

Evolution of CCI into phase 2 and beyond to a new ESA Climate programme

Feedback from the Science Leads

Broad Aspirations



1. Observations to support action under the present climate policy regime (Paris Agreement and broader)
2. Observations to advance the climate science needs of the future
3. Solutions to climate challenges
 - Observations to meet and address “local” climate needs (e.g. sustainable development) and risks
 - Observations tailored to assess effectiveness of mitigation actions
 - Building capacity to exploit EO for national activities relevant to the Global Stocktake and other aspects of the Paris Agreement
 - Supporting Climate Change Adaptation measures and success monitoring



4. Integrating existing and new sources of observations as well as novel technologies, ensuring continuity, quality and consistency
 - Sentinel expansion, 3rd party missions, and new ECV capabilities
 - Rescuing historic EO data and adding past missions to enhance CDRs
 - ECVs and ECV Products, required for science and solutions, that are “missing” from CCI, building on progress in other R&D programmes

1. Building on the solid foundations



The foundation for a globally important, distinctive programme will be ensuring the **continued generation, quality assurance, robustness, validation, interoperability and analytics of and for new and existing climate data records:**

- Critical support for R&D essential to the continuity, quality and enhancement of climate data provision to operational climate services and evidence-based policy-making around climatic change
- Challenges to maintaining the high quality of the CCI datasets with regards to existing and past missions
- Addressing gaps in the CCI family



2. Streamlining the R&D Programme



Streamlining the R&D programme for CDR delivery towards fewer projects addressing linked ECVs may **optimise sharing of knowledge and expertise in the programme and facilitate cross-validation:**

- 1) By shared satellite missions series or main remote sensing technologies
 - 2) By climate domain (spheres) or Earth system cycle, grouping ECVs around challenges in these and fostering the synergistic use responding to overarching research questions
- It is crucial that **streamlining should retain key expertise to address the observation science challenges** for a high-quality climate information service
 - Data creators in the next programme should be more **fully supported to be centrally involved in collaboratively exploiting the data** they best understand for solving climate problems



3. Contributing to the Paris Agreement



The programme needs to make a clear contribution to the Paris Agreement and identify and develop activities exploiting CCI ECVs contributing to the Global Stocktake. **These activities can be integrated into consolidated ECV projects that keep the CDR-science and exploitation science closely coupled**, and may be devised to frame ECV R&D within consolidated projects

- Landscape-atmosphere: carbon balance for monitoring, mitigation and adaptation/resilience, including by nature-based solutions
- Ocean variables: coastal/island zones and for particular ecological habitats, both for nature-based solutions and adaptation/resilience
- For land-focussed: CCIs nature-based solutions looking at drawing down CO2 from the atmosphere
- For the atmosphere: information on climate system response/sensitivity, mitigation



4. Consideration of broader UNFCCC needs



The programme must also have regard for **broader UNFCCC relevance and involvement in the climate science needed to improve and frame future policy regimes** (e.g. UNFCCC Systematic Observations)

Increase input to and dialogue with IPCC (leveraging ESA observer status) and other programmes (GCOS, WCRP) including consideration of future GCOS Implementation Plans

Showcase what we could do in a future programme at COP26



5. Developing more localised outputs



The future programme should develop **localised, added-value information from global ECV products to make them more relevant to many users and policy makers**, specifically driven by user needs and involving data producers directly to ensure appropriate exploitation:

- Creating/contributing derived products to local observatories/data stores
- Facilitating CCI outputs for a wider range of users at local to regional scales, who may from these create commercial services
- Bridging the gap between the production of highest quality scientific datasets and the practicalities of what users need for policy or commercial exploitation
- Building interfaces between our observations and exploitation required by nations addressing their obligations to declare Nationally Determined Contributions under the PA



Larger science questions that can not yet be answered (Solutions)

Integrative studies for mitigation and adaptation solutions

- Combining information to assist planning of adaptation strategies at local-to-global scale:
 - Multiple stressors on coastal ecosystems
 - Climate stresses on food security
 - Urban climate impacts on vulnerability

Local Extremes

- Monitoring / reporting climate change impacts from space (e.g. water availability, droughts/flooding/heatwaves, geohazards)
- Can we use space-based observations to develop solutions for adaptation to climate extremes at local scales ?
- Can we correlate interactions between local anthropogenic changes and climate extremes ?

Larger science questions that can not yet be answered (Budgets)



Global Energy Budget

- Build a consistent estimate of the components of the time varying global Earth energy budget and compare it with the surface temperature variations to derive observational constraints on the climate feedbacks and the climate sensitivity

Sea Level Budget

- Are we able to determine regional sea level change and regional ocean mass change?
- Are regional trend patterns still dominated by natural climate modes?
- Can we detect the sea level fingerprint related to global ice and water mass redistribution?

Can we close the global water balance ?

- Includes groundwater, precipitation, evapotranspiration, run-off, sea-level change, change of land storage, etc.)



Larger science questions that can not yet be answered (ECVs)



Glaciers

- What is the annual mass balance of all glaciers globally?
- Can we have a near-real time monitoring system for all glaciers showing rapid dynamic changes?
- What is the SWE (weekly aggregated) in all major mountain ranges?
- What is the high-mountain precipitation and their vertical and horizontal gradients?

CO2 and CH4

- Need to fully exploit existing high-spatial resolution satellites/instruments to derived anthropogenic emissions in support of the Paris Agreement and to prepare for future missions



Summary



1. Observations to support action under the present climate policy regime (Paris Agreement and broader)
2. Observations to advance the climate science needs of the future
3. Solutions to climate challenges
4. Integrating existing and new sources of observations as well as novel technologies, ensuring continuity, quality and consistency

Full details will be provided to ESA in a Concept Note

