

climate change initiative

**→ UNDERSTANDING CLIMATE CHANGE
FROM SPACE**



→ A GLOBAL CHALLENGE

Global climate change is arguably the most pressing environmental challenge we face today. The consequences of a warming climate are far-reaching, potentially affecting societies all over the world through food production and water supplies among other things, and triggering an increase in extreme weather events. Action to combat and adapt to a changing climate is high on political, social, environmental and economic agendas worldwide. Understanding how Earth functions as a system and obtaining unequivocal evidence of the changes taking place are key to addressing issues linked to climate.

→ SPACE FOR EARTH

Satellites observing Earth provide a clear picture of changes across the entire planet. They measure and monitor our vast oceans, land, atmosphere and areas that are difficult to reach such as the polar regions. To produce data suitable for climate research, information from many different satellite missions needs to be combined to produce datasets that span decades.

“ Scientific evidence for warming of the climate system is unequivocal ”

Intergovernmental Panel on Climate Change

→ A EUROPEAN RESPONSE

Developed by ESA and its Member States, the Climate Change Initiative helps address issues related to our changing world. Through this initiative, robust, long-term global satellite datasets on key components of the climate system are produced and made available to scientists and policy-makers around the world.

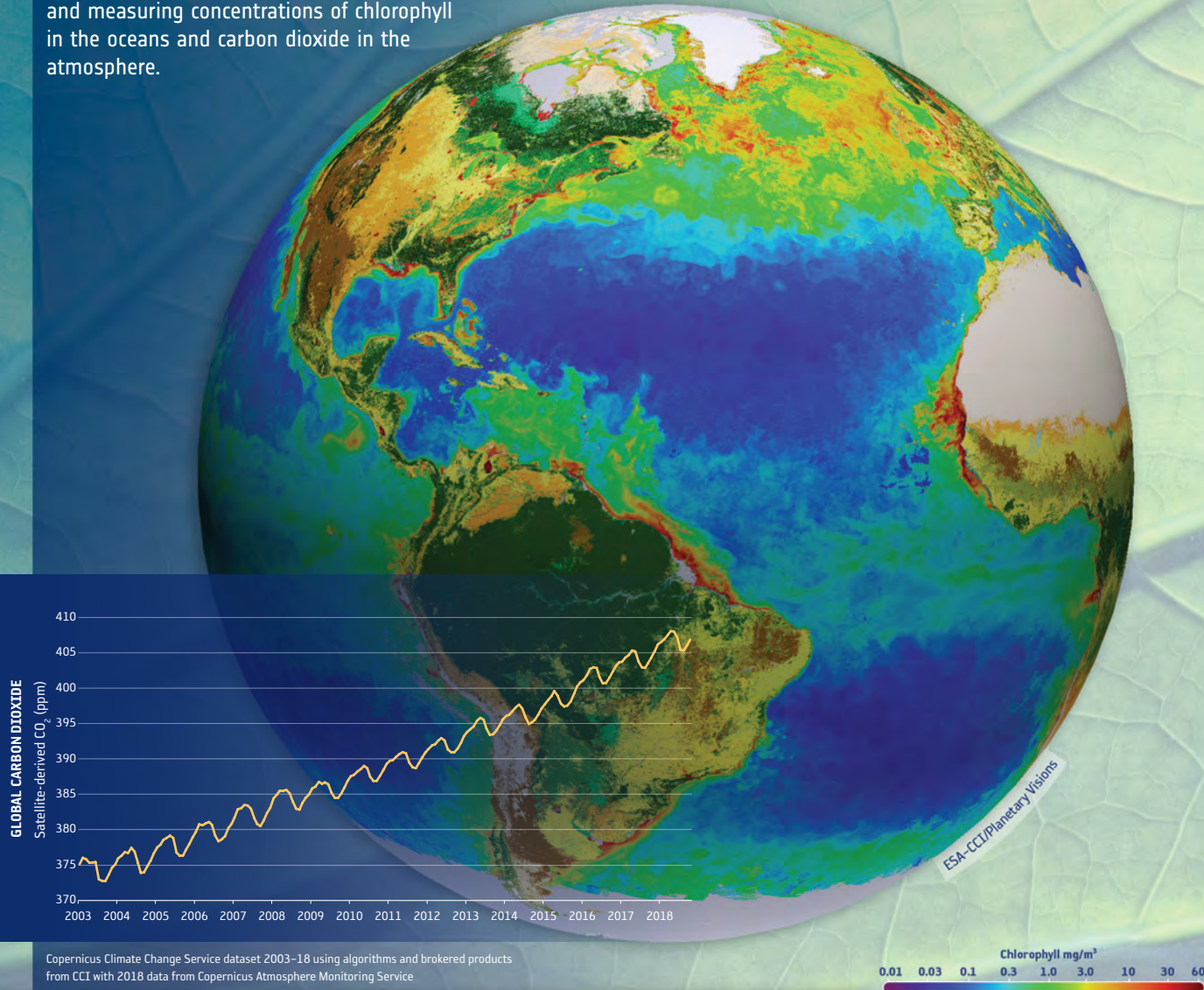
Observations from ESA's 40-year satellite archive as well as from current ESA missions, the Copernicus Sentinels and ESA third-party missions all contribute to generating datasets on these components – known as essential climate variables.

