Geophysical Research Abstracts, Vol. 9, 01776, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-01776


# Source Mechanism and Rupture Histories of the Recent Gulf of Gökova and Sigacik Bay Earthquakes

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This presentation is concerned with the geometry of faulting in the Sigacik and Gökova Gulfs and is based on newly retrieved and obtained earthquake source mechanism solutions from waveform inversion of teleseismic body-waveform data. The epicentral distributions of earthquakes reveal that these gulfs are seismically active. We used teleseismic long-period P- and SH-, broad-band P-waveforms, and first motion polarities of P- waves recorded by GDSN stations to determine the source parameters of the earthquakes in the Gulf of Gökova region using body-waveform inversion method of Nábélek (1984). To obtain source mechanisms we compared the shapes and amplitudes of long period P- and SH-waveforms and recorded in the distance range of 30 – 90 degrees, for which signal amplitudes were large enough, with synthetic waveforms. Seismograms are generated by combining direct (P, S) and reflected (pP and sP or sS) phases from a point source embedded in a given velocity structure. Receiver structures are assumed to be homogeneous half-spaces. Seismograms were weighted according to the azimuthal distribution of stations. Then, strike, dip, rake, centroid depth and source time function were determined, and the uncertainties in the parameters for each event were also estimated. The solutions were constrained by P-wave first motion polarities of near-field stations. We have also obtained rupture histories of the earthquakes by using inversion scheme of Yagi and Kikuchi (2000).

To better understand the active deformation in these regions, we have obtained source mechanism solutions and spatio-temporal distribution of the moment release for the recent moderate earthquakes. For the Gulf of Gökova region, we have obtained source mechanism solutions and rupture histories for 7 earthquakes, of magnitude $M > 5.0$ and shallow focal depth ($h < 20$ km), which occurred during the period 1986-2005. The kinematics of the deformation in the gulf is controlled by normal faults with

small strike slip components trending E-W, NE-SW and NW-SE directions. T-axes obtained from source mechanism solutions demonstrate the NW-SE direction of extension as a result of the convergence between the African and the Eurasian plates and the westward movement of the Anatolian block. Earthquakes have generally short source duration and uniform rupture propagation along the dip direction.

For Sigacik Gulf earthquakes, inversion results indicate that NE-SW oriented right lateral strike slip faulting and uniform rupture propagation on the fault plane are observed dominantly in a good agreement with the local geology and structural features of the region. For both gulfs, earthquake focal depths are shallow and usually less than 15 km.

References:

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