→ FUTURE CLIMATE OBSERVATIONS FROM SPACE

Comprehensive, coherent, long-term and reliable measurements of many parts of the Earth system are needed to establish climate models and enhance our understanding of climate change.

Satellites are particularly suited to supply such measurements since they provide data with regular, homogeneous and global coverage. Moreover, they allow for reliable assessments of trends over time for specific variables, enable observations in remote regions that are under-sampled by conventional networks, and help with the detection of biases in data.

ESA has been providing measurements of relevant climate variables through a number of space-based Earth Observation missions, starting with ERS-1, ERS-2 and Envisat. The Earth Explorer missions SMOS, GOCE, Cryosat and Swarm have also been contributing data, as are next generation of Earth observation missions, the Copernicus Sentinels.

Topics addressed within these missions include carbon dioxide levels, cloud formation, aerosols ice sheets, sea ice, glaciers, soil moisture, the magnetic field, ocean salinity, sea surface temperature, ocean circulation and sea level rise.

ESA's Climate Change Initiative contributes to the database of Essential Climate Variables required by the United Nations Framework Convention on Climate Change (UNFCCC). It aims to exploit the full potential of the global Earth Observation archives that ESA has established over the last 40 years together with its Member States.

The Copernicus programme – a joint ESA and European Commission venture – is the next step in providing a European system for monitoring the Earth. A set of six pairs of satellites, known as the Copernicus Sentinels 1-6, form a key part of the system.

The Copernicus Sentinels 1a, 1b, 2a, 2b, 3a, 3b and 5P have launched and are already providing satellite data at better spatial, temporal and spectral resolutions than have been seen before. This data is being combined with ground-based measurements to provide information relevant for a wide variety of environmental variables through a set of information services.

The CCI performs research and development of pre-operational ECV data products and processing systems. To date 13 CCI ECVs have reached maturity and have been successfully transferred to the Copernicus Climate Change Service which provides access to several climate indicators (e.g. temperature increase, sea level rise, ice sheet melting, warming up of the ocean) and climate indices (e.g. based on records of temperature, precipitation, drought events) for climate drivers and the expected climate impacts. This information enables Users to respond to environmental and societal challenges associated with human-induced climate change.