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High resolution climatology
- towards climate change services

The “Year without summer 1816

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One famous example of an extreme climatic event is the cold summer of 1816 in Europe and North America. This specific year, which was later called the “Year without summer 1816”, had profound social and environmental effects. The cataclysmic eruption of Mt Tambora is now commonly known to have largely contributed to the negative temperature anomalies of the summer 1816, but some uncertainties remain.
The eruption which occurred in April 1815 is the largest within the last 500 years and this extreme climatic forcing provides a real test for climate models. A crucial parameter to assess in order to simulate this eruption is the aerosol size distribution, which strongly in[U+FB02]uences the radiative impact of the aerosols (through changes in albedo and residence time in the stratosphere, among others) and the impacts on dynamics and chemistry. The representation of this major forcing is done by using the AER-2D aerosol model which calculates the size distribution of the aerosols formed after the eruption. The modeling of the climatic impacts is then done by the state-of-the-art Chemistry-Climate model (CCM) SOCOL.
The characteristics of the Tambora eruption and results from simulations made using the aerosol model/CCM, with an emphasis on the radiative and chemical implications of the large aerosol, will be shown. For instance, the speci[U+FB01]c absorption/scattering ratio of Mt.Tambora aerosols induced a large stratospheric warming which will be analyzed. The climatic impacts will also be discussed in regards of the high sedimentation rate of Mt. Tambora aerosols, leading to a fast decrease of the atmospheric optical depth in the [U+FB01]rst two years after the eruption.
The link will be made between the modeling results and proxy-reconstructions as well as with available historical daily data from Geneva, Switzerland. Finally, insights on the contemporary response to this climatic extreme will be shown.