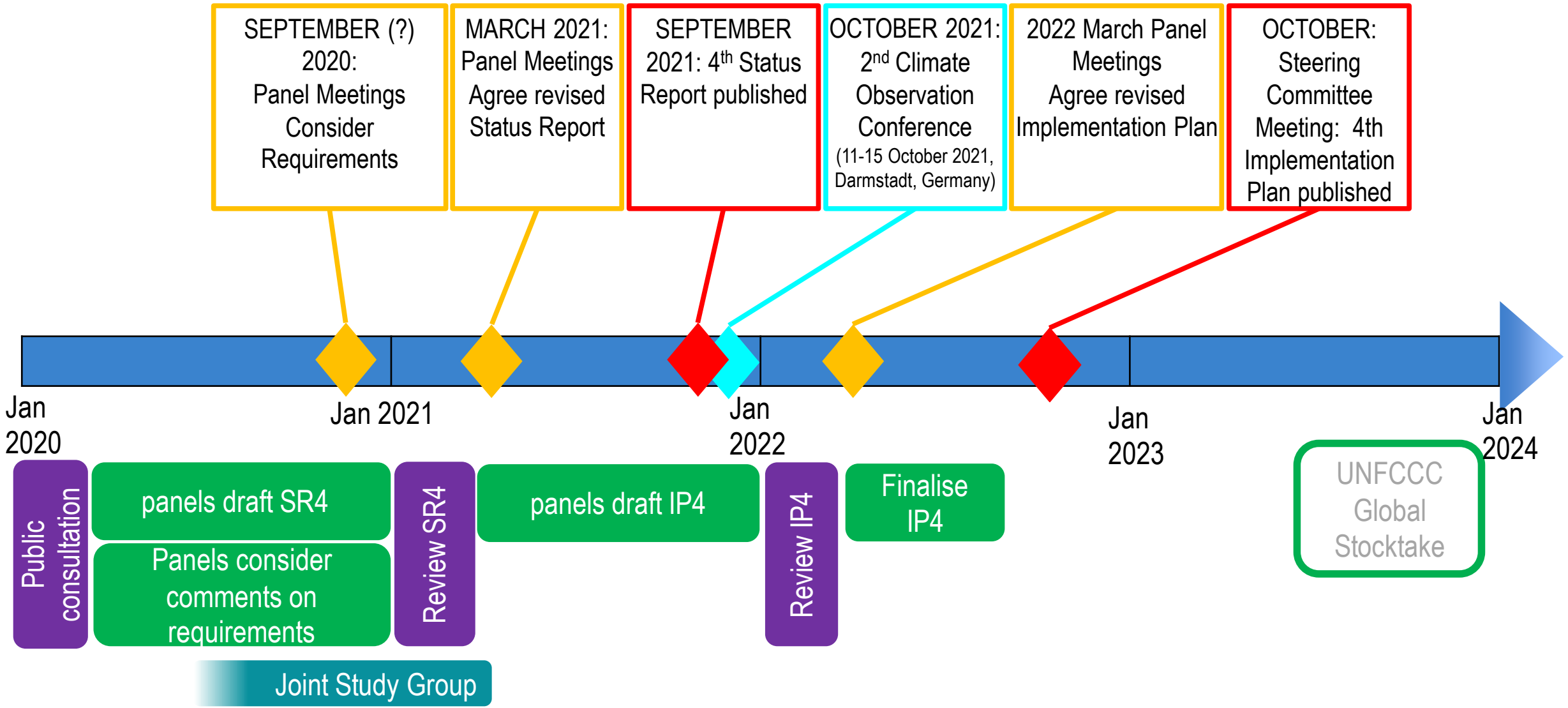
- New
  - Director: Anthony Rea
  - Chair: nominated and awaiting final confirmation
  - The GCOS secretariat will be based in the Infrastructure Departments reporting to its director at WMO (previously it was in the Climate and Water Department)
- WMO remains committed to hosting GCOS
- The 4 GCOS co-sponsors will review the governance of GCOS aiming to make proposals in 2021 for approval by the co-sponsor's governing bodies.
- GCOS steering committee and panels are working to
  - review the ECV requirements,
  - revise the Status report and implementation plan,
  - improve climate observations
    - Improve the uptake of ECV requirements by WMO and others
    - Improve networks
  - Consider adaptation, impacts and global climate cycles


