Seismic Quiescence as an Earthquake Prediction Tool

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Heterogeneity of Reporting in the Earthquake Catalog of the Western North Anatolian Fault Zone

In collaboration with researchers from the University of Kiel we have investigated the difference in magnitudes reported by the German and the Turkish analysts. During the first two years of operations two magnitudes M_1 and M_2 were reported for each earthquake based on different definitions, one by each research group. During the second two years only one magnitude was reported. We used this data set to test our method to detect inadvertent changes in the magnitude scale. The direct comparison of the duplicate magnitude sets gave the "observed" magnitude difference which we used for calibration. The heterogeneous data set on which we tested the GENAS method to detect magnitude scale changes was made up of two years of M_1 data followed by two years of M_2 data. Our method found the time of change and the magnitude shift correctly within small uncertainties. However, we also found that in addition to a shift, stretching of the magnitude scale occurred.

Heterogeneity of Reporting in the Revised Preliminary Earthquake Catalog of Central California

We concentrated our initial efforts with this new catalog on the area surrounding the Loma Prieta earthquake. We found that magnitude shifts are present in this catalog. North and south of Loma Prieta, positive and negative magnitude shifts exist, respectively. The raw data for the southern part of the Loma Prieta aftershock zone show an extremely impressive seismicity rate decrease in excess of 50% that lasted for many years. This observation might be interpreted as a quiescence precursor to the Loma Prieta mainshock of 18 October 1989. However, we found that three negative magnitude shifts of -0.1 each probably accumulated a difference of $\Delta M=-0.3$ between the 1970s and the late 1980s magnitudes in this area. After correcting for what we interpret as magnitude shifts, no precursory quiescence anomaly exists before the Loma Prieta earthquake. We find that the type of heterogeneity found is different in neighboring volumes with dimensions of 20 km in some parts of central California.