The datasets support the United Nations Framework Convention on Climate Change and the International Panel on Climate Change by providing scientific evidence on climate change to help steer decision-making.

Society is already benefiting. Climate Change Initiative research and data are being used by the Copernicus Climate Change Service to support policy-makers, scientists, consultants and planners.

COUNTING CARBON

ESA's Climate Change Initiative is helping to ensure the long-term generation of data on climate variables for more accurate carbon modelling. This includes mapping the amount of vegetation on land and measuring concentrations of chlorophyll in the oceans and carbon dioxide in the atmosphere.

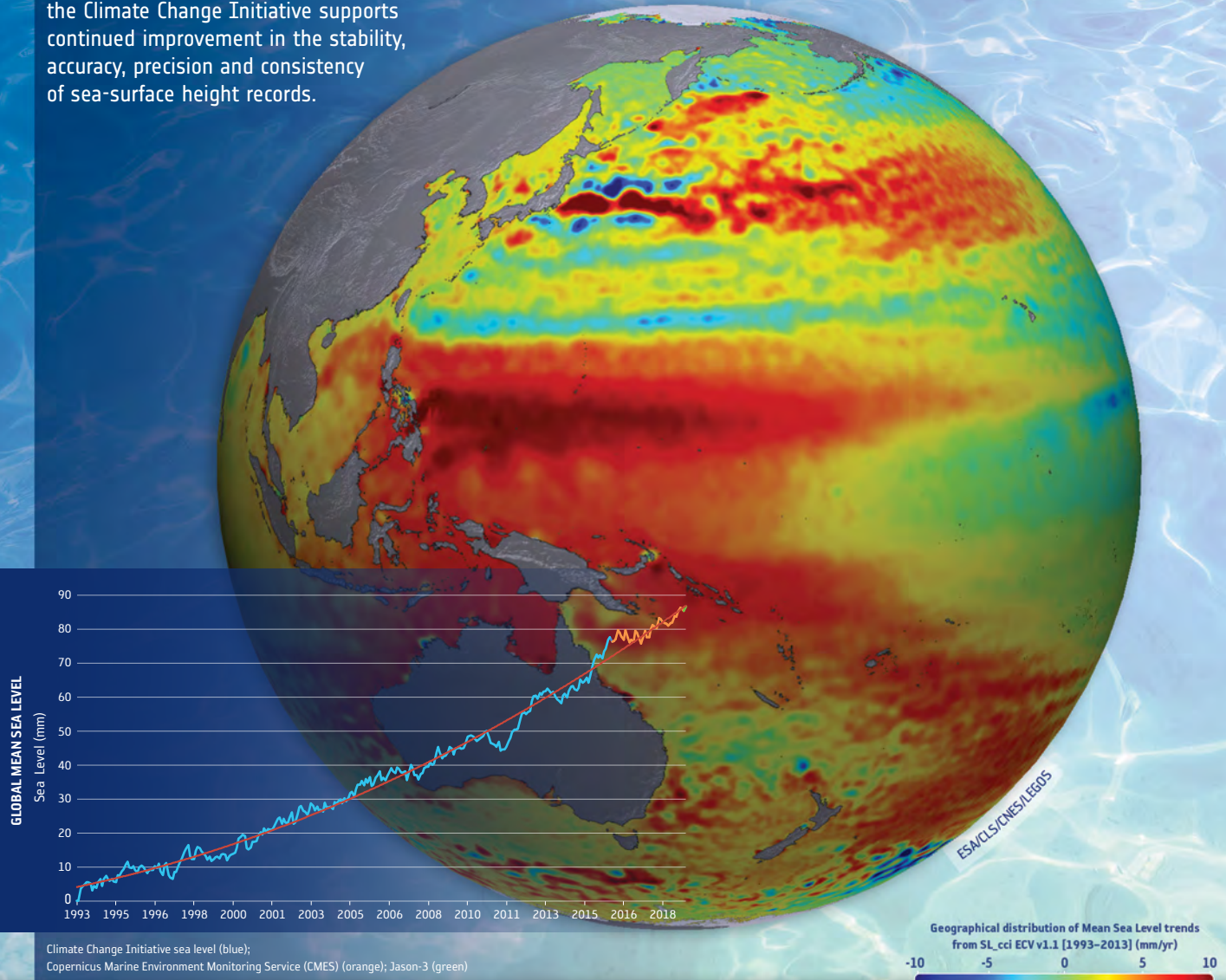


“Carbon dioxide concentrations have increased by 40% since pre-industrial times, mainly from fossil-fuel emissions and net land-use change emissions. The ocean has absorbed about 30% of the emitted anthropogenic carbon dioxide, causing ocean acidification.”

CLIMATE CHANGE 2013 – The Physical Science Basis IPCC

AN OCEAN OF CHANGE

Change in sea level is considered to be a primary indicator of global climate change. Building on the most accurate and best calibrated long-term observations, possible only from space, the Climate Change Initiative supports continued improvement in the stability, accuracy, precision and consistency of sea-surface height records.

