

Climate Change Initiative

Current activities & future outlook

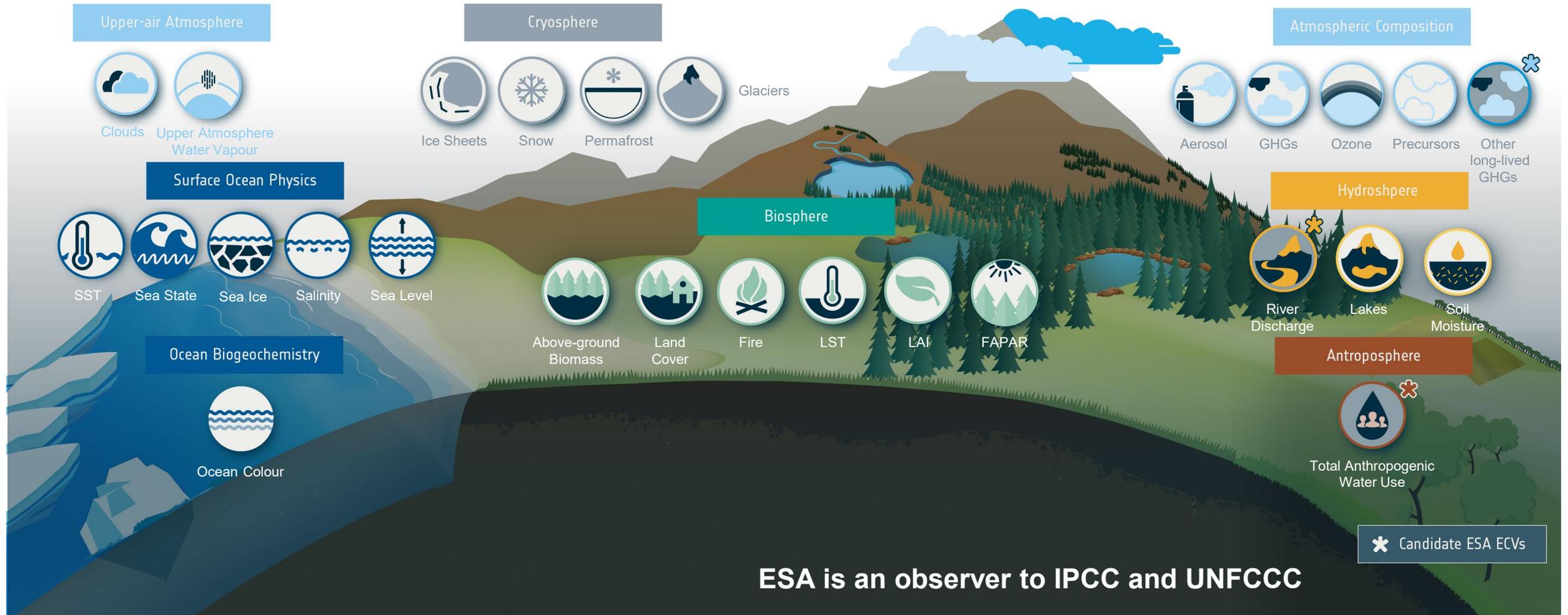
Susanne Mecklenburg
Head of ESA Climate Office

26 October 2022 | ESRIN

Current activities under CCI+ phase 2

ESA's Climate Change Initiative ECVs

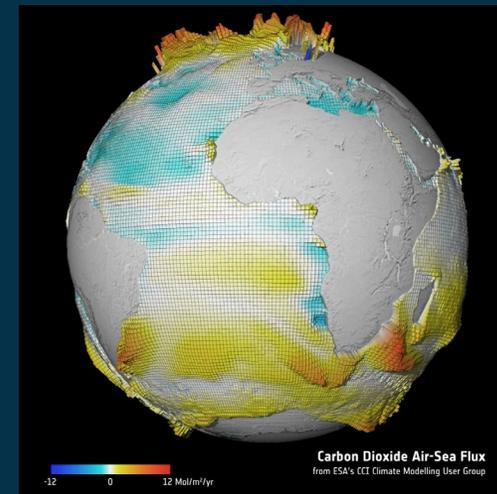
GCOS defined **54** Essential Climate Variables | **36** benefit from space observations | **23** generated by ESA Climate Change Initiative



ESA is an observer to IPCC and UNFCCC

ESA's Climate Modelling User Group

- Dedicated collaboration between EO and Climate Modelling
- Providing tailored space based ECVs products for CMIP evaluation
- 50% of ECVs implemented into ESMValTool
- Support to WCRP's Obs4MIPs (ESA is co-chair)
- Close interaction with WCRP data advisory council



