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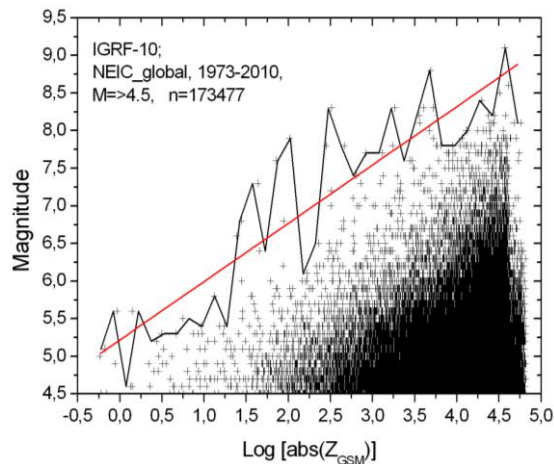
ON GEOMAGNETIC CONTROL OF SEISMICITY

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It was found earlier [1] an association between planetary-scale distribution of seismic belts and geometry of the main geomagnetic field: i) latitudinal variation of earthquake recurrence is organized better in dependence on geomagnetic latitude or angle of geomagnetic inclination, then on the geographical latitude; ii) the largest amount of earthquakes occur in those regions of planet where the geomagnetic declination angle is close to zero value. Present report shows new results in this field of science. It is found [2] that geomagnetic control of seismicity becomes more apparent if one analyses geomagnetic field components in geocentric solar magnetospheric (GSM) coordinate system. In GSM coordinate system the X-axis points from the Earth towards the Sun. The Z-axis (positive) is perpendicular to the X-axis and parallel to the projection of the negative dipole moment on a plane perpendicular to the X-axis. The Y-axis completes a right-handed coordinate system. It is defined to be perpendicular to the Earth's magnetic dipole so that the X-Z plane contains the dipole axis. Since the Y-axis is perpendicular to the dipole axis, it is always in the magnetic equator and since it is perpendicular to the Earth-Sun-line, it is in the dawn-dusk meridian (pointing towards dusk). The GSM coordinate system rocks about the solar direction with a 24 hour period in addition to a yearly period due to the motion of the Earth about the Sun. As a result, for any particular geographical point, the geomagnetic components in GSM coordinate system vary in the course of day and year. Using data of the global seismological catalogue NEIC, the geomagnetic components in GSM coordinates were calculated for epicenters of 173477 earthquakes with magnitude $M \geq 4.5$, which occurred at the planet in 1973-2010. Seismic statistics in relation to geomagnetic GSM components showed that earthquakes prefer occur then and there, when and where geomagnetic Z_{GSM} components reach large positive values, that takes place at low and middle latitudes. The possible maximal magnitude of earthquake (M_{max}) has a linear dependence on the logarithm of absolute Z_{GSM} value in the epicenter (Figure 1).



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Figure 1. Distribution of the magnitude of earthquake versus the logarithm of absolute value of geomagnetic Z_{GSM} component [$\text{abs}(Z_{GSM})$] in the epicenter. Black line is an envelope of maximal magnitude in sequential bins of 0.15 size, and a red solid line is the linear fit to envelope with a correlation coefficient $R=0.91$ [2].

It is found also in [3] that there is a geomagnetic conjugacy between certain tectonic structures. In particular, the middle ocean ridges located in the southern hemisphere along the boundary of the Antarctic tectonic plate are magnetically conjugate with the areas of junction of continental orogens and platforms in the northern hemisphere (Figure 2). The most close magnetic conjugacy exists between southern boundary of the Nazca tectonic plate and northern boundaries of the Cocos and Caribbean plates.

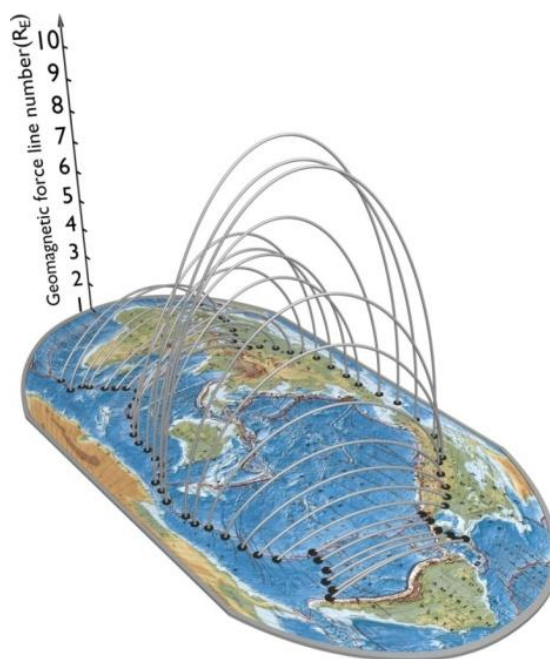


Figure 2. Geomagnetic force lines connecting the points located along the boundary of the Antarctic tectonic plate in the southern hemisphere, with their magnetically conjugate points located in the northern hemisphere.

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