

→ OCEAN WARMING

ESA's Climate Change Initiative includes projects for monitoring sea surface temperature (SST), sea level and ocean colour. Each gives an important view of the evolving state of Earth's oceans.

Knowledge of the evolution of sea surface temperature over time is essential to climate science. Most of the energy gained within Earth's climate is 'used' to warm the oceans; therefore, oceans regulate the pace of global warming. Sea surface temperature changes modify weather patterns and influence the seasonal weather, such as droughts, from year to year. Under a dedicated CCI project, sea surface temperature measurements from space have provided a crucial and sensitive verification of measurements of ocean surface warming.

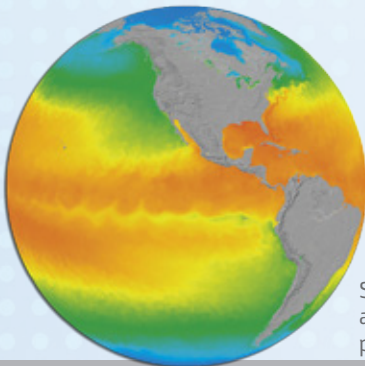
Sea levels are rising at around 3 cm per decade, and this can be detected from space. About 1 cm of this comes from thermal expansion caused by the warming oceans, i.e. as the oceans warm they expand. Around 1.6 cm comes from melting land ice, such as ice sheets and glaciers, whilst the rest is from changes in the amount of water stored on land.

Measurements from space give a picture of the geographical variation of sea-level rise around the world, which otherwise would not be clear from the sparse measurements of tide gauges. This level of detail helps scientists to confirm their ideas about the different contributions to recent sea-level rise, which in turn can be used to predict future change. This is of particular importance to low-lying coastal populations.



Ocean colour measurements detect subtle changes in the colours present in light scattered from the ocean. These changes can be linked to the chlorophyll (green pigment) of microscopic plants floating in the near-surface waters. These plants are at the bottom of the food chain, and play a crucial role in the oceans' absorption of the greenhouse gas carbon dioxide.

In ESA's CCI programme, highly accurate observations of the state of the oceans have been created and continue to be improved and extended. Together, they reveal the inter-play of different aspects of climate.



Sea Surface Temperature (SST) as produced by the SST CCI project.

