

Satellite observations support latest IPCC climate report

March 3 2022



Flooded villages. Credit: Pok Rie/Pexels

Human-induced climate change is causing dangerous and widespread disruption in nature, affecting the lives of billions of people around the world, according to the latest state of the climate report by the

Intergovernmental Panel on Climate Change (IPCC) published this week.

The report utilizes [satellite observations](#) as crucial input, including several long-term datasets of key aspects of the [climate](#), known as Essential Climate Variables, generated via Europe's leading research teams working as part of ESA's Climate Change Initiative.

The [report](#) confirms that [climate change](#) is here to stay and some of its effects are now unavoidable and calls for ambitious, accelerated action to adapt to climate change, at the same time as making rapid, deep cuts in greenhouse gas emissions.

Released on 28 February, the report is the second installment of the latest climate assessment from the UN Intergovernmental Panel on Climate Change. The first installment, issued last August, assessed the physical state of the climate, and the third scheduled for April will focus on evaluating humanity's options for battling climate change, including ways of reducing greenhouse gas emissions.

According to the report, an estimated 3.3 to 3.6 billion people live in regions that are considered "highly vulnerable to climate change." Yet these impacts are unequally distributed, and those most at risk are often cut off from resources that can help them to adapt or mitigate risk.

The report uses evidence from more than 34,000 scientific sources and show how extreme storms, droughts, floods, heatwaves and wildfires are disrupting food production, interfering with fishing and aquaculture causing damage to cities, infrastructure and human health.

Findings

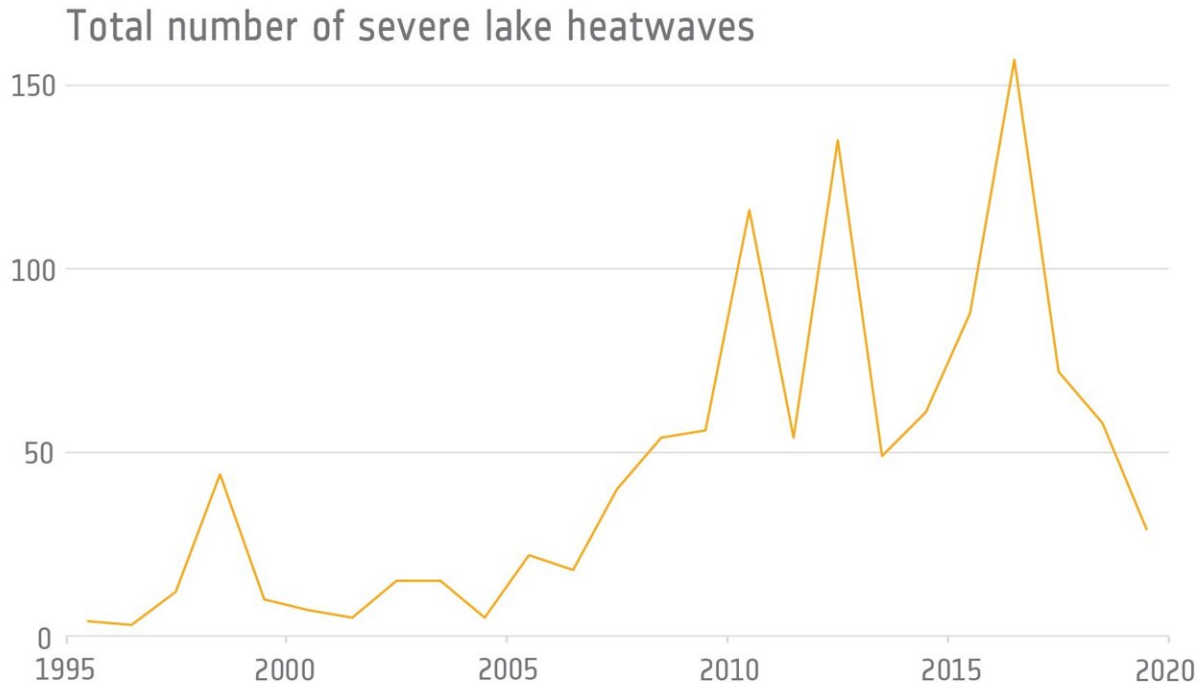
- Climate change has already caused "substantial damages and

increasingly irreversible losses, in terrestrial, freshwater and coastal and open ocean marine ecosystems."

