INSTABILITY OF THE EARTH'S ROTATION IN 1833 - 2000 YEARS

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1. DATA AND METHOD OF THE ANALYSIS

We used the following series of data for analysis:
(D) - Excess of the duration of the day to 86400s (IERS Annual Report, 2000);
(EQ) - The mean annual numbers of Earthquakes with a magnitude of more than 7 in 1900-2004 (http:/neic.usgs.gov/neis/eqlists/);
(SSC) - The mean annul numbers of the geomagnetic sudden commencements in 1868-2002 (http://www.wdcb.ru/);
(GMT) - Global Temperature Anomalies (http://www.cdc.noaa.gov/ClimateIndices/);
(aa) - Geomagnetic Indices (http://www.wdcb.ru/);
(W) - Relative Sunspot Numbers (http://www.wdcb.ru/).

Calculations are based on a classical spectral methods and two-channel estimates of the autoregressions (AR) spectral power density.

2. MODEL USED AND RESULTS

We have found the basic not tidal waves with the periods near 64, 32, 21 years in the (D) - data. The (D)-data are interpreted on the base of new quasi-polynomial model:

$$s(t) = \sum_{m=1}^{n} \sum_{l=0}^{k_l - 1} a_{ml} t^l e^{z_m t}, \tag{1}$$

where $n \geq 1, k_l \geq 1, z_m$ are some complex numbers.

The analytical approximation with (D)-data is accurate to better than 12 % .

According to (1) oscillations with the periods 64 year and 21 year (Figure 1, gr.3,5) are similar structure and also describe fading process. This fact will be coordinated to conclusions Braginsky's (1982) about generation by their one system torsion fluctuations in liquid core of the Earth. The oscillation with the period 32 year (Figure 1, gr.4) has well defined character of the quasi-harmonic process. It will be coordinated to the assumption Morrison (1979) about various mechanisms of generation inside the Earth of oscillations with the periods about 64 year and 32 year.

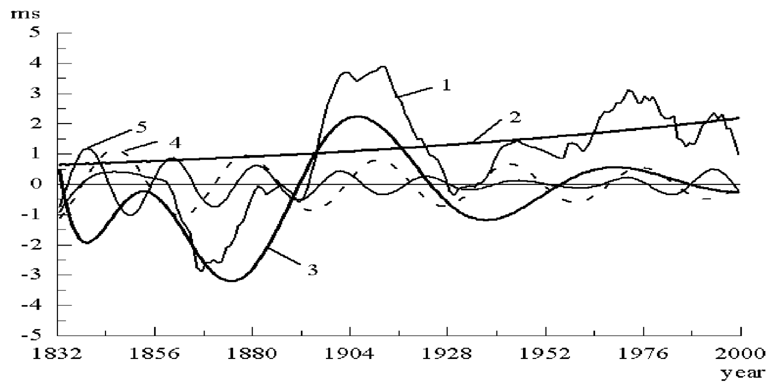

Figure 1: The basic oscillations in the structure of quasi-polynomial models
1 - initial (D)-data; 2 - trend; 3 - oscillation with the period 64 year; 4 - oscillation with the period 32 year; 5 - oscillation with the period 21 year.

3. TWO-CHANNEL AR-ANALYSIS

In table 1 results two-channel AR-analysis are presented. The basic oscillations in (D) (I the channel) are compared with similar oscillations in various geophysical and atmospheric numbers.

Table 1: Results two-channel AR-analysis of the (D)-data (I channel) and compared the data (II channel)

Name of data (II channel)	Quantity of data	Period (year)	Displacement , year (in I channel concerning II)	SMC %
aa	132	21.3	10.4	83
aa	132	22.3	-10.4	94
W	132	22.3	- 9.7	95
aa	132	32.0	10.4	92
EQ	100	32.0	0.2	85
EQ	100	64.0	-18.0	96
GMT	120	64.0	18.1	62
SSC	100	64.0	-12.9	78

That fact, that on close frequencies of oscillations in (D) - data have a high degree of coherence (the square modulus of the coherence(SMC)>80 %) with external and internal processes simultaneously, admits the possibility of the existence of the interconnected mechanism of the generation different from tidal changes.

REFERENCES

Braginsky S.I., 1982, “Analytical descriptions of secular variations of a geomagnetic field and speed of rotation of the Earth”, Geomagnetizm i aeronomiya, vol.22, 1, pp.115-122.

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