

The Spatial Signature of Volcanic Forcing of Climate Estimated From Paleoclimate Reconstructions of the Past few Centuries

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Recent large-scale climate reconstructions from proxy data such as tree rings, ice cores, and corals, allow potential insights into the role of external (e.g., solar and volcanic) forcing of climate over the past few centuries. Evidence from both empirical correlations and model/data comparison studies employing estimated histories of past explosive volcanism indicate a significant influence of volcanic radiative forcing on mean (e.g. hemispheric) temperature changes. The apparent spatial signal of volcanic forcing is, however, complex, suggesting the added importance of atmospheric and/or oceanic dynamical responses. Such dynamical responses have been inferred from the instrumental record and from climate modeling studies. The use of paleoclimate reconstructions, however, provides a significantly longer timeframe, and accordingly greater statistical constraint on the apparent patterns of response. Analyses of recent annual and seasonal temperature reconstructions of Mann and colleagues are analyzed for insights into patterns of response to past volcanic forcing. Use is made of independent reconstructions of indices of the North Atlantic Oscillation (NAO) and El Nino/Southern Oscillation (ENSO) to assess possible dynamical features of this apparent response.