

## **Microseismicity results from the Volcanic Risk in Saudi Arabia (VORISA) project, northern Harrat Rahat, Al-Madinah, Kingdom of Saudi Arabia**

Catherine Lewis Kenedi<sup>1</sup>, Mohammed F. Abdelwahed<sup>2</sup>, Marcos Alvarez<sup>1</sup>, Essam M. Aboud<sup>2</sup>, Jan M. Lindsay<sup>1</sup>, Mohammed R. Moufti<sup>2</sup>, Talal A. Mokhtar<sup>2</sup>

<sup>1</sup>University of Auckland, New Zealand, <sup>2</sup>King Abdulaziz University, Saudi Arabia

E-mail: [katelk@auckland.ac.nz](mailto:katelk@auckland.ac.nz)

Since April, 2012, an 8-station borehole seismic research array has been recording microearthquakes in northern Harrat Rahat. This recently active monogenetic volcanic field lies southeast of Al-Madinah, Kingdom of Saudi Arabia, and is being evaluated for volcanic hazard. The goal of the seismic array is an improved understanding of the local geology and structure by locating and analysing microearthquakes. We report on the following: (1) The location of and instrumentation in the array, (2) A new seismic velocity model using a genetic algorithm method, (3) Microearthquakes located around the city of Al-Madinah, and (4) Local tremor activity.

The array has a total aperture of 17 km with station spacing at 5 to 10 km. The seismometers are housed in 2-Hz, 3-component borehole sondes. Sensor depths range from 107 to 121 m. The data acquisition system at each stand-alone station consists of a Reftek 130-01, 6-channel, 24 bit data logger which records at 250 samples per second. Local temperatures reach extremes of 0 degrees - 50 degrees C, so the battery and recorder are contained in a specially designed underground vault. We can locate local microearthquakes of M-1. All stations show a very high signal to noise ratio. The tremor is seen sporadically throughout the recording period with at least one period of concentrated activity.

The VORISA seismographs are operated in collaboration between King Abdulaziz University in Jeddah, Kingdom of Saudi Arabia, and the Institute of Earth Science and Engineering, University of Auckland, in New Zealand.