



The Energy Balance of a seismogenic Area considered as an "open" physical System. Application on the Magnitude Estimation of a large imminent EQ and on the seismic Potential of the regional seismogenic Area.

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A seismogenic region is considered as an "open" physical system that absorbs energy, while at the same time seismic energy is released through its seismicity. The mathematical analysis of its energy balance under stable conditions and particularly the study of its released cumulative energy for large periods in the past, suggests a method for the estimation of the maximum magnitude of a future large EQ in the same seismogenic region, provided the most probable time of its occurrence has been estimated by another methodology. Statistical validation test and results obtained from the retrospective application of this methodology for the time period of years 1972 - 2001 for a total of 18 large EQs of $M_s \geq 6.4R$ (of known location and time of occurrence) of Greece has shown that it was possible to calculate the expected magnitude with a very good accuracy as $dM \text{ Mean} = -.067R$ and $dM \text{ S.Dev} = 0.13R$. Following this methodology, a large number of virtual seismogenic areas (100Km by 100Km) have been considered in Greece and the seismic energy balance has been studied for each one of them. The expected magnitude of a hypothetical EQ has been determined for 5 years time intervals, from 1970 to 2000 and the results have been used for the compilation of the corresponding seismic potential maps. Seismicity ($M > 6R$) for each time period has been compared to the corresponding seismic potential map thus indicating the close relationship between the seismic potential of Greece at a certain year and the number of registered large EQs for the next 5 years time period. In conclusion the seismic potential of a regional area is an "indicator" of its strain charge and prescribes in a quite satisfactorily way its future seismic behavior.