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Volcanic impact on the Atlantic Meridional Overturning Circulation in two generations of the IPSL model

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The oceanic response to volcanic eruptions over the last 1000 years is investigated with a focus on the North Atlantic Ocean, using two versions of the fully coupled AOGCM developped at IPSL forced by a realistic time series of volcanic eruptions, total solar irradiance (TSI) and atmospheric greenhouse gases concentration. One major difference between the two versions of the model lies in the vertical resolution, which is enhanced from 19 vertical levels and 39 vertical levels, allowing a much more finer resolution of the stratosphere. The module implementing volcanic eruptions was also improved in the last version of the model with a more realistic spreading of sulfate aerosol optical properties over the first layers of the stratosphere and relevant spectral intervals. The tropospheric natural aerosols are also taken into accounts following a prescribed pre-industrial climatology.
The earliest version of the IPSL model had shown a different response of the AMOC to eruptions occurring after 1400 A.D. and to the stronger eruptions occurring between 1100 and 1300. This study tests the robustness of the result in order to gain understanding in the diversity of AMOC response to volcanic eruptions in climate models.