Linking Earth Observations and Climate Modelling

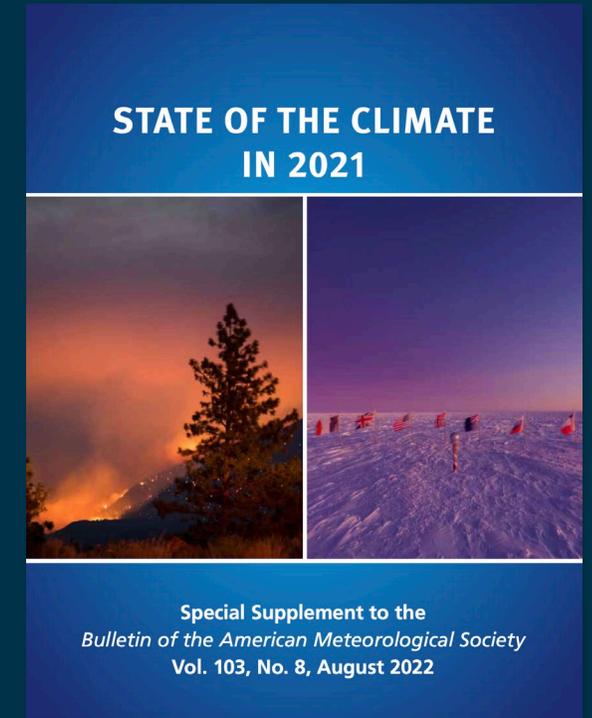


The WCRP CMIP International Project Office

- Dedicated secretariat support to CMIP
- Focal point for leading national and international entities in climate modelling
- Operational from March 2022
- Director: Dr Eleanor O'Rourke
- Hosted by ESA ECSAT site, alongside the ESA Climate Office

Implementation of CCI+ phase 2 ongoing

- Continue provision of **high-quality climate relevant data**
- Extension of existing ECV contracts – ongoing
- **Two new ECVs:**
 - Vegetation parameters (LAI, FAPAR) – KO spring 2022
 - Precursors for aerosols and ozone – KO summer 2022
- **Upcoming procurements**
 - ITT SLBC-2 selection ongoing
 - ITT for long-lived Green-House-Gases – planned for Q4/2022
 - Further expansion of the ECV portfolio
 - River discharge – KO Q4/2022
 - Terrestrial water use & Anthropogenic water use –roadmap – under preparation, Q4/2022
 - Call for CCI Research Fellowship, focus on CMIP collaboration before end of 2022
- Successful Climate Day and events at **LPS22**
- **Climate Science Advisory Board** planned for Jan 2023, focussing on the implementation approach for CLIMATE-SPACE post CM22



BAMS State of the Climate 2021

ESA CCI contributes publications and data covering ozone, ice sheets, sea ice, glaciers, snow & soil moisture project. In 2021:

- Record lake temperatures (0.6° C above average)
- Rock glacier velocities 2-10x faster than 1980s
- Global mean sea level rose to a new record high: 97mm above 1993 average

TOWARDS CLIMATE-SPACE

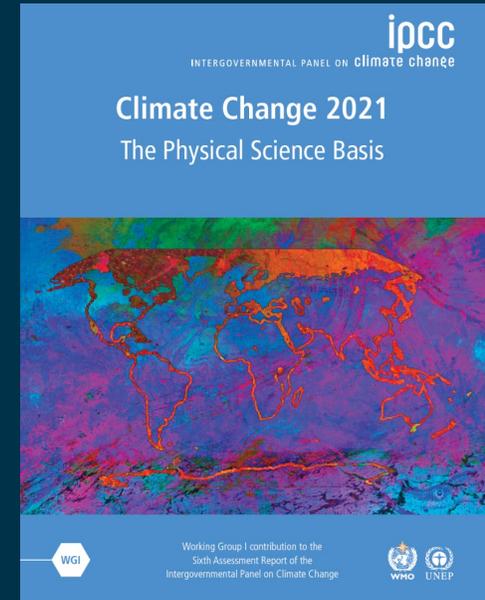
The new climate initiative

CLIMATE-SPACE

- Programme proposal ready to go to ESA member states at CM22
- Implementation plan will be presented to PB-EO in Feb 2023
- Financial approval for expenditure in March/April 2023
- New activities issued / ITTs from May 2023+

CLIMATE-SPACE: preparation

- Evolving requirements from GCOS and IPCC
- Interactions with operational services: C3S, CAMS, CGLS, CMEMS & EUMETSAT
- Expanding ECV portfolio: see previous slides
- Addressing UNFCCC Paris Agreement: prep activities
- Links between observation and modelling community
- Increase interaction with IPCC towards AR7 – Climate Office is observer
- Tipping points workshop with ISSI – Oct 2022



