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Static displacements and stress changes of the Kythira 2006 Earthquake

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The south-western part of the Hellenic Subduction Zone was struck by a magnitude $M_w = 6.7$ earthquake on Jan. 8, 2006. This earthquake has been recorded by 58 stations of the EGELADOS network. It was the first large earthquake for over a decade in the area of the south-western Peloponnese and the adjacent part of the Hellenic Subduction Zone. It was followed by 5 more large earthquakes in the same area in 2008. The static displacements and changes in the stress field of this earthquake are investigated.

The seismic records of broad-band stations contain the signal of the station's static displacement due to strong earthquakes. This signal can be obtained by converting the velocity record to displacement seismograms. The dense network set up in the EGELADOS project is used to investigate the limits of observability of the static displacements. The EGELADOS network was operated by the Ruhr-University Bochum and German (GFZ, Uni Hamburg), Greek (NOA, AUTH) and Turkish (ITU) partners in the southern part of the Aegean and adjacent areas from October 2005 to May 2007.

Baseline shifts in displacement seismograms can be observed in the obtained displacement records from about 100 km and up to about 600 km epicentral distance. Closer stations can not be analysed since the records are clipped due to the large ground motion near the epicentre. The static displacement is modelled numerically (software PSGRN/PSCMP) with a homogeneous layered elastic half-space model. The results are compared to the observed baseline shift.

The earthquake also changed the stress field in the vicinity of the fault and at larger distances. This stress changes and resulting changes of the Coulomb failure stress (ΔCFS) at the rupture planes of the successor earthquakes are calculated to investigate this unusual earthquake series.