

O-SE2 THE NOVEMBER-DECEMBER 1994 LEFKAS (W.GREECE) EARTHQUAKE SEQUENCE: RESULTS FROM IN SITU SEISMOLOGICAL SURVEY

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On November 30 and December 1, 1994, two moderate earthquakes of $M_s=5.2$ and 5.0 took place in western coast of Lefkas island (W. Greece), causing considerable damages in the nearby villages. The island is known to have suffered from several destructive earthquakes, most of which are located at its northern part, while during the present century the most significant earthquake was the one of November 4, 1973, $M_s=5.9$. The aftershock sequence was recorded by a temporary seismic network comprising of six 3-component digital seismographs and one 16 bits digital strong motion recorder, installed on the island, for a period of three weeks following the main shocks. During that period more than 2000 aftershocks were recorded, from which 100 are located with an accuracy better than 1 km. The spatial distribution of the best located events shows an intense activity in the vicinity of the meizoseismal area, around the village of Kalamitsi (fig. 1). A cross-section in E-W direction shows a superficial depth distribution of the aftershocks down to 12 km, defining a deforming zone dipping towards the east (fig. 2). Using P-waves first motion polarities we constrained fault plane solutions for 40 aftershocks recorded from more than 5 stations having a GAP less than 180° . The majority of the computed fault plane solutions indicate dextral strike-slip and oblique reverse slip on a NNE-SSW east dipping nodal plane (fig. 3), consistent with the direction of the observed co-seismic surface ruptures. The intensity distribution as well as in situ observations suggest that the macroseismic effects have followed the pattern of the 1973 event.

The precision of the locations due to the small epicentral distances and the high quality of the recorded waveforms allow the application of doublets analysis for determining the geometry and rupture processes of the post-seismic deformation. The cross correlation spectral analysis applied for the 48 largest aftershocks indicates two clusters, each of them distinguished by the coherent spectral content (fig. 4), while a third cluster located between them, in depth 7-10 km, is not correlated with the two others, presenting various incoherent frequency contents. The two first clusters define two parallel zones dipping towards the east. The east zone is located west of Kalamitsi village and coincides with the one defined by a microearthquake survey in 1989. The west zone might correspond to the major Kafallinia-Lefkas transform fault system where the largest earthquakes of the area have been reported. The third cluster, might correspond to an intermediate zone of diffuse deformation resulting from the seismic slip distributed along the two main parallel faults.

The two mainshocks have been recorded by a SMA-1 analogue accelerograph located in the town of Lefkas. The evolutionary power density spectra using maximum entropy method, shows that the first main event is a simple shock, while the second event is probably a double shock. Both events are dominated by a site effect amplification in a bandwidth around 2 Hz. Using the seismotectonic results as well as the first mainshock as an empirical Green's function, a magnitude 6 earthquake has been simulated for various rupture processes.

ACKNOWLEDGMENTS

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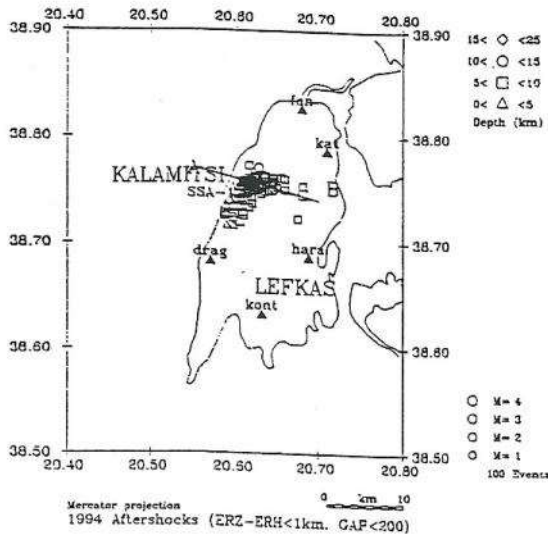


Figure 1. Map of the best located aftershocks.

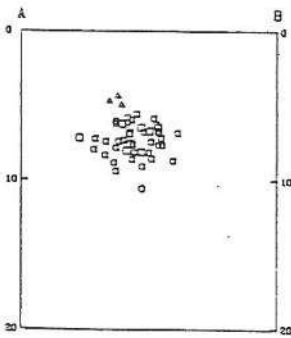


Figure 2. Cross-section along AB

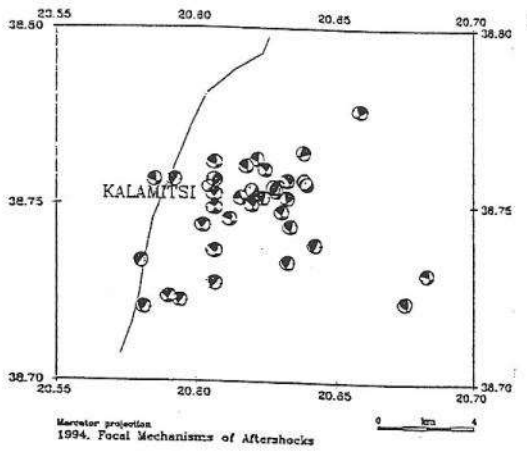


Figure 3. Fault plane solutions for 40 aftershocks.

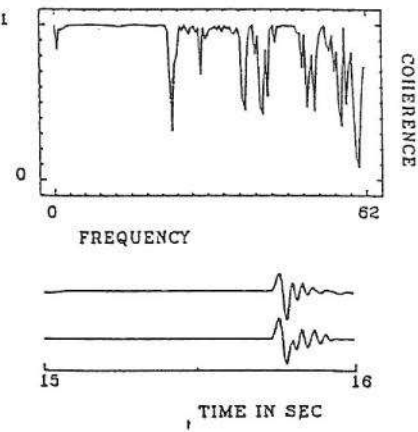


Figure 4. The coherence for 2 events is almost 1 for frequencies <20 Hz.