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Some New Empirical relations in the Seismic Regime and Their Interpretation

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The spatial changes in the seismic regime are investigated using a combination of a few rarely used parameters and the routinely used ones. The rarely used parameters are the following: the change in the origin time and depth of the earthquake as being determined from the hypocentre determination and from the seismic moment determination, and the mb/mw ratio value. The routinely used ones are the earthquakes number density, and the mean apparent stress σa, and b-values. The rarely used parameters give possibility to characterise the typical direction and velocity of spread of the earthquake failure and the relative contribution of the high- and lower frequency modes in seismic radiation. The values of the examined parameters were averaged in some depth intervals and in different tectonic areas (oceanic ridge zones, subduction zones, others) to ensure sufficiently robust estimates. The tendencies in change of the mean parameter values with the depth, and in different tectonic conditions were examined. The interrelations between values of different parameter taking place in different tectonic regions and in different characteristic depth intervals were examined also. Besides of a few correlations well known before several new relations between the parameters examined were revealed. Thus, the main tendency in the change with the depth in the values of majority of parameters was revealed to be similar (in accuracy to a coefficient) to the change of the relative temperature T/Tmelt with the depth. Some specific features in the parameters values were revealed at the depth of the main transformations occurring in the subducted plate. Some of the relations revealed can be treated as artefacts but the majority of them appear to have the physical meaning and to be useful for the understanding of the mechanism of the seismic process. Thus, some of the relations revealed can be treated as an evidence for the existence of the fluid component in the earthquake foci both in the cases of crustal and mantle earthquakes. The correlations obtained are discussed and their interpretation in terms of different models of the earthquake genesis including the fluid-metamorphogenic model is presented.