Climate Science
Inputs into climate models and reanalysis
Supporting IPCC Assessments
Detecting Climate Change
Enabling attribution of climate change
Global Climate Policy
Supporting UNFCCC Systematic Observations
Enabling national and regional climate predictions
Supporting global and national observations
GCOS Cooperation Mechanism
Regional Workshops
WMO's Global Basic Observing Network
Status Reports and Implementation Plans
Impacts of Climate Change
Identifying regional an local changes
Supporting forecast and predictions
Responses to Climate Change
Monitoring of some responses to climate change
Supporting planning of response measures and adaptation

GCOS – work plan



ECV requirements

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Review of ECV Requirements

- In 2019 the panels considered the requirements
  - Clarified definitions
  - Identified issues and proposed solutions
  - Filled in gaps

- Jan-Feb 2020 Public Consultation Invited Comments on ECV Requirements

- March onwards
  - Panels consolidate comments
  - Develop suggested requirements for next Implementation plan
  - Discussions on issues arising

- None of these changes will be adopted until the updated implementation Plan is agreed.

Updates to ECV Requirements

- In in order to allow flexibility for the design of observing networks, the requirements for each of these criteria, are provided by a minimum (threshold) and ideal (goal)values. Breakthrough values are optional intermediate values.

  - *Threshold*: The minimum requirement: the value that has to be met to ensure that data are useful.

  - *Goal*: The ideal requirement above which further improvements are not necessary. This is likely to evolve as applications and technologies progress.

  - *Breakthrough*: One or more values that enable additional uses within climate monitoring. The additional uses need to be described in the "derivation" section.

