Geophysical Research Abstracts,
Vol. 10, EGU2008-A-09017, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-09017
EGU General Assembly 2008

The impact of volcanic eruptions on global sea level: a conceptual model

M. A. Morales Maqueda (1) and S. Jevrejeva

(1) Proudman Oceanographic Laboratory, Liverpool, United Kingdom (mamm@pol.ac.uk, sveta@pol.ac.uk)

Accurate calculation of the impact of anthropogenic greenhouse gases on global climate requires knowledge of the natural climate variability. Volcanic eruptions are an important driver of natural variability. Aerosols emitted during a volcanic eruption screen the Earth's surface against incoming sun light, causing surface cooling and altering the cycle of evaporation, rainfall and run-off. Cooling of the ocean surface is expected to lead to a decrease in sea level because of thermal contraction of seawater. However, cooling will also cause a decrease in surface evaporation and in the ability of the atmosphere to store water vapour, both of which effects tend to create a rise in sea level. Observational evidence (Grinsted et al. 2007) suggests a complicated sea level response to volcanic eruptions, with an initially rise of sea level of about 9 mm in the first year after the eruption, followed by a fall in sea level of about 7 mm two to three years later. We present here a conceptual model of the upper ocean and lower atmosphere that describes the evolution of sea level after a volcanic eruption. The model physics takes into account the above mentioned competition between thermal contraction caused by cooling and volume increase caused by changes in the evaporation-precipitation-runoff balance. The model reproduces the evolution of sea level observed by Grinsted et al. (2007), but shows as well that sea level changes have a marked dependence on latitude.