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Climate-Seismicity Coupling

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Topic of the slow climate changes is rather popular at present. Two important problems are usually discussing in connection with the climate variability: several years quasi-periodicity (El Nino/La Nino effect) and long-term trend in the global temperature (global warming or cooling). Concerning forcing agent on the climate changes several hypotheses have been suggested including changes in solar luminosity, variations in the Earth's orbit around the Sun, cosmic rays, volcanic eruption activity and so on but the most accepted cause is the change in atmospheric greenhouse gas concentrations due to human activity. We have tried to find a correlation between slow climate changes using variation in sstoi indices (sea surface temperature anomalies in the 3 selected areas of near-equatorial Pacific Ocean, 160E-90W) and seismic activity using USGS catalog on crustal earthquakes (EQs) in about the same areas. We calculate the values that are proportional to seismic energy release as indices of seismic activity and compare the variation of half-year sstoi and seimic
indicies during period of 1973-2008. Autocorrelation of both indices smoothed by 1-year window shows the same behavior in the all selected regions with averaged 4.5 year periodicity while the cross-correlation of the indices envisages 1.5-2 years time delay of sstoi indices in relation to seismic indices. Such the mother-daughter delay is checked by comparison of deep and crustal seismic activity using technique that described in the paper [1]. Furthermore there is clear similarity in the trends of sstoi and seismic indices. We conclude that slow climate variations are probably induced by changes in natural seismicity. Energetic estimations of the climate-seismicity coupling are also discussed.

[1] O.A. Mochanov and S. Uyeda, Upward migration of earthquake hypocenters in Japan, Kurile-Kamchatka and Sunda subduction zones, Physics and Chemistry, 2008, doi:10.1016/j.pce.2008.09.011.