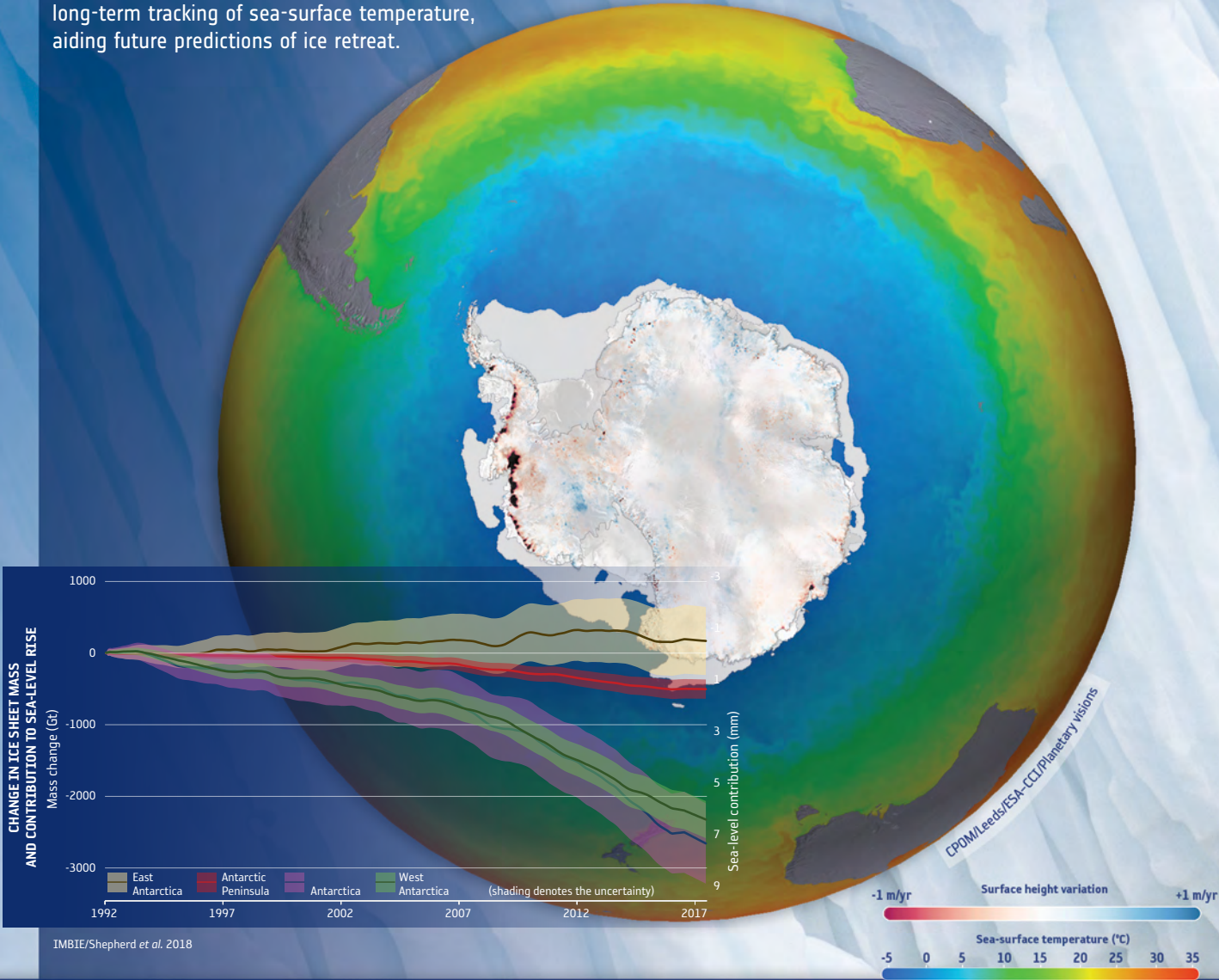


“Global mean sea level rise averages 3.1±0.3 mm/yr, with an acceleration of 0.1 mm/yr² over 1993–present.”

World Climate Research Programme (Global Sea Level Budget Group), 2018

ICE RETREAT

The polar regions play an important role in global ocean circulation. Satellite data used in the Climate Change Initiative are vital for monitoring rapid changes in the cryosphere and for the long-term tracking of sea-surface temperature, aiding future predictions of ice retreat.



