



Static stress transfer at ocean island volcanoes

T. R. WALTER (1) and **F. AMELUNG** (2)

(1) GFZ Potsdam, Germany (<http://www.volcanotectonics.de/>) (2) RSMAS, University of Miami, USA

There is increasing evidence that volcanoes are influenced by very small perturbations of the stress field. Most notably, volcanoes may be influenced by their tectonic environment at active plate boundaries. But also isolated ocean island volcanoes that are located at large distance to any regional tectonic zones show a strong coupling to local volcanotectonic processes. For those isolated ocean island volcanoes we elaborate processes that cause perturbations of the static stress field. Our results suggest that the volcanic activity is significantly influenced by the extrinsic processes. We consider mechanisms common at ocean island volcanoes, specifically (i) short-term mechanisms (earthquakes, landslides, or volcanic activity), and (ii) long-term mechanisms (gravitational deformation, spreading, rifting). Using ground deformation (InSAR) and earthquake data we can estimate the source of deformation and the development of stress field with time. In numerical models we simulate those magmatic and tectonic events and calculate the pattern and magnitude of stress changes. For instance, we simulate earthquakes and find that following dikes intrude exactly at the location of normal stress drop. We simulate intrusions and find that following earthquakes occur at the location of coulomb stress increase. These results may be of great importance for understanding a volcano's behavior and for developing new prognostic tools widely applicable in volcano hazard evaluations elsewhere.