Geophysical Research Abstracts,
Vol. 11, EGU2009-4699, 2009
EGU General Assembly 2009

A new radiative forcing data set comprising the major volcanic eruptions from the Central American Volcanic Arc for paleo climate studies

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Of all the natural causes of climate change, major volcanic eruptions are most important as they have a significant impact on Earth's global climate system, especially on the stratosphere and troposphere, the atmospheric circulation and chemical composition. The direct injection of gases, aerosols and volcanic ash into the stratosphere has a strong and long lasting radiative influence, which leads to a global cooling of surface temperatures for several years, probably decades. In this study we will investigate the climate feedbacks of large Plinian eruptions from volcanoes at the Central American Arc within the last 200ka with the help of state of the art climate models.
To evaluate the radiative forcing of the climate system, we need reliable estimates of the paleo volcanic stratospheric aerosol loading. Here we use a newly derived volcanic data set for Central America based on a) new eruptive mass estimations that are based on compositional land-sea correlations of widespread tephra layers and b) incoporation of measured degassed volatile fractions (S, Cl, F, Br, I) derived from those tephras by the "petrological method" into the mass calculations (Kutterolf et al. 2008a,b). This facilitates the consideration of large eruptions of the past for climate modelling. Using information about strength and height of the volcanic sulphur injection we create a new data set of aerosol optical depth comprising the major volcanic eruptions of Central American Volcanic Arc over the last 200ka.
The poster will introduce the underlying steps to derive an aerosol optical depth set from the petrologic derived sulfate aerosol loading in more detail and discuss possible uncertainties. As soon as possible climate sensitivity studies will follow, in which different SO2 scenarios will be applied, for low, medium and large size SO2 eruptions. To assess the climate impact of past CAVA eruptions on a paleo time scale an earth system climate model of intermediate complexity will be employed.