

Volcanic eruptions impact global sea level

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Clouds of gases and particles sprayed into the stratosphere by volcanic eruptions cool the oceans and temporarily offset the rise in global sea level caused by the greenhouse effect, according to research findings published today in *Nature*.

Research team leader, Dr John Church from CSIRO and the Antarctic Climate & Ecosystems Collaborative Research Centre (ACECRC), says the study is the first to isolate and measure the effect of volcanic eruptions on sea level variations.

“Using computer models and observations, we tracked sea level variations and temperatures in the upper 300 metres of the ocean

recorded during and following major volcanic eruptions in the late 20th century” Dr Church says. “What we have seen is a slowing in the rate of sea level rise immediately after volcanic eruptions followed by an acceleration over periods of a decade or more.”

This temporary slowing of sea level rise following a series of major eruptions occurring since 1960 (Mt Agung in Indonesia in 1963, El Chichon in Mexico in 1982 and Mt Pinatubo in the Philippines in 1991) temporarily masked the acceleration of sea level rise that would otherwise have resulted from the effects of greenhouse gases in the atmosphere.

Dr Church says although climate scientists generally agree the sea level has risen by an average of 1.8 mm a year over the last 50 years, there has been little focus on the shorter term variability in this rate.

“Scientists have known that volcanic aerosols cause a decrease in the global average surface temperature and other changes in Earth's climate system. However, until now there has been no study of how the aerosols impact on sea level and ocean temperatures,” he says.

The model results are confirmed by ocean observations. The effect persists for at least a decade because of the large heat capacity of the oceans compared to that of the atmosphere and the slow redistribution of heat by ocean circulation.

Sea level rise occurs in two ways: expansion of the ocean as a result of ocean warming (thermal expansion); and, changes in the amount of water in the ocean due to melting glaciers and ice sheets.

Other members of the team are: Dr Neil White of CSIRO and the ACECRC; and, Ms Julie Arblaster from the National Center for Atmospheric Research in the US and the Bureau of Meteorology

Research Centre.

The team's findings – from collaborative research involving the ACECRC, CSIRO's Wealth from Oceans Flagship and the Australian Climate Change Science Program – will be presented at a major international climate change conference, in Melbourne from 13-17 November, *Greenhouse 2005*.

Source: CSIRO

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