Uncertainty and Stability Definitions

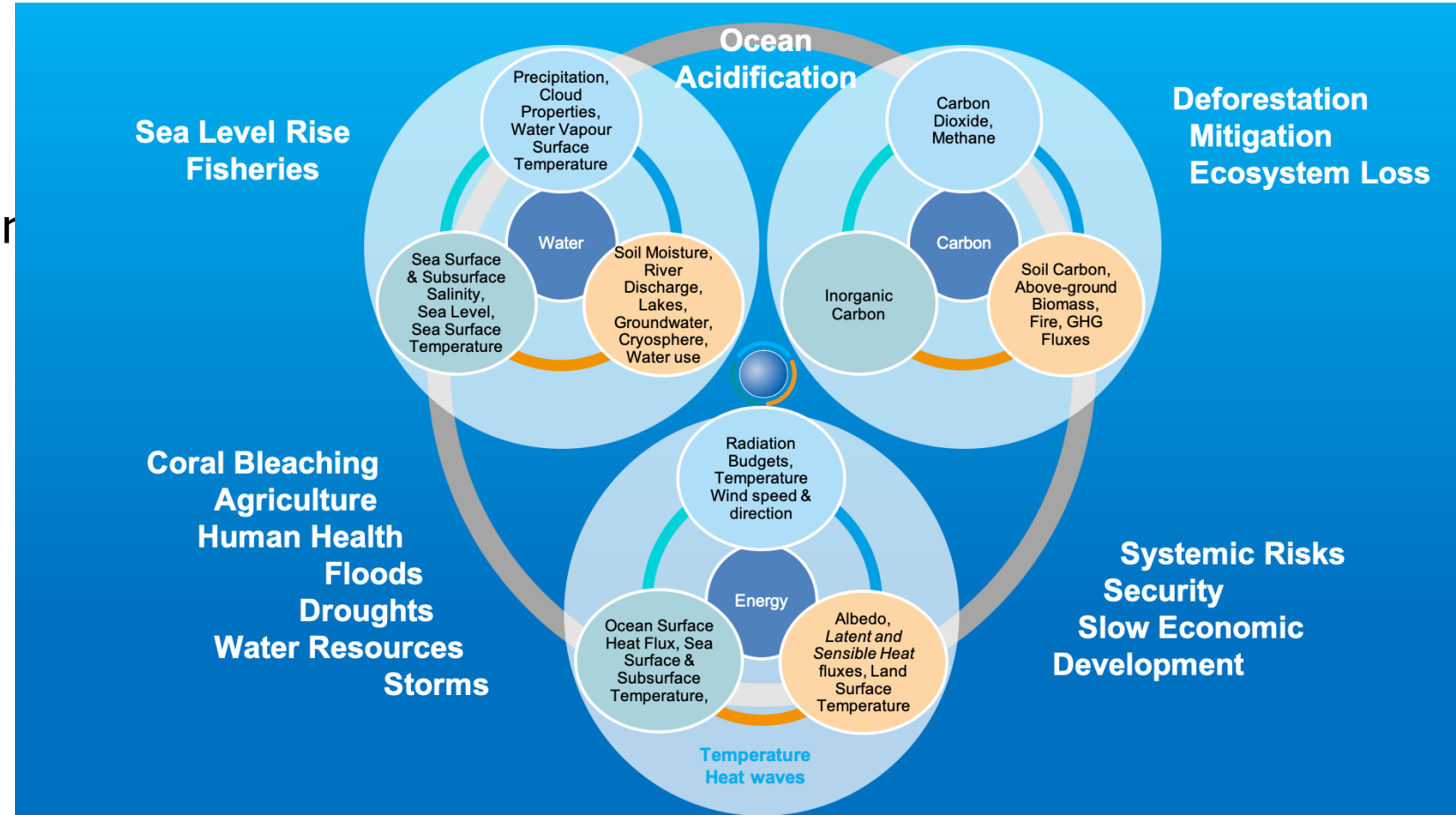
- *Uncertainty*,
  - in line with
    - the International Vocabulary of Metrology (VIM, De Bièvre, 2012; International Bureau of Weights and Measures (BIPM), 2017)
    - and the Guide to the Expression of Uncertainty in Measurement (GUM, International Bureau of Weights and Measures (BIPM), 2012),
  - the required measurement uncertainty includes all quantifiable uncertainties.
  - The uncertainty is considered the range within which the true state of the measurand will plausibly reside.
  - Uncertainty should be expressed in units of two standard deviations..
- ***Stability*** is defined as the maximum permissible cumulative effect of systematic changes of the measurement system to allow long-term climate records compiled from assorted measurement systems.
  - If not stated differently, it is defined as maximum permissible percentage change per decade. In order to set the stability requirement,
  - an approach frequently used is to use a percentage of the expected trends, chosen so that the expected trend is clearly detectable.

Other Updates

- Definitions checked and clarified
- *Timeliness* is the delay between the observation and the data being available, for example to support annual reporting of the state of the climate. This only applies to currently observations: there is value in rescued data as well, but this is not covered by this requirement.
- Is the ECV Product directly relevant to support Climate Adaptation?
- Can the ECV Product be used to monitor climate extremes or aspects of extremes?

Climate Cycles

- GCOS IP has targets for observing the climate cycles:
  - Carbon, Water, Energy, Biosphere
- Consider how well the existing ECV achieve these targets and if the ECV requirements are
  - Adequate to meet these cycle targets
  - Consistent with each other within the cycle



Name					
Definition					
Unit					
Note					
Requirements					
Item needed	Unit	Metric		Value	Derivation and References and Standards
Horizontal Resolution			G		
			B		
			T		
Vertical Resolution			G		
			B		
			T		
Temporal Resolution			G		
			B		
			T		
Timeliness			G		
			B		
			T		
Required Measurement Uncertainty			G		
			B		
			T		
Stability			G		
			B		
			T		
Standards and References					

Adaptation and Extremes			
	Relevant? (Yes/No)	Sugg. Req. sufficient? (Yes/No)	Explanation
Adaptation			
Extremes			

Some ECV proposed changes clarify data needed

- Some ECV products are part of the measurement not the data needed by users e.g.
  - for river discharge it is the volume discharge that is needed not the river cross section or speed
  - Ground water ECV products reduced as well e.g. wellhead level and recharge
- Improved conformity with meteorological definitions

