

PAMIP Webinar Series

Feedbacks, climate sensitivity and polar amplification insights from volcanic eruptions in model large ensembles

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Abstract

The climate system response to large volcanic eruptions can give insights into fundamental aspects of how the system responds to external forcing. It has been previously suggested that this response can be used to constrain effective climate sensitivity (EffCS), and that the climate sensitivity to volcanic eruptions is lower than that to greenhouse gases. These previous studies, however, had been limited by the availability of ensemble members and inadequate forcing scenarios to fully investigate these questions. Here we make use of the recently available CMIP6 simulations, in which many models have provided large numbers of ensemble members, to investigate the relationship between the climate response to volcanic eruptions and climate feedbacks, EffCS, and polar amplification. We show that the response to the Mt Pinatubo eruption is not a good constraint on EffCS, and that the high-latitude response to volcanic eruptions differs fundamentally from that to increased greenhouse gases concentrations. The response to volcanoes is less polar amplified than that to greenhouse gases, the lapse rate and Plank feedbacks are more negative, and the surface albedo feedback in the Arctic is weaker.



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