

Insights from Antarctica on volcanic forcing during the Common Era†

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Assessments of climate sensitivity to projected greenhouse gas concentrations underpin environmental policy decisions, with such assessments often based on model simulations of climate during recent centuries and millennia¹⁾⁻³⁾. These simulations depend critically on accurate records of past aerosol forcing from global-scale volcanic eruptions, reconstructed from measurements of sulphate deposition in ice cores⁴⁾⁻⁶⁾. Non-uniform transport and deposition of volcanic fallout mean that multiple records from a wide array of ice cores must be combined to create accurate reconstructions. Here we re-evaluated the record of volcanic sulphate deposition using a much more extensive array of Antarctic ice cores. In our new reconstruction, many additional records have been added and dating of previously published records corrected through precise synchronization to the annually dated West Antarctic Ice Sheet Divide ice core⁷⁾, improving and extending the record throughout the Common Era. Whereas agreement with existing reconstructions is excellent after 1500, we found a substantially different history of volcanic aerosol deposition before 1500; for example, global aerosol forcing values from some of the largest eruptions (for example, 1257 and 1458) previously were overestimated by 20–30% and others underestimated by 20–50%.

References

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