

Project: **769**

Project title: **Alert for LARge volcanic eruptions in Medium term climate prediction (ALARM)**

Project lead: **Claudia Timmreck**

Allocation period: **1.1.2016 - 31.12.2016**

## Project overview

The central goal of project 769 is to leverage ongoing activities exploring the response of the climate system to aerosol perturbations in the atmosphere, and the effects of past volcanic eruptions. From the gain of knowledge by these studies, more accurate predictions of the response of the climate system to future volcanic eruptions can be deduced. Depending on the location and strength of the next volcanic eruption, large changes in the Earth system are expected. For instance, as a response to the 1991 eruption of Mt. Pinatubo in the Philippines, global surface cooling with a maximum of about 0.4 K was observed. However, it is uncertain how accurately such a response of the Earth system can be predicted. In particular, we have little knowledge about how the response depends on the atmosphere-ocean state, as well as on the season, location, and strength of the volcanic eruption.

In the framework of this project, we have provided a volcano module for the integrated medium term forecast system planned in the MiKlip research program. The module will be applicable immediately after a large eruption when the major climate relevant eruption parameters (amount of sulphur released into the stratosphere) have become available from satellite observations or other volcanological estimations.

The accuracy of the medium-term decadal predictions will greatly improve if a volcanic eruption takes place and can be included on short notice if the perturbation of the climate system is large enough. In order to establish criteria for the perturbation potential of a volcanic eruption, the analysis of a series of sensitivity simulations of volcanic eruptions with different parameters such as location, source strength, season of the eruption, and state of the tropical ocean is necessary.

## Range of planned work from the scientific view

The MIKLIP I project ALARM project ends in December 2015 but not all analysis and data processing will be done at that time. In 2016 we need dataspace on work, hpss and doku to continue and finish our analysis for the last MIKLIP ALARM papers.

## Mathematical and/or computational aspects

### Algorithmic/mathematical/numerical methods and solution procedures

### Particular suitability to solve the problem with help of HLRE-3

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### Performance benefits depending on the number of used CPUs (scalability)

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### Required computing time and amount of storage space

### Computing time:

Only a small amount of computing time is required for postprocessing and for preparation for archiving and long term storage. We assume

Mistral compute time [Node hours] 100

### Storage space:

The work space should be large since several ensemble members have to be held at the same time for analysis on the fast disks /work. The mid-term archive should accommodate the postprocessed data. We will prepare in 2016 data for long-term archiving, we therefore need more storage space on doku than the years before. For analysis of existing simulations and for preparation of the last papers and long-term storage, we request:

Lustre work [GB]: 15000

HPSS arch [GB] : 10000

HPSS doku [GB] : 15000

## Additional value compared to other projects

The impact of large volcanic eruption on seasonal and decadal climate predictability is not covered by other projects. The MIKLIP ALARM project will continue in MIKLIP phase II. Due to the reorganization of this project resources for this work will be requested in a new MIKLIP II Module B HRLE project