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Volcanic forcing for climate modeling: A new microphysics-based dataset covering years 1600-Present

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Large volcanic eruptions may account for a substantial part of the climate variability on the interannual to centennial timescales. However, uncertainties in the volcanic forcing used in climate models remain important. As the understanding and model representation of the impacts of volcanic eruptions on climate have improved in the last decades, uncertainties in the stratospheric aerosol forcing from large eruptions are now not only linked to visible optical depth estimates on a global scale but also to details on the size, latitude and altitude distributions of the stratospheric aerosols. To assess the extent of the volcanic influence on climate, a new volcanic forcing dataset for climate models is presented for the 1600-Present period. It was constructed by simulating 26 eruptions with a 2D aerosol model in order to provide spatially and spectrally resolved fields of optical properties (extinction coefficient, single scattering albedo, asymmetry factor) as well as aerosol surface area densities for chemical interactions. Results from chemistry-climate model simulations using this volcanic forcing will also be presented for the early 19th century, when two large eruptions (Unknown 1809 and Tambora 1815) occurred and may have led to a long lasting climatic impact through stratospheric and oceanic perturbations.