Project: **960**

Project title: **StratoClim Stratospheric and upper tropospheric processes for better climate predictions**

Project lead: **Claudia Timmreck**

Report period: **2016-01-01 to 2016-12-31**

The central goal of the MPI contribution to StratoClim is to investigate the climate impact of upper tropospheric and stratospheric aerosol.

For 2016, CMIP6 (Coupled Model Intercomparison Project, Phase 6, Eyring et al., 2016) related work was planned.in the frame of the “Model Intercomparison Project on the climate response to Volcanic forcing” (VolMIP, Zanchettin et al; 2016). In VolMIP different time scales are considered: the seasonal-to-interannual atmospheric response to a 1991 Pinatubo-like volcanic eruption (volc-pinatubo) and the long-term (up to the decadal time scale) climate response to very strong volcanic eruptions, like the 1815 Tambora eruption(volc-long). In this project the VolMIP volc-long experiments will be performed

Different from the original plan in 2015, the VolMIP MPI-ESM runs could not be carried out in 2016 because the MPI-ESM piControl for CMIP6 does not exist so far and is now expected for early 2017. This will be the start of the VolMIP volc-long experiments in StratoClim. In 2016 preparatory work for VolMIP has been carried out by analyzing first MPI-ESM Tambora simulations with the easy volcanic aerosol module (EVA, Toohey et al., 2016). The model results agree quite well with recent temperature reconstructions in the global and Northern Hemisphere mean but also show a large spread in their seasonal and regional pattern (Figure 1).This emphasises the importance of large ensemble for the VolMIP experiments.

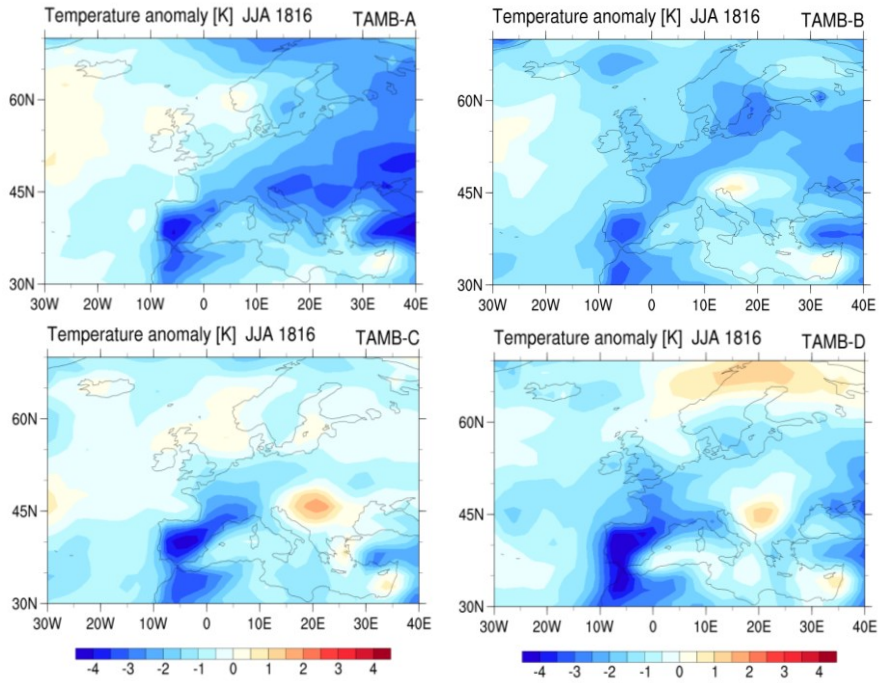

Figure 1 Temperature anomalies for summer 1816 for 4 Tambora simulations with the MPI-ESM module and EVA volcanic forcing

In addition, StratoCLIM will simulate unperturbed and enhanced stratospheric aerosol loading under present and future conditions with the global aerosol model ECHAM5-HAM and contribute to an international SSiRC (Stratospheric Sulfur and its Role in Climate, http://www.sparc-ssirc.org) stratospheric aerosol model intercomparison project ISA-MIP (Timmreck et al, to be submitted, 2016). This intercomparison of global stratospheric aerosol models addresses existing uncertainties and differences among the models with respect to aerosol radiative forcing and its climate response. Unfortunately the planned simulations for the ISA-MIP experiments had to be postponed as well, as the experimental design has not been completely fixed until now. The experiments are now planned for 2017.

References

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