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# Toward a more realistic assessment of the climatic impacts of the 1257 eruption

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Polar ice cores attest to a colossal volcanic eruption that occurred in 1257 to leave the largest sulphur signal of the past millennium and possibly the last 7000 years1,2. Paradoxically, while climate models suggest a global surface cooling of about 2°C after the Samalas eruption, proxy-based records largely lack evidence of significant climate cooling3–5. This stunning discrepancy has hampered the understanding of the contribution of historical volcanic eruptions to past climate changes and precluded conclusions about potential consequences of future eruptions on climate6. Drawing on a compelling body of evidence from newly exhumed contemporary historical sources, tree-ring reconstructions, and a general circulation model (GCM) – which explicitly incorporates microphysical aerosol processes as well as information about the eruption location, season and height of $SO_2$ injection –, we demonstrate that a persistent dry veil started to install in Europe in October 1257 to cause a year without a summer over much of the northern hemisphere in 1258 (–1.2°C). Converging proxy and climate model data also attest to the persistence of volcanic cooling until 1261, but point to significant regional differences of impacts. We conclude that single colossal volcanic eruptions may effectively perturb climate at local and regional scales, but that their impact is neither sustained in time nor spatially generalized.