OCEAN CARBON SINK

90s slow-down

AGU Advances **1**, e2019AV000149 (2020).

Credit: IMAGEBROKER / ALAMY STOCK PHOTO

More than a third of industrial-age fossil fuel CO_2 emissions have been absorbed by the ocean. This uptake has had implications for ocean chemistry and marine life by driving ocean acidification, but has also mitigated atmospheric CO_2 concentrations and their impact on climate. However, despite its critical importance for climate and understanding climate–carbon feedbacks, the dynamics of the marine carbon sink are not well constrained.

Galen McKinley from Columbia University and Lamont Doherty Earth Observatory and colleagues investigate the mechanisms behind the slow-down of marine carbon uptake in the 1990s through models and observations. They find that uptake slowed due to a lower growth rate of atmospheric CO_2, which influenced the air–sea flux. Changes in sea surface temperature caused by the volcanic eruption of Mount Pinatubo modified the timing of the sink within the decade. These results highlight the role of factors external to the ocean in driving variability in the ocean carbon sink and indicate that this sink will decrease as soon as the growth rate of atmospheric CO_2 is reduced by reductions in anthropogenic emissions. *AF*

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ATMOSPHERIC DYNAMICS

Regional monsoon changes

Clim. Dynam. http://doi.org/dzkt (2020).

Regional monsoons, including the South Asian and West African systems, are characterized by a highly uneven precipitation distribution throughout the year. The majority of the global population resides in areas impacted by these systems, and understanding the effect of climate warming on their intensity, onset and withdrawal is important in estimating future impacts. Global climate models exhibit uncertainty at the scales needed to capture monsoon dynamics, leading to spread in future monsoon behaviour and the need for more regionalized studies.

Moetasim Ashfaq of Oak Ridge National Laboratory, Tennessee, USA, and co-authors analysed regional climate model experiments covering nine distinct monsoons, focusing on their response to low- and high-end warming scenarios. Under high warming, all monsoons experience a contracted wet season by 2100, with heavier precipitation during the season's peak but less before and after. The onset and withdrawal dates also shifted later. In contrast, the low-end warming did not significantly alter future monsoons, highlighting the potential for strong emissions controls to mitigate changes to these high-impact phenomena. *BL*

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CLIMATE COMMUNICATION

Uncertain attribution

Glob. Environ. Change **62**, 102070 (2020).

Public engagement on climate change is difficult because people do not directly experience long-term statistical changes in global temperatures. Instead, people experience consequences of climate change, such as extreme weather events. Although experiences of extreme weather can impact attitudes toward climate change, it is not clear how the science of extreme event attribution (EEA) supporting this connection is perceived.

Shannon Osaka from the University of Oxford and Rob Bellamy from the University of Manchester conducted interviews and focus groups with key stakeholders about the 2011–2017 California drought. Journalists reported that it has become normal to link extreme weather and climate change, but expressed concern over the challenge of simplifying the narrative for the public while also conveying uncertainty. When shown media articles on differing EEA studies about the drought, neither agriculturalists nor environmentalists found the studies convincing. However, they interpreted the uncertain EEA evidence in ways that confirmed their prior beliefs about whether climate change is natural or human-caused. These results suggest that while EEA has value for the scientific community, inherent uncertainty renders it less useful as a tool for public communication. *JR*

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CORAL REEFS

Bleach me colourful

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Credit: KIKE CALVO / ALAMY STOCK PHOTO

When faced with extreme stress, coral reefs can undergo bleaching: a breakdown of the relationship between the animal host and their colourful internal photosynthetic symbionts. Bleached corals that are unable to recover their symbiont populations face starvation, disease and death. Bizarrely, bleaching sometimes results in vibrantly green-, yellow- or purple–blue-coloured coral, rather than white. These colours are known to arise from pigments produced by the coral host, but the triggers, mechanisms and meaning behind colourful bleaching remain unclear.

Elena Bollati from the University of Southampton, UK, and colleagues show that colourful bleaching is a global phenomenon, affecting multiple key reef-building species. Their experiments reveal that upregulation of the colourful pigments by the coral host is a natural response to increased light stress. Loss of light-shielding symbionts due to heat- or nutrient-induced bleaching can lead to massive active upregulation of the host pigments, which can then protect and promote symbiont recolonization.

Colourful bleaching can act as an identifier for local environmental stressors but can also indicate post-stress coral recovery potential. *TAM*

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