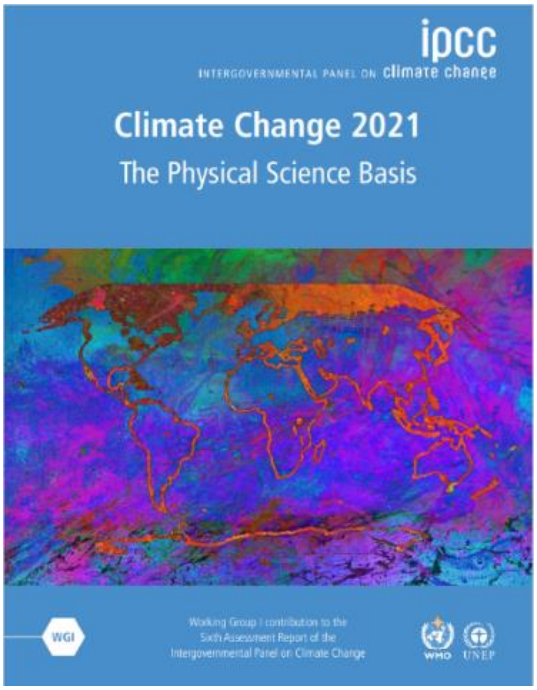
Through these bulletins, IMCA disseminates practical solutions, innovations and lessons learnt by its Members. Content is generated by IMCA or its Members and anonymised as appropriate. Members are encouraged to share articles, information and initiatives, or topic ideas with IMCA at sustainability@imca-int.com.

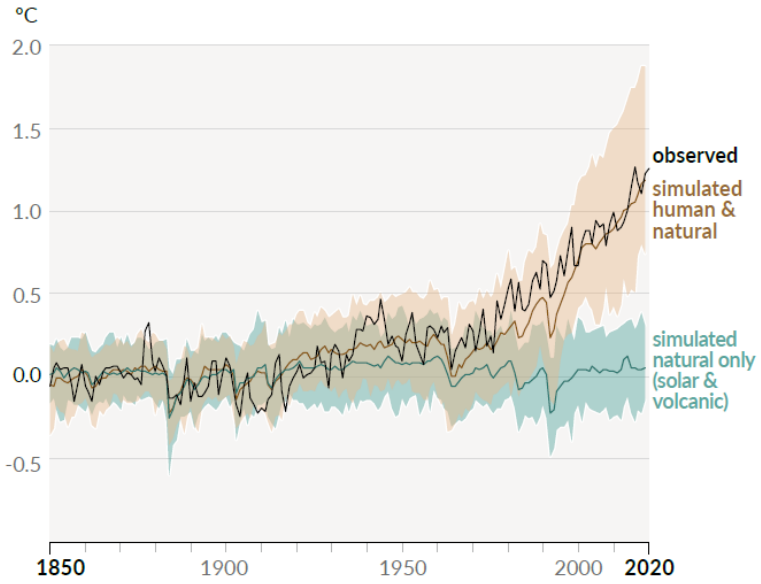
IPCC release report on the Physical Science of Climate Change

On 9 August 2021, the output of the Intergovernmental Panel on Climate Change (IPCC), Working Group 1 of the Sixth Assessment Report (AR6), consisting of 234 authors from 65 countries, reviewing over 14,000 publications was released and generating over 78,000 comments. This nearly 4000-page report forms part of the suite of reports of AR6.



IMCA Members may wish to note some of the key findings from this report, including the unequivocal evidence that human activities have warmed the atmosphere, ocean and land. Atmospheric carbon dioxide (CO_2) concentrations are at their highest point in 2 million years, and two other greenhouse gases, methane and nitrous oxide, are at their highest point in 800,000 years. The science also shows that the "*likely* range of total human-caused global surface temperature increase from 1850-1900 to 2010-2019 is 0.8°C to 1.3°C, with a best estimate of 1.07°C." This increase is apparent in the graph below, extracted from page 7 of the Summary for Policy Makers.

b) Change in global surface temperature (annual average) as **observed** and simulated using human & natural and only natural factors (both 1850-2020)



