ABRUPT CLIMATE CHANGES AND ITS OSCILLATIONS IN SOLAR-TERRESTRIAL DATA

T. Kuznetsova (1)

(1) IZMIRAN, Russian Academy of Sciences tvkuz@izmiran.rssi.ru/Fax: +7-095-3340124

Time series of different solar-terrestrial data (on solar activity, geomagnetic field variations, Be-10, C-14, anomaly of global surface temperature,) are analysed by a method of non-linear spectral analysis (named by the MGM method) to detect time intervals of appearance of non-stationary oscillations of large amplitude and times of abrupt changes of their oscillation regime. Analysis shows that the most power cycles of the calculated spectra can be interpreted by periods (and overtones) of astronomical origin. The powerest non-stationary (with varying phase and amplitude) sinusoid at mean period $T \approx 2230$ yr. (and its overtones), reflecting oscillations of non-dipole part of the geomagnetic field in C14 data and variations of long-term solar activity), is connected with climate variability and its abrupt changes. Derived regularities in behaviour of this cycle allow forecasting the tendency of climate changes in the future. Analysis of different studies shows that this cycle was detected in many geophysical data (governed by different physical mechanisms). It is shown that the time intervals of regime change of oscillations of the 2230-year cycle is reflected in all geophysical data synchro. It is generally recognized that climate regime shifts are connected with sudden changes of other geophysical systems although these systems are controlled by different physical mechanisms. However, this speed and the global synchronicity of climate changes are the major problems in understanding links between the Milankovich forcing of astronomical origin and climate data. It is possible to separate in orbital motion of each celestial body non-perturbed (Kepler’s) part and perturbed one. The non-perturbed part of tide force characterizes non-evolving orbital motion (analogous to normal part of geophysical fields, for instance, gravitational and geomagnetic); respectively, perturbed part of tide force characterizes evolving orbital motion (analogous of anomalous part that can be extracted from observation). A possible physical mechanism is presented showing a
possibility of transformation of signals of perturbed tide forces of astronomical origin (arising during orbital motion of the Earth) to geophysical systems through small variations of dissipative parameters of a dynamo system.