- Increasing weather and climate extreme events "have exposed millions of people to acute food insecurity and reduced water security," with the most significant impacts seen in parts of Africa, Asia, Central and South America and the Arctic.
- Approximately 50 to 75% of the [global population](#) could be exposed to periods of "life-threatening climatic conditions" due to extreme heat and humidity by 2100.
- Climate change "will increasingly put pressure on food production and access, especially in vulnerable regions, undermining food security and nutrition."
- The report calls for ambitious, accelerated action to adapt to climate change and make rapid, deep cuts in greenhouse gas emissions.

Satellite support

ESA's Climate Change Initiative satellite observations have formed an integrative part of the evidence-based assessment of climate change impacts on land, freshwater, ocean, coastal, mountain and polar systems.



The total number of severe lake heatwaves detected from 1995 to 2019. Credit: ESA (Data: Woolway et al., 2022)

More than 270 climate experts authored the UN's IPCC assessment, including Marie-Fanny Racault, a Research Fellow at the University of East-Anglia, and Lead Author of Chapter 3 Ocean and Coastal Ecosystems, the Summary for Policymakers and the Technical Summary.

Her previous work as an ESA Living Planet fellow led to key assessment of climate change impact on phytoplankton phenology in the global oceans.

She comments, "ESA-CCI products offer great potential for technology-based adaptation solutions, including early-warning systems for extreme

events, environmental monitoring, improved forecast and hindcast models.

"Enhanced development and extended implementation of these tools, especially in the most vulnerable and highly affected regions, will be paramount to support timely adaptation actions to reduce climate risks under global warming."

The life cycles of many pathogenic organisms are affected by climate change, increasing the risk posed by vector and water-borne diseases on human health. Long-term satellite datasets, with high resolution observations, have enabled research to investigate the climate-drivers of these outbreaks.

ESA Young Graduate trainee Amy Campbell's work is cited in the report, which uses datasets from ESA's Climate Change Initiative along with innovative use of artificial intelligence to determine the important climatic drivers of outbreaks of cholera in coastal regions where the disease is endemic.

Relatively new global climate data for lakes from ESA have supported major advances in the understanding of the impacts of changing climate on these landlocked waterbodies. More frequent and severe lake heatwaves are anticipated, combined with worsening water quality due to algal blooms, as global temperatures rise, with deleterious consequences for these important ecosystems.

[ESA's Climate Change Initiative Land Cover](#) data are used in research warning that biodiversity loss is projected to affect a greater number of regions with increasing warming, with about one third of land area risking loss of more than 50% of species currently inhabiting those ecosystems. The authors add that species' losses are projected to be worst in the northern South America, southern Africa, most of Australia,

and northern high latitudes.

The report points to a clear picture of human alteration of the global water cycle and cryosphere, that are already impacting the climate system, agriculture, water availability and hydrological risks and are detectable by satellites.

Changes in precipitation, evapotranspiration and increasing temperatures are reflected in a change in soil moisture worldwide. Drying soil moisture trends are more widespread, while data from the [ESA Climate Change Initiative Soil Moisture project](#) shows regional changes vary, with both increases and decreases of 20% or more in some regions between the late 1970s and mid-2010s.

Satellites have proved invaluable lines of evidence of the changing cryosphere. [ESA's Climate Change Initiative Snow project](#) shows snow mass losses in North America of 4,600,000,000 tons per year from an observation record spanning 1980 to 2018.

The report also highlights the societal impacts of declines in glacier runoff on irrigation, hydropower production and tourism, as well as the impact on species distributions. [ESA's Climate Change Initiative Glaciers project](#), which maps glacier mass change on a global scale, is cited as evidence of the accelerating glacier mass loss over the observation record, showing that present rates of glacier melt contribute 25–30% of global sea level rise.

Rapid ambitious and accelerated action

The report urges accelerated action to adapt to climate change, at the same time as making rapid, deep cuts in greenhouse gas emissions. While having quantified many aspects of the changing climate, the role of Earth observation is evolving to support national entities and

stakeholders to build resilience and work towards their net zero commitments.

ESA's proposed new climate program, Climate-Space, which is subject to approval at the ESA Ministerial Conference taking place in November 2022, aims to play a significant role and intends to harness Earth observation into actionable information for stakeholders and national entities towards delivering against their Paris Agreement commitments.

Provided by European Space Agency

Citation: Satellite observations support latest IPCC climate report (2022, March 3) retrieved 25 April 2024 from <https://phys.org/news/2022-03-satellite-latest-ipcc-climate.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.