

Essential Climate Variables for addressing the Paris Agreement



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Systematic observations of the climate

The European Space Agency's (ESA) Climate Change Initiative (CCI) programme produces long time series of satellite data for climate scientists by merging different satellites and sensors (Fig 1). Emphasis is put on creating stable data sets of Essential Climate Variables that include quantified details on the accuracy and uncertainties in the data. This means these data products are specifically adapted to climate applications.

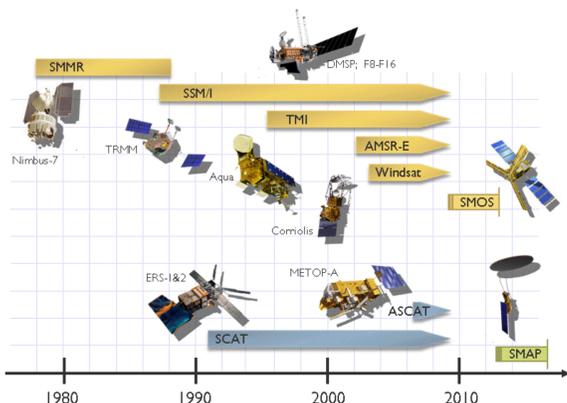
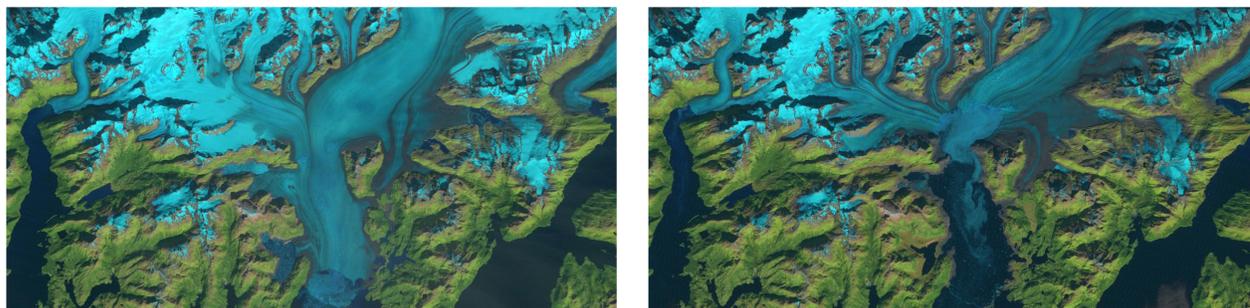


Fig 1: Some of the satellites that are combined to create the merged active and passive CCI Soil Moisture data product.

ESA works in collaboration with the Copernicus Climate Change Service (C3S), providing prototypes of Climate Data Records that are then taken up to run operationally under C3S. This Research & Development phase is essential to providing a fully functioning service under C3S.

Glacier Mass Balance

To measure changes in the mass balance of a glacier you first need to have accurate measurements of the location, size and movement of a glacier. The CCI Glaciers project has helped to establish the first global inventory of glaciers, giving us a detailed picture of the world's glaciers. They then concentrated on delivering three key products that allow us to measure mass balance: glacier area, elevation change and velocity.



The Columbia glacier, Alaska, in 1986 (left) and 2010 (right).

Global Climate Indicators

The Global Climate Indicators (Fig 2.) are a set of seven parameters that describe the changing climate without reducing climate change to only temperature. They comprise key information for the most relevant domains of climate change: temperature and energy, atmospheric composition, ocean and water as well as the cryosphere.

The Climate Change Initiative data sets address all of the Indicators but two are highlighted here:

Sea Level

Mean sea level evolution has a direct impact on coastal areas and is a crucial index of climate change since it reflects both the amount of heat added in the ocean and the mass loss due to land ice melt.

The CCI Sea Level project provided a revised global mean sea level time series covering 21 years that gives a rise of 3.25 mm/yr and shows a clear acceleration over 1993-present.

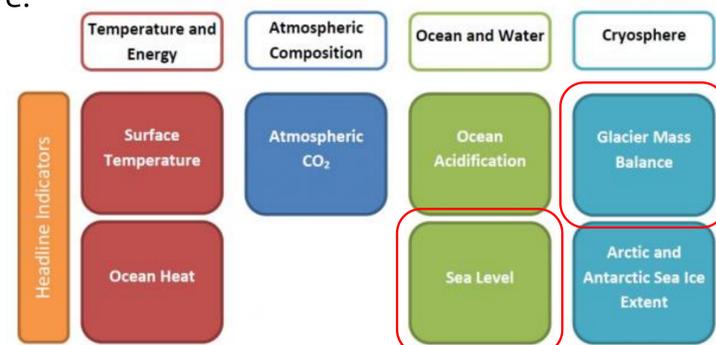
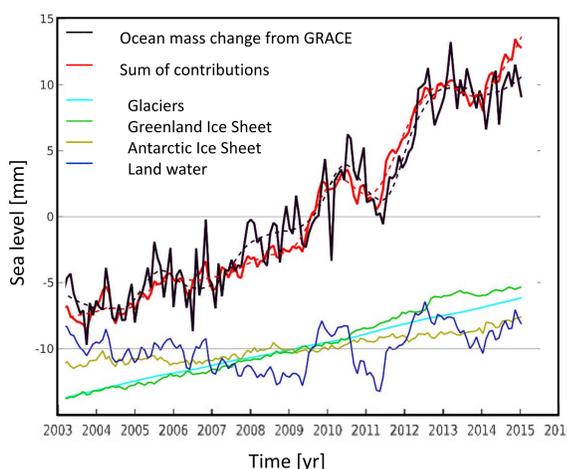


Fig. 2: The Global Climate Indicators, as described by GCOS.



This CCI project aims to improve our overall understanding of the causes of sea level change (Fig 3). It is doing this by looking at the components of sea level in a consistent way to improve the data and reduce the uncertainties.

Fig 3 (left): Sea level change, shown by its components and independently measured by the GRACE satellite.

Open and free data policy

All of the Essential Climate Variable datasets listed below are contributing to improving our understanding of climate change. They are specifically developed for the needs of climate modellers and scientists. All data is open and free to access via a dedicated portal:

cci.esa.int/data

For more information:

cci.esa.int

[@esaclimate](https://twitter.com/esaclimate)

climate.office@esa.int

Established Essential Climate Variable data sets



New Essential Climate Variable data sets

