

## On the possibilities and problems of using creepex as a characteristic of the seismogenic environment stress-strain state

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This paper highlights the development of the conceptual provisions and solutions set out in [1-4] on the creepex-analysis of seismicity in the tasks of geodynamic research of the major earthquakes preparation areas: 1) by the change in the creepex value around their foci [1] or in the accompanying seismic swarms [2], 2) by the correlation of the creepex with magnitude and depth during the major shock preparation [3]. The influence of the medium-depth seismicity of regional and global deep faults on the processes of focus preparation was also studied [4].

In this paper the dynamics of the correlation coefficient  $K_{\text{KOR}}$  (of the pair correlation of the magnitude  $M_S(t)$  and the creepex  $Cr(t)$ ) is considered on a global scale according to the Harvard CMT catalog by deep ( $H \geq 50$  km) seismicity extended along two strictly orthogonal to each other "main" seismic belts of the Earth [4], that are detecting by GIS-ENDDB seismolineamentic algorithm [5] and covering all earthquakes of the Globe with  $M_S \geq 7.5$ .

The  $K_{\text{KOR}}$  graphs demonstrate the four earthquakes having the most extensive  $K_{\text{KOR}}$  anomalies with approximately the same time intervals between them: 27.12.2003, 18.01.2011, 8.9.2017 and 9.01.2023.

This is two earthquakes: New Caledonian 27.12.2003 ( $M_S=7.0$ ) and Mexican 8.9.2017 ( $M_S=8.3$ ) corresponding to positive anomalies and the maximum of the trend growing before and decreasing after these events. Similar display can be associated with endogenous processes that increase the medium decompression, i.e. with episodes of global geotectonic stretching.

The Pakistani 18.01.2011 ( $M_S=7.0$  and 7.0) and Indonesian 8-9.01.2023 ( $M_S=7.0$  and 7.7) events have the largest negative anomalies, starting 49 and 15 days before them. It is logical to associate them with the consolidation of the environment along global seismic belts, presumably due to episodes of the most intense geotectonic compression of modern times. Such episodes may be connecting with the registered now fluctuation of the Earth's rotation [6].

Thus, the analysis results confirm the validity of the previously obtained conclusions [5] on the classical parameter creepex  $Cr_0 \sim M_S - m_b$  according to the IDC catalog. The need to verify these results arose in connection with the observed cases of mass recalculation of the  $M_S$  values of this catalog. The lack of sufficient stability of the paired definitions of  $M_S$  and  $m_b$  forced us to involve other pairs of magnitudes in the creepex-analysis, in particular, the surface  $M_S$  and the moment one  $M_W$  (available in the CMT catalog). The resulting modified kind of the creepex  $Cr \sim M_S - M_W$  has a clear physical meaning of estimating the degree of enriching the rupture in the focus by seismic energy  $E_S$  per unit of seismic moment [7] and therefore, just like the classical creepex, reflecting the relationship between creeping and explosive shift component [8].

The possibility of confirming the conclusions of the creepex-analysis with data from other catalogs (including with the involvement of other magnitude pairs), greater reliability of the definitions of  $M_S$  and  $m_b$  magnitudes and their completeness would increase the reliability of the results of retrospective geodynamic analysis.

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