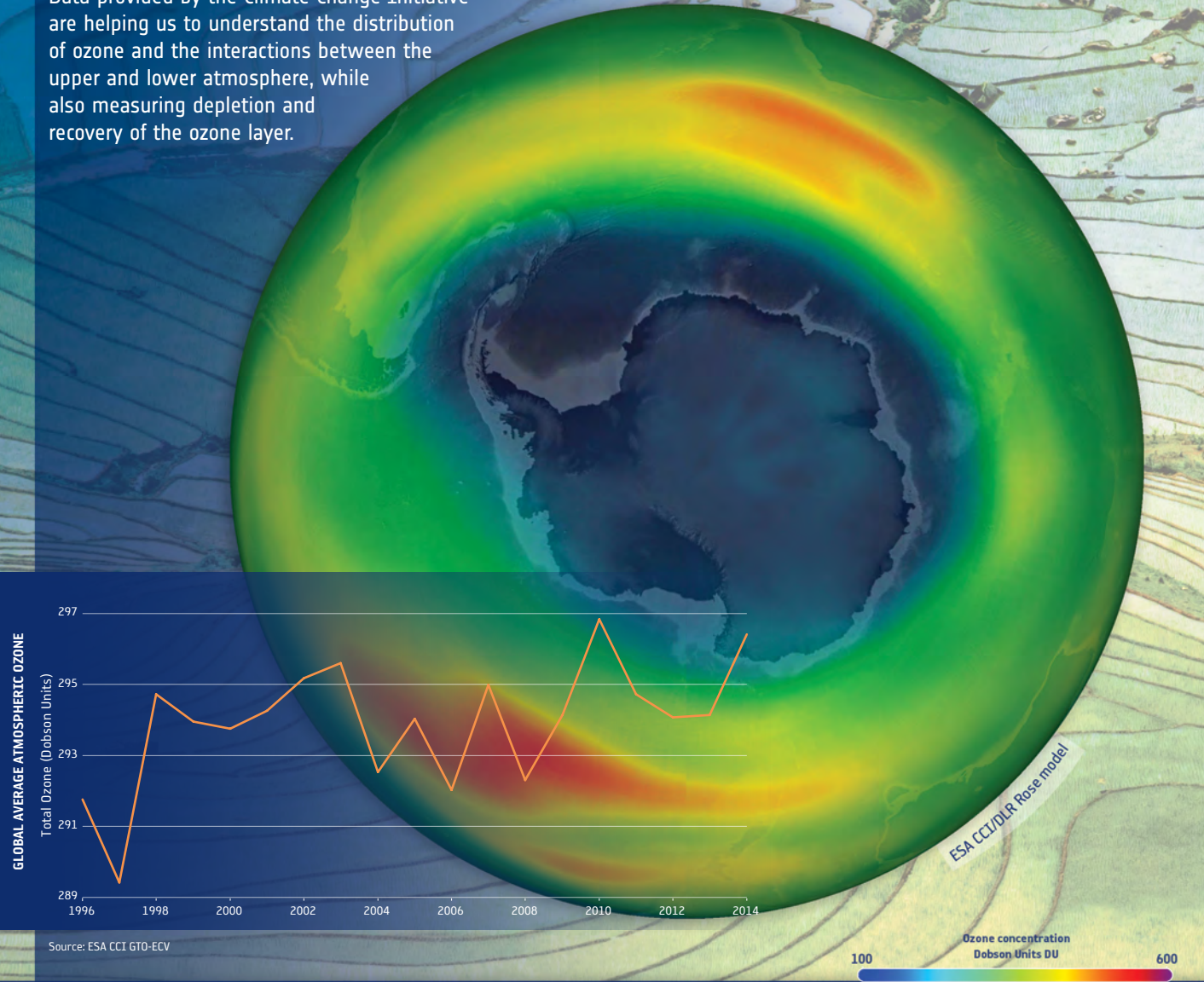
IMBIE/Shepherd et al. 2018

“It is virtually certain that the upper ocean (0–700 m) warmed from 1971 to 2010, while over the last two decades, the Greenland and Antarctic ice sheets have been losing mass and glaciers worldwide have continued to shrink.”

CLIMATE CHANGE 2013 – The Physical Science Basis IPCC

OBSERVING OZONE

The ozone layer shields life on Earth from ultraviolet solar radiation and plays an important role in regulating atmospheric temperature. Data provided by the Climate Change Initiative are helping us to understand the distribution of ozone and the interactions between the upper and lower atmosphere, while also measuring depletion and recovery of the ozone layer.



Source: ESA CCI GTO-ECV

“It is very likely that anthropogenic forcings, dominated by the depletion of the ozone layer due to ozone depleting substances have contributed to the cooling of the lower stratosphere since 1979.”

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