Marine Habitats

- Mangrove Cover and Composition
- Sea Grass Cover and Composition
- Macroalgal Canopy Cover and Composition
- Hard Coral Canopy Cover and Composition
- Also discussion about deep ocean…

Status Report

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Status Report: Overview

- Timing constrained by need to report as part of the UNFCCC Global Stocktake in 2023 i.e.
  - Status Report 2021,
  - Update to Implementation Plan and ECV Requirements in 2022
- These reports will:
  - Be much shorter more concise documents
  - Be based on existing work by ECV Stewards and IP Action Rapporteurs
  - With secretariat combining contributions and coordinating reviews (internal and public)
- Approach:
  - Ask ECV Stewards to complete data sheets (later in presentation)
  - Simultaneously, agree report outline with Panel Co-Chairs
  - Ask outside groups for inputs as well e.g. WGClimate, Copernicus, WIGOS etc.
  - Small group from panels and users to compile and agree conclusions and assessments
  - Two reviews: by panels and by public
  - Approval by panels in 2021 and final approval in mid-2021

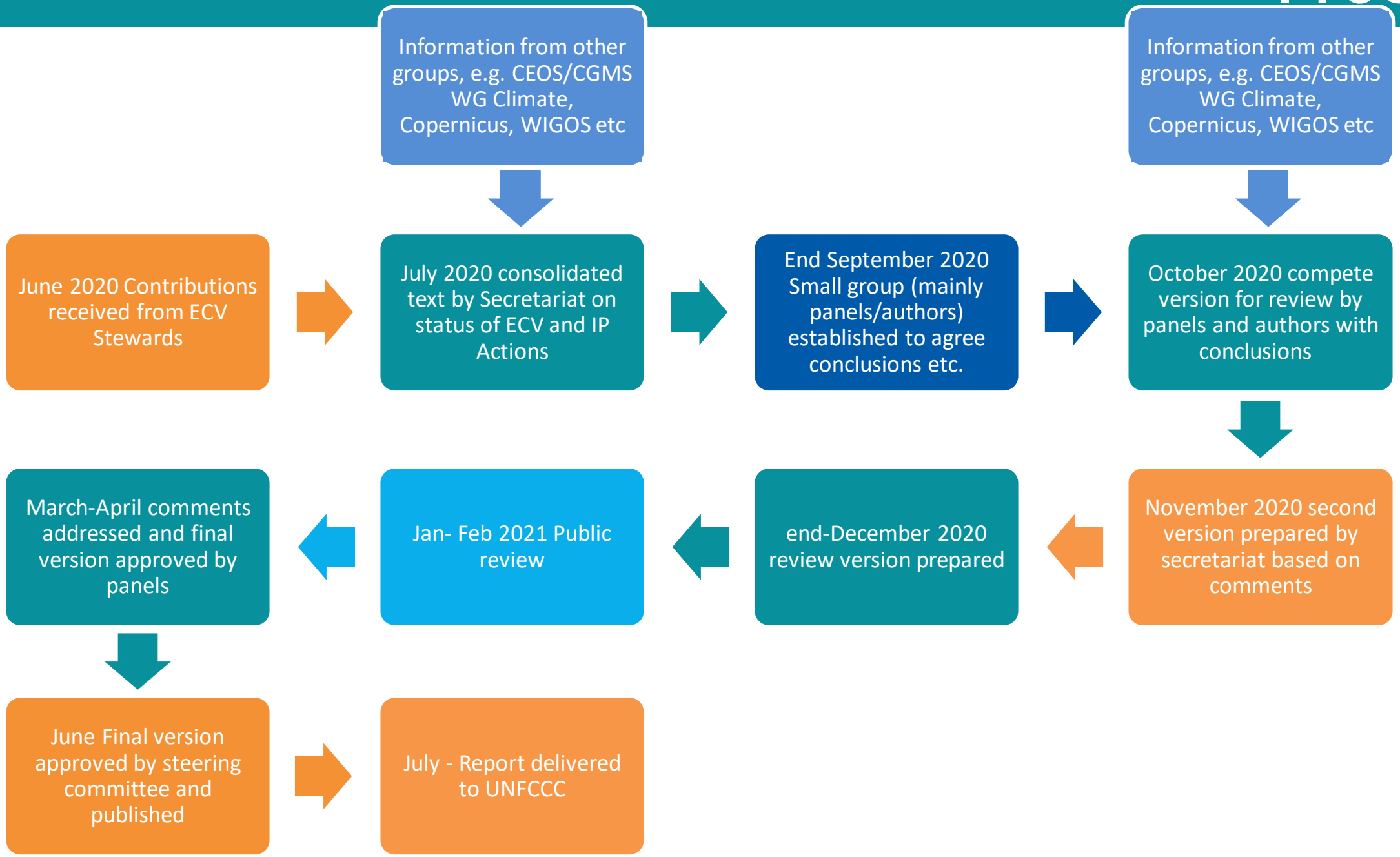
Inputs

- The main authors will be the GCOS Panels and ECV Stewards

- However we will lean on input from the satellite agencies including:
  - The satellite agencies' response to the GCOS 2016 IP response (2017)
  - The WGClimate Gap Analysis in August
  - The IP rapporteurs of the actions in the GCOS IP 2016

- Also inputs from ocean observing systems and terrestrial networks

Process


Information from other groups, e.g. CEOS/CGMS WG Climate, Copernicus, WIGOS etc
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June 2020 Contributions received from ECV Stewards
July 2020 consolidated text by Secretariat on status of ECV and IP Actions
End September 2020 Small group (mainly panels/authors) established to agree conclusions etc.
October 2020 compete version for review by panels and authors with conclusions
November 2020 second version prepared by secretariat based on comments
end-December 2020 review version prepared
Jan- Feb 2021 Public review
March-April comments addressed and final version approved by panels
June Final version approved by steering committee and published
July - Report delivered to UNFCCC

