EARTHQUAKE HAZARD ASSESSMENT FOR CENTRAL GREECE INCLUDING LOCAL GEOLOGICAL STRUCTURE

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As earthquakes are a serious threat to communities, the principal way in which seismologists are able to help them at present is through assessing seismic hazard and through this advising engineers, politicians, designers and urban planners. To calculate earthquake hazard it is important to know how the strength of shaking decreases with distance from epicenter. The use of macroseismic intensity values gives a direct measure of earthquake effects in human terms. However, new methods in routine macroseismic data gathering and their evaluating have to reflect societal changes. Therefore an application of the point kriging griding method for an automatic computer drawing of isoseismal maps was delivered. Smoothing rates and numerical parameters used in the kriging algorithm were tested on macroseismic data of Greek earthquakes and the optimum values were defined. Isoseismals represent the spatial distribution of macroseismic intensities and their shapes depend on source properties, lithosphere structures, tectonic line orientations, site geology and topography. The isoseismals of higher intensities are shaped in accordance with local rupture zones and their seismotectonic characteristics, lower intensity isoseismals reflect broad regional structural features of the shaken area. Even less consolidated geological formations (soils, sands, etc.) in large epicenter distances can also influence isoseismals significantly. The point kriging method allows for every earthquake a local macroseismic difference, residue, between individual original and smoothed values to be evaluated. Detected residues were related to physical properties of local rock formations, e.g. seismic wave velocity and bulk density, to find appropriate relations. The positive intensity rate (an intensity increase) correlates to less consolidated young sediments and negative rate (an intensity decrease) to igneous or metamorphic rocks, as well as limestone, dolomite, etc. The geological map of Greece, on scale 1:500 000 was vectorized. An application of the intensity rates to standard probabilistic earthquake hazard calculations with respect to local geological structures for Central Greece gave more reliable assessment of earthquake hazard values.