



How can Tropical explosive Volcanic eruptions trigger El Niño?

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Stratospheric aerosols from large tropical explosive volcanic eruptions backscatter shortwave radiation and reduce the global mean surface temperature. Observations suggest that they also favour an El Niño within two years after the eruption. Modelling studies have, however, so far reached no consensus on either the sign or physical mechanism of El Niño response to volcanism. Here we show that an El Niño tends to peak during the year following large eruptions in simulations of the Fifth Coupled Model Intercomparison Project (CMIP5). Targeted climate model simulations further emphasize that Pinatubo-like eruptions tend to shorten La Niñas, lengthen El Niños and induce anomalous warming when occurring during neutral states. We further investigate the physical processes of this Niño-like response, using a hierarchy of atmosphere and ocean model experiments. The cooling of tropical Africa plays a key role in remotely-driving Pacific wind anomalies that drive an El Niño-like response during the year that follow the eruption. The Bjerknes feedback also contributes to amplifying the resulting anomalies, but plays a comparatively weaker role for “volcanic El Niños” than for their naturally-occurring counterparts.