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Climate change widespread, rapid, and intensifying – IPCC

GENEVA, Aug 9 – Scientists are observing changes in the Earth’s climate in every region and across the whole climate system, according to the latest Intergovernmental Panel on Climate Change (IPCC) Report, released today. Many of the changes observed in the climate are unprecedented in thousands, if not hundreds of thousands of years, and some of the changes already set in motion—such as continued sea level rise—are irreversible over hundreds to thousands of years.

However, strong and sustained reductions in emissions of carbon dioxide (CO₂) and other greenhouse gases would limit climate change. While benefits for air quality would come quickly, it could take 20-30 years to see global temperatures stabilize, according to the IPCC Working Group I report, *Climate Change 2021: the Physical Science Basis*, approved on Friday by 195 member governments of the IPCC, through a virtual approval session that was held over two weeks starting on July 26.

The Working Group I report is the first instalment of the IPCC’s Sixth Assessment Report (AR6), which will be completed in 2022.

“This report reflects extraordinary efforts under exceptional circumstances,” said Hoesung Lee, Chair of the IPCC. “The innovations in this report, and advances in climate science that it reflects, provide an invaluable input into climate negotiations and decision-making.”

Faster warming

The report provides new estimates of the chances of crossing the global warming level of 1.5°C in the next decades, and finds that unless there are immediate, rapid and large-scale reductions in greenhouse gas emissions, limiting warming to close to 1.5°C or even 2°C will be beyond reach.

The report shows that emissions of greenhouse gases from human activities are responsible for approximately 1.1°C of warming since 1850-1900, and finds that averaged over the next 20 years, global temperature is expected to reach or exceed 1.5°C of warming. This assessment is based on improved observational datasets to assess historical warming, as well progress in scientific understanding of the response of the climate system to human-caused greenhouse gas emissions.

“This report is a reality check,” said IPCC Working Group I Co-Chair Valérie Masson-Delmotte. “We now have a much clearer picture of the past, present and future climate, which is essential for understanding where we are headed, what can be done, and how we can prepare.”

Every region facing increasing changes

Many characteristics of climate change directly depend on the level of global warming, but what people experience is often very different to the global average. For example, warming over land is larger than the global average, and it is more than twice as high in the Arctic.

“Climate change is already affecting every region on Earth, in multiple ways. The changes we experience will increase with

additional warming,” said IPCC Working Group I Co-Chair Panmao Zhai.

The report projects that in the coming decades climate changes will increase in all regions. For 1.5°C of global warming, there will be increasing heat waves, longer warm seasons and shorter cold seasons. At 2°C of global warming, heat extremes would more often reach critical tolerance thresholds for agriculture and health, the report shows.

But it is not just about temperature. Climate change is bringing multiple different changes in different regions – which will all increase with further warming. These include changes to wetness and dryness, to winds, snow and ice, coastal areas and oceans. For example:

- Climate change is intensifying the water cycle. This brings more intense rainfall and associated flooding, as well as more intense drought in many regions.
- Climate change is affecting rainfall patterns. In high latitudes, precipitation is likely to increase, while it is projected to decrease over large parts of the subtropics. Changes to monsoon precipitation are expected, which will vary by region.
- Coastal areas will see continued sea level rise throughout the 21st century, contributing to more frequent and severe coastal flooding in low-lying areas and coastal erosion. Extreme sea level events that previously occurred once in 100 years could happen every year by the end of this century.

- Further warming will amplify permafrost thawing, and the loss of seasonal snow cover, melting of glaciers and ice sheets, and loss of summer Arctic sea ice.
- Changes to the ocean, including warming, more frequent marine heatwaves, ocean acidification, and reduced oxygen levels have been clearly linked to human influence. These changes affect both ocean ecosystems and the people that rely on them, and they will continue throughout at least the rest of this century.
- For cities, some aspects of climate change may be amplified, including heat (since urban areas are usually warmer than their surroundings), flooding from heavy precipitation events and sea level rise in coastal cities.

For the first time, the Sixth Assessment Report provides a more detailed regional assessment of climate change, including a focus on useful information that can inform risk assessment, adaptation, and other decision-making, and a new framework that helps translate physical changes in the climate – heat, cold, rain, drought, snow, wind, coastal flooding and more – into what they mean for society and ecosystems.

This regional information can be explored in detail in the newly developed Interactive Atlas interactive-atlas.ipcc.ch as well as regional fact sheets, the technical summary, and underlying report.