Draft Outline

FOREWORD

EXECUTIVE SUMMARY 2

1. INTRODUCTION

2. STATUS OF THE GCOS ESSENTIAL CLIMATE VARIABLES

   2.1. Status of ECV

      2.1.1. Atmospheric

      2.1.2. Ocean ECV

      2.1.3. Terrestrial ECV

3. STATUS OF THE OBSERVING NETWORKS

   3.1. Satellite Observations

   3.2. GCOS Networks

4. STATUS OF THE IMPLEMENTATION OF ACTIONS FROM THE 2016 IMPLEMENTATION PLAN

5. OBSERVATIONS OF AND FOR ADAPTATION, AND EXTREMES

6. OBSERVATIONS OF THE EARTH SYSTEM CLIMATE CYCLES

7. CONCLUSIONS (structure tbc)

   6.1. Principal Findings

Annexes: Glossary, Contributors and Reviewers of this report

Assessment of Status of Observations of ECV

- *Adequacy of the Observing System* and *Data Stewardship* will be addressed
- For each
  - rating 5-step rating from *very good* to *poor*.
  - a short (>120 character reason/summary)
- A longer discussion should be given in the text about the ECV (up to one page)

Adequacy of the Observational System

- The ability of the observational system to produce adequate datasets for users: Does the observation system produce adequate datasets that meet the GCOS requirements?
  - *Very Good*: Meets requirements.
  - *Good*: Generally meets requirements, provides reliable global trends.
  - *Medium*: Does not meet requirements: while observations are useful and reliable from a user's perspective, they have significant issues at a regional level.
  - *Low*: Can only produce datasets with limited reliability from a user's perspective at global and regional levels.
  - *Poor*: Do not meet requirements and does not provide reliable trends.

Availability and Stewardship

- Covers all aspects of data stewardship including availability, discoverability and archiving: Is the data freely available, discoverable, accessible with QA/QC and adequate metadata?
  - *Very Good*: Data available worldwide, with high standards of data stewardship
  - *Good*: Data available but not meeting the highest standards of data stewardship.
  - *Medium*: Most regions have available data but there may be stewardship issues, however the data are useful and reliable from a user's perspective
  - *Low*: Some data is available but of limited utility
  - *Poor*: Useful data is not available at a global or regional level.

