



## **Volcanic aerosol size distribution, diffuse radiation and vegetation productivity**

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After the Pinatubo eruption the land carbon uptake was significantly enhanced, which is known from the analysis of global carbon budgets. Two mechanisms have been proposed as an explanation:

- (1) Less soil respiration due to cooling over land
- (2) Increased net primary productivity (NPP) of vegetation driven by more diffuse radiation

We discuss the two hypotheses by means of ensemble simulations of the large eruption in the year 1258 with the atmosphere/ocean general circulation model ECHAM5/MPIOM including the land surface scheme JSBACH. According to ice core records this 1258 AD eruption, with still unknown location, probably caused the largest SO<sub>2</sub> injection into the stratosphere during the last 7,000 years.

Four cases related to different aerosol size distributions are considered covering the full range of possible particle size distributions that may have formed after such a large SO<sub>2</sub> injection. Results indicate that the direct response of NPP to changes in radiation after a large volcanic eruption crucially depends on the size distribution of the stratospheric aerosol.