Human influence on the past and future climate

“It has been clear for decades that the Earth’s climate is changing, and the role of human influence on the climate system is

undisputed,” said Masson-Delmotte. Yet the new report also reflects major advances in the science of attribution – understanding the role of climate change in intensifying specific weather and climate events such as extreme heat waves and heavy rainfall events.

The report also shows that human actions still have the potential to determine the future course of climate. The evidence is clear that carbon dioxide (CO₂) is the main driver of climate change, even as other greenhouse gases and air pollutants also affect the climate.

“Stabilizing the climate will require strong, rapid, and sustained reductions in greenhouse gas emissions, and reaching net zero CO₂ emissions. Limiting other greenhouse gases and air pollutants, especially methane, could have benefits both for health and the climate,” said Zhai.

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Notes for Editors

Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the

Intergovernmental Panel on Climate Change

The Working Group I report addresses the most updated physical understanding of the climate system and climate change, bringing together the latest advances in climate science, and combining multiple lines of evidence from paleoclimate, observations, process understanding, global and regional climate simulations. It shows how and why climate has changed to date, and the improved understanding of human influence on a wider range of climate characteristics, including extreme events. There will be a greater focus on regional information that can be used for climate risk assessments.

The Summary for Policymakers of the Working Group I contribution to the Sixth Assessment Report (AR6) as well as additional materials and information are available at <https://www.ipcc.ch/report/ar6/wgl/>

Note: Originally scheduled for release in April 2021, the report was delayed for several months by the COVID-19 pandemic, as work in the scientific community including the IPCC shifted online. This is first time that the IPCC has conducted a virtual approval session for one of its reports.

AR6 Working Group I in numbers

234 authors from 66 countries

- 31 – coordinating authors
- 167 – lead authors

- 36 – review editors

plus

- 517 – contributing authors

Over 14,000 cited references

A total of 78,007 expert and government review comments

(First Order Draft 23,462; Second Order Draft 51,387; Final Government Distribution: 3,158)

More information about the Sixth Assessment Report can be found [here](#).

About the IPCC

The Intergovernmental Panel on Climate Change (IPCC) is the UN body for assessing the science related to climate change. It was established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) in 1988 to provide political leaders with periodic scientific assessments concerning climate change, its implications and risks, as well as to put forward adaptation and mitigation strategies. In the same year the UN General Assembly endorsed the action by the WMO and UNEP in jointly establishing the IPCC. It has 195 member states.

Thousands of people from all over the world contribute to the work of the IPCC. For the assessment reports, IPCC scientists volunteer their time to assess the thousands of scientific papers published each

year to provide a comprehensive summary of what is known about the drivers of climate change, its impacts and future risks, and how adaptation and mitigation can reduce those risks.

The IPCC has three working groups: [Working Group I](#), dealing with the physical science basis of climate change; [Working Group II](#), dealing with impacts, adaptation and vulnerability; and [Working Group III](#), dealing with the mitigation of climate change. It also has a [Task Force on National Greenhouse Gas Inventories](#) that develops methodologies for measuring emissions and removals. As part of the IPCC, a Task Group on Data Support for Climate Change Assessments (TG-Data) provides guidance to the Data Distribution Centre (DDC) on curation, traceability, stability, availability and transparency of data and scenarios related to the reports of the IPCC.

IPCC assessments provide governments, at all levels, with scientific information that they can use to develop climate policies. IPCC assessments are a key input into the international negotiations to tackle climate change. IPCC reports are drafted and reviewed in several stages, thus guaranteeing objectivity and transparency. An IPCC assessment report consists of the contributions of the three working groups and a Synthesis Report. The Synthesis Report integrates the findings of the three working group reports and of any special reports prepared in that assessment cycle.

About the Sixth Assessment Cycle

At its 41st Session in February 2015, the IPCC decided to produce a Sixth Assessment Report (AR6). At its 42nd Session in October 2015 it

elected a new Bureau that would oversee the work on this report and the Special Reports to be produced in the assessment cycle.

Global Warming of 1.5°C, an IPCC special report on the impacts of global warming of 1.5 degrees Celsius above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty was launched in October 2018.

Climate Change and Land, an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems was launched in August 2019, and the *Special Report on the Ocean and Cryosphere in a Changing Climate* was released in September 2019.

In May 2019 the IPCC released the *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*, an update to the methodology used by governments to estimate their greenhouse gas emissions and removals.

The other two Working Group contributions to the AR6 will be finalized in 2022 and the AR6 Synthesis Report will be completed in the second half of 2022.

For more information go to www.ipcc.ch

The website includes outreach materials including videos about the IPCC and video recordings from outreach events conducted as webinars or live-streamed events.