EO for Tipping Points & TIPMIP workshop



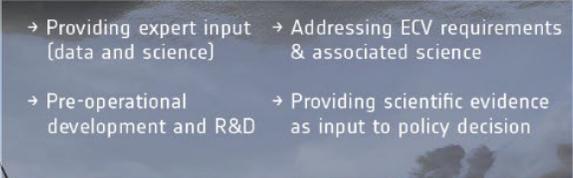
October 10-14 2022; Workshop International Space Science Institute (ISSI) ; co-convened with ESA, WCRP & Future Earth AIMES

- Brought together a **diverse community**: EO experts, climate modelling and tipping points theorists, covering terrestrial biosphere, ocean bio, ocean physical, atmosphere and cryosphere.
- **35 in-person participants about 10 online**, including 9 from ESA / ESA CCI projects and fellows, IPCC authors, 10% early careers.
- Participatory **breakouts and plenary discussions every day**, working on recommendations for funders/ESA – a white paper in a few weeks, plus ~ 12 journal papers in prep, to form an ISSI Springer series book.

STAKEHOLDERS



ESA'S ROLE



USERS



The international climate network

- Policy drivers
 - UNFCCC Paris Agreement/ IPCC AR
 - GCOS & WCRP requirements
 - New users: biodiversity & ecosystems, health

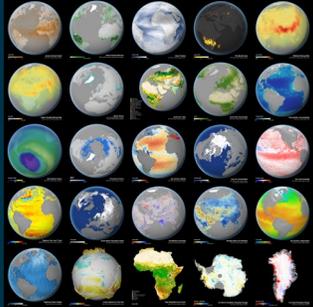
- 2030 Agenda for Sustainable Development
- Sendai Framework for Disaster Risk Reduction 2015–2030
- EU's Green Deal

- Focus on collaboration, complementarity and synergy

CLIMATE-SPACE (2023-2029): main pillars



EXPANDING THE ECV PORTFOLIO

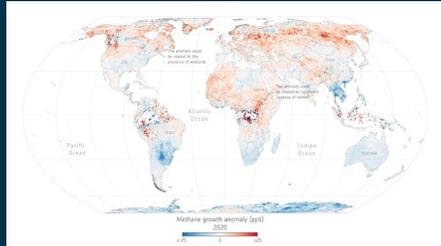


New ECV products will be developed in response to evolving user requirements e.g. GCOS 2021 Status report (GCOS-240) including:

- **Other Greenhouse gases** (N₂O & halogenated carbon compounds)
- **River discharge**
- **Terrestrial total water use & Anthropogenic Water Use**

R&D will also improve existing satellite-based CDR and integrate new sensor data e.g. Copernicus Expansion and Extension

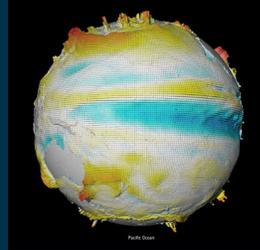
RESPONDING TO UNFCCC PARIS AGREEMENT



Provide the physical evidence base required by IPCC, contributing to its forthcoming assessment reports, as well as contributing to the State of the Climate reports issued by e.g. WMO, BAMS, C3S, to inform decision and policymakers to take action.

Support national and international obligations under the UNFCCC Paris Agreement, working closely with ESA Member States.

LINKING EARTH OBSERVATION & CLIMATE MODELLING



Earth observation and climate modelling communities will be brought closer together to increase utility of satellite data in climate modelling activities.

- EO-based ECV demonstration studies
- **EO data-model fusion** technique development
- Cross-ECV consistency investigation
- **Support community** to e.g. obs4MIPs and ESMValTool
- **Facilitate EO data use** in CMIP & CMUG experiments
- Continue to host **CMIP's International Project Office** at ESA ECSAT.

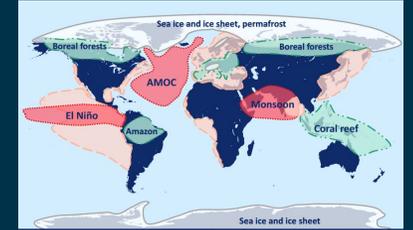
WORKING WITH CLIMATE SERVICES



Work closely with climate service providers, including Copernicus services - C3S, CMEMS, CAMS, CLMS, CEMS - Eumetsat's CDOP, & national climate services, to provide research and pre-operational development.

- Jointly agreed priorities with include:
- transfer
 - new topics, such as **biodiversity** and **terrestrial hydrology**

CROSS-ECV & TIPPING POINTS R&D



Cross-ECV exploitation studies will support the science needs relevant to IPCC assessments etc.; Earth system cycle understanding & tipping

KNOWLEDGE EXCHANGE BEING A CLIMATE AMBASSAFOR

- **Climate extremes**
- **Regional studies**
- **Lateral exchange of fluxes** between land, ocean, cryo- and atmosphere,
- **Atmospheric radiation closure** studies (aerosol, cloud, albedo, & LST ECVs)

