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## The weak volcanic response in climate models related to low-frequency Pacific variability

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Volcanic eruptions are among the most important naturally occurring cause of climate variability. Their effect can outlive the residence time of the volcanic aerosol in the stratosphere, due to the intervention of the ocean as heat reservoir. Coupled models exhibit deficiencies and uncertainties in their response to volcanic forcing as well as multiannual variability. We have investigated a possible link by analysing experiments included in the fifth and sixth phases of the Coupled Model Intercomparison Project (CMIP), along with several ad-hoc model simulations, in comparison with observational reanalyses and reconstructions. We introduce a novel technique to analyse the delayed response of sea surface temperature (SST) and mean sea level pressure (MSLP) in the Pacific Ocean to large volcanic eruptions, complemented with with an empirical orthogonal function analysis. Our study shows that coupled models are not able to reproduce the observed SST response to volcanic forcing, which has the shape of the cold phase of the Interdecadal Pacific Oscillation (IPO), and that their MSLP response is too weak. On the other hand, the observed MSLP response is reproduced by atmosphere-only simulations forced with realistic 20th-century SST.