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Foreshocks and aftershocks of the October-November 2005 earthquake sequence in East Aegean Sea: lessons learned for earthquake prediction

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On 17 October 2005 two strong earthquakes of M_L 5.4 and 5.5 occurred in the East Aegean Sea near the island of Samos (Greece). On 20 October 2005 the mainshock of M_L 5.6 took place. It seems that the strong earthquakes are associated with strike-slip faulting of about east-west orientation. On a real-time framework it became impossible to evaluate if the first strong earthquake was a foreshock or the mainshock. The retrospective analysis of the daily national earthquake catalogue of Greece, which lists earthquakes determined by at least three P and S phases, it results that the foreshock activity started on 17 October 2005. To verify this hypothesis we analyzed the records of the station SMG (on Samos island) which is the closest to the epicenters of the three strong earthquakes (epicentral distance $\sim$50 km). This analysis revealed a set of $\sim$50 small early foreshocks that occurred from 12 to 17 October 2005. For the foreshocks listed in the catalogue a relationship was established between the duration magnitude and the signal duration in SMG. Then, duration magnitude was obtained for the early foreshocks from their signal duration. The statistics (b-value, seismicity rate) of the foreshock sequence for the period from 12 to 20 October, as well as of the aftershock sequence from 20 October to 21 November 2005 indicates the different properties of the two main sequences. The results obtained imply that the application of an algorithm for the daily automated seismicity analysis may help to recognize in near-real time conditions the initiation of foreshock sequences. Such a method is in practice since 2003 for the daily seismicity analysis of the Corinth Gulf, Central Gulf. After the example of October 2005 we decided to expand the capabilities of our software

for the daily automated seismicity analysis of all Greece.