Table showing status of Observations of ECV

ECV		**Adequacy of the Observational System** (the ability of the observational system to produce adequate datasets for users).	**Availability and Stewardship** (availability, discoverability and stewardship)
Temperature		Yes	Yes
Precipitation		High Quality	Gaps
…		…	…
River discharge		High Quality	Much data is not exchanged
Above-ground Biomass		Not accurate enough - new satellite missions underway to address this. This is some text and a	Global coverage from satellites
Lakes	Lake colour	Under Development	Under Development
	All other products	Measurements of good quality	Not all data exchanged

Assessment of status of Actions in the last IP

- A 5-step classifications have been proposed assessing progress on actions:
  - Complete.
  - Progress on track.
  - Underway with significant progress
  - Started but lottle progress
  - Little or no progress

- Is there a class needed for actions that are now redundant/superseded?

Table showing status Actions in the last IP

Action		Comment
G1	Guidance and best practice for adaptation observations	Task Team on Observations for Adaptation convened and reported to Steering Committee. Work continues.
G2	Specification of high-resolution data	Depends on outcome of adaptation task team (G1).
G3	Development of indicators of climate change	Done. Used in WMO Statement on Climate Change
G4	Indicators for Adaptation and Risk	Depends on outcome of adaptation task team (G1).
G5	Explore how ECV data can contribute to: a) The Ramsar Convention; b) the Sendai Framework for Disaster Risk Reduction; c) other MEAs.	Pending outcome of adaptation related work (G1)
G6	Assisting Developing Countries to maintain or renovate climate observation systems and to improve climate observations networks	Done. Work limited by available funds.
G7	GCOS Coordinator	Not all countries identify a GCOS Coordinator
G8	Regional Workshops	Done - one workshop annually. Work limited by available funds. Planning on continuing annually
G9	Communications strategy	Done but implementation pending WMO reorganisation
G10	Maintain ECV Requirements	Underway - an on-going activity
G11	Review of CDR availability	Available via ECV Inventory form EUMETSAT
G12	Gap-analysis of CDR	Underway - an on-going activity
G13	Review of ECV observation networks	Underway - an on-going activity
G14	Maintain and Improve Coordination	Underway - an on-going activity

Data table for ECV Stewards

Item		Status
ECV Name		
ECV Products covered by this sheet (group as much as possible)		
Accuracy (Uncertainty and Stability) Assessment	Class (1-5)	
	short text	
Resolution (both temporal and spatial) Assessment	Class (1-5)	
	short text	
Availability and Stewardship Assessment	Class (1-5)	
	short text	
Networks		
Satellites		
Models, Reanalysis etc.		
Extremes		
Adaptation		.
Discussion One-page (max)		
Other information (e.g. Networks, Satellites, reanalysis, models etc.)		

Instructions

- Where possible, group ECV Products together in order to minimise the number of sheets to be completed
- In general, ECV are global products and the coverage should be global, or wherever applicable
- Where the product delivered to the is the output of a model or reanalysis the assessment should consider if the observations are sufficient to support accurate outputs from these models or reanalysis.
- Add text on the networks and satellites below if additional information is needed
- Data collected on the ECV should provide most of the information needed.
- Both numeric assessments should be accompanied by a short (max 90 character) description.
- The longer text “Description” is important as it will provide the justification for the assessment of the ECV above. This will be published but may not be included in a short version of the report. Highlighting issues, gaps and deficiencies. Note if there are some applications where the available observations are inadequate.
- Extremes - Highlight if the observations are adequate to capture extreme events, if there are an issue for this ECV
- Adaptation - Identify if the ECV can be used to support or monitor adaptation, or any improvements needed
- “Resolution” means the resolution of data needed by users. In the existing ECV requirements the resolution is not always specified in this way (e.g. Surface Temperature is given as “site”) so expert judgement is needed to determine if the resolution is adequate (e.g. for surface temperature the specifications of GBON provide a guide).

Thank you

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