UNIVERSITÉ DE NEUCHÂTEL

CHYN
Centre d'hydrogéologie et de géothermie

MSc in Hydrogeology and Geothermics
Thesis topic proposal 2017

NUMERICAL AND EXPERIMENTAL STUDY OF LUSI GEOTHERMAL SYSTEM MUD CALDERA

Context and objectives

The newly formed Lusi mud eruption east Java, Indonesia is a geologically rare example of the initial stages of a volcanic newborn hydrothermal/geothermal system. Analysing the mechanical behaviour of this system is challenging because of its rheological complexity. Two continuous gravity experiments 2016 conducted near the edge of the mud caldera zone showed gravity variations up to 0.020 mGal that mostly changing over 12 to13 hour time periods. Our working hypothesis is that gravity variations are due to density changes corresponding to mud mixing on the rise through the caldera zone. The goal of this project is to numerically model this behavior for a deeper understanding of the driving processes and develop insight into the early stages of hydrothermal/geothermal systems. Results of this project will help to constrain the depth of the mud caldera that can be used to address liquefaction risk.

Research approach and methodology

Experimental measurements of the different mechanical properties of samples of dry and wet mud from Lusi will be the first part of this project. These measurements provide constraints on numerical model input. A

2D model will be developed coupling Cam-Clay type soil models to a non-Newtonian fluid model [1].

Partners and collaboration

The project will be supervise by Prof. Steven Miller, Dr. Boris Galvan and Dr. Guillaume Mauri.

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1] S.Pudasaini. A general two-phase debris flow model. Journal of Geophysical Research, vol. 117, F03010,doi:10.1029/2011JF002186, 2012

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