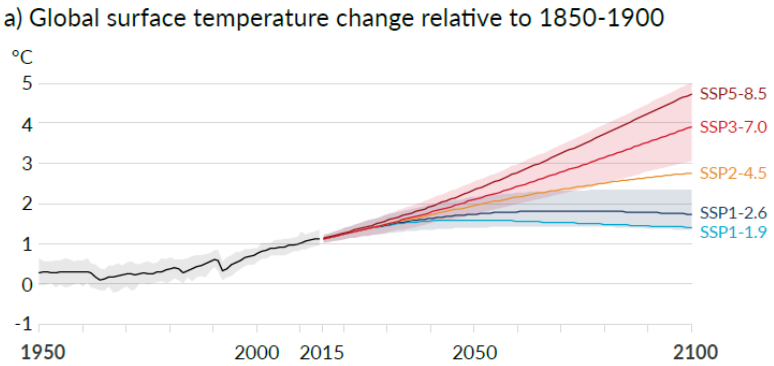
In terms of the global oceans, the scientists conclude with virtual certainty that human-induced (i.e. anthropogenic) climate change is the main driver of ocean acidification. They further conclude that global sea level rise has increased by 0.20 metres (1901-2018) with the main driver very likely to be human influence. This rate increase exceeds any preceding century in the last 3000 years. Moreover, the scale of recent changes to the whole climate system and many aspects of its present state are unprecedented. Anthropogenic climate change is already affecting many weather and climate extremes in every region across the globe.

IMCA store terms and conditions (https://www.imca-int.com/legal-notices/terms/) apply to all downloads from IMCA's website, including this document.

IMCA makes every effort to ensure the accuracy and reliability of the data contained in the documents it publishes, but IMCA shall not be liable for any guidance and/or recommendation and/or statement herein contained. The information contained in this document does not fulfil or replace any individual's or Member's legal, regulatory or other duties or obligations in respect of their operations. Individuals and Members remain solely responsible for the safe, lawful and proper conduct of their operations.

© 2021

The report considers five emissions scenarios starting from 2015. with varying levels of greenhouse gas emissions as shown in the graph below taken from page 29 of the Summary for Policy Makers.



For each scenario it shows the range of temperature increase in Degrees Celsius. The scientists point out that global surface temperatures will continue to increase until at least mid-century, and that we will not limit warming to 1.5°C or 2°C without "deep reductions in CO_2) and other greenhouse gas emission occur[ing] in the coming decades".

They also sound the alarm about the effectiveness of natural land and ocean carbon sinks to take up progressively larger amounts of CO_2 emissions in the higher temperature scenarios. And they further point out that climate changes are exacerbated in direct relation to larger global warming, including increased frequency and intensity of hot extremes, marine heatwaves and heavy precipitation and reduced Arctic sea ice. For example, extreme rainfall intensifies by 7% for each additional 1°C.

There is no region of the world unimpacted and readers are able to use their interactive Atlas to see impacts in different regions. The report has a strong focus on regional information and also introduces the concept of climatic-impact drivers (CID) defined as "physical climate system conditions (e.g. means, events and extremes) that affect an element of society or an impact". These include heat and cold, rain and drought, snow and ice, wind, coastal and ocean, other and open ocean. There also appears to be a heightened focus on air quality.

A final key finding worth noting is stated on page 42 of the Summary for Policy Makers:

Scenarios with very low or low GHG emissions (SSP1-1.9 and SSP1-2.6) lead within years to discernible effects on greenhouse gas and aerosol concentrations, and air quality, relative to high and very high GHG emissions scenarios (SSP3-7.0 or SSP5-8.5).

Under these contrasting scenarios, discernible differences in trends of global surface temperature would begin to emerge from natural variability within around 20 years, and over longer time periods for many other climatic impact-drivers (high confidence).

This illustrates the IPPC's point that "The climate we experience in the future depends on our decisions now".

Some changes are irreversible, some could be slowed and some stopped. The IPPC caution that "*unless there are immediate, rapid, and large-scale reductions in greenhouse gas emissions, limiting warming to 1.5°C will be beyond reach*".

To access the Report and Interactive Atlas, see Sixth Assessment Report (ipcc.ch).