



Load-induced Stress Concentration beneath Islands

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Since 2002 the seismicity of the Hellenic Volcanic Arc is observed by the CYClades seismic NETwork (CYCNET). The localisation of these events shows that the seismicity beneath the islands focus on a shallow area of a few kilometers depth. The island as a load makes an important contribution to the stress distribution. This stresses can be modelled with the finite-element method (FEM). To investigate the resultant stress in the vicinity of the island, several models are created with the programm ABAQUS. The ratio of maximum shear stress and normal stress acts as an indicator for potential area with increased seismicity. If this ratio exceeds a certain threshold rocks do not longer resist the current stress and break down.

Starting point of the investigation is a model of an elastic half space and an island with a triangular profile. In several steps the model is adapted to more realistic rheologies and proportions. Firstly the half space is divided into two layers. The selected depth of the layer boundary is consistent with the average depth of the Moho in this area. In the next step the model is computed with viscous mantle material. The layer boundary still remains in the average Moho depth. In a further step the crust gets a ductile rheology to approach the natural behaviour of rocks. The layer boundary also still remains in a constant depth. At this point changes are only made to petrophysical parameters. Among these parameters a realistic model has to contain a real run of the Moho and real topography and bathymetrie respectively. In a last step the model is modified in that way, that the run of the Moho, the topgraphy of the island and the bathymetry of the sea bottom is adapted to realistic proportion.

For the elastic half space the computation of the ratio of maximum shear stress and normal stress shows that critical values are obtained in shallow areas at the edge of the island. This indicates seismicity at the coastline which is supported by the observations of the CYCNET. Furthermore the results of the sophisticated models are to be shown.