



Complex and Segmented Rupture of the 14 August 2003 (M_w 6.2) Lefkada (Ionian Islands) Earthquake

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The 14 August 2003 (M_w 6.2) Lefkada earthquake ruptured the Lefkada Segment of the Cephalonia Transform Fault Zone (CTFZ) a major structure along the Ionian Islands of Greece. We invert 30 P and 9 S waves recorded by the Global Seismographic Network to recover the slip distribution of the earthquake. Teleseismic (Benetatos et al., 2004) and regional (Zahradnik et al., 2004) waveform modelling has revealed the multiple (mainly double) source character of the mainshock, and our preferred model indicates a) the earthquake occurred as two distinct events, separated in space (~ 40 km) and time (14 sec), b) the moment was released in three distinct patches (asperities). The first patch of moment released is located underneath the western coast of Lefkada Island confined in a small area ($\sim 25 \times 10 \text{ km}^2$) and at depths below 12 km. The second patch of moment release is located further south in the sea, close to the northern coast of Cephalonia Island and is confined in an even smaller area ($\sim 15 \times 10 \text{ km}^2$). The third patch of moment released occurred in the area between the two fault segments considered, which corresponds to the intersection of the Lefkada and Cephalonia Segments of CTFZ. A maximum slip of ~ 34 cm was observed on the north segment beneath Lefkada Island. In order to obtain satisfactory fit to the teleseismic body waves the contribution from subevents on both segments has to be considered. Shakemaps of peak ground velocities (PGV), simulated from the slip model around the epicentral region, especially on the western coast of Lefkada Island, are in good agreement with the distribution of reported damage and intensity level of VII.

The displacement field on the surface calculated using forward modelling shows very small values and limited subsidence of the northern parts of Lefkada and Cephalonia Islands. Descriptions of historical events indicate that sequential and segmented rupture of the Lefkada CTFZ has occurred in the past, and the strength of the fault seems variable, with the southern part being stronger and more resistant to rupture than in the north.