VARIATIONS OF THE INTENSITY OF SIBERIAN ANTICYCLONE AND EARTH ROTATION.

A. KORSUN(1), G. KURBASOVA(2),
(1) Main Astronomical Observatory, Ukrainian Academy of Sciences,
Kiev-127,03680, Ukraine
e-mail: akorsun@mao.kiev.ua
(2) Crimea Astrophysical Observatory,
p/o Nauchny, Crimea, 98677,Ukraine,
e-mail: gsk@crao.crimea.ua

ABSTRACT. For the research of time variations, displacement of the centre of the Siberian anticyclone and parameters of orientation of the Earth were used data for the period 1891-1967 years. At the decision of a problem of revealing of the connected variations in the compared data the effect of coherence of fluctuations in the system composed of the Earth and the Moon was taken into account. Variations in change of dynamic parameters of the system composed of the Earth and the Moon which may play a role of the trigger mechanism in change of amplitude and displacement of the centre of the Siberian anticyclone are revealed.

1. INTRODUCTION

It is known that the origin, evolution and intensity of atmospheric cyclones and anticyclones are connected with the season of the year by the various geophysical phenomena. The atmosphere is dynamical shell of our planet in which various physical processes differently proceed. It has high sensitivity charge of a mechanical pressure i.e. relation of force to the area. The tidal pressure created by forces of the attraction of the Moon and the Sun, definitely influence background atmospheric processes changing speeds of distribution of the centres of anticyclones. The tides create essential sign-variable (they may either strengthen or slow down processes in the atmosphere) the additive to a background field of pressure. Therefore it is rather useful to study the low of the time changes of the connection tides and the atmospheric phenomena as they may act in a role of the trigger mechanism at the origin of cyclones and anticyclones. At a final stage of origin of cyclones and anticyclones enough extremely weak push which may appear a tidal pressure and gravitational interaction in system the Earth—the Moon.

Unstable processes occurbing in an atmosphere results in the reorganization of spectral structure of waves which reasons are not always clear. This reorganization is expressed in change of one dominant waves by other in their merge and splitting.

The analysis of the data for 77 years (1891-1967) about anomalies intensities and displacement of the centre of the Siberian anticyclone shows that this anticyclone reaches the greatest force in January that will be coincide with the maximum al speed and the position of the Earth in the perihelion. The redistribution of energy in the connected system the Earth—the Moon causes the consented variations in the mobile shell of the Earth and the parameters of orientation of the Earth.

Our article is devoted to a problem of the revealing of the connected variation in the system the Earth— the Moon. We pay main attention to global period of the variation centred at a period close to 4.4 years in following phenomena: Earth rotation, integrated seismic energy, ENSO phenomenon and the variation of the distance between of the centers of the Earth and the Moon.

2. THE DATA AND THE METHOD OF THE ANALYSIS

For the analysis the mean-annual data of the polar coordinates of the Earth (as $z = \sqrt{x^2 + y^2}$), changes of the duration of day (ΔD), integrated seismic energy (E), index of the Southern fluctuation (I) and the data about minimal ($\rho_{\min}$) and maximal distance ($\rho_{\max}$) between the centers of the Earth and the Moon were used. Parameters of the Siberian anticyclone: displacements of the centre on a longitude (S_λ), on a latitude (S_φ), and anomalies of the intensity (S_α)[2]. The method of two-channel spectral analysis was used [1]. This method finds out compares the fluctuations of identical frequency in the series of the initial data located in two channels. The results of the analysis are given in Table 1.

The degree of similarity of the fluctuation with the identical period (column 3) is determined by size of square of the module cogerence (column 4). The relative displacement of the compared fluctuations are given in column 6.

The analysis of the results of a comparison shows that at the data there is a variation with the common component centred at a period close to 4.4 years. This fluctuation is found out both in geodynamic and the geophysical data that may specify the common source of its generation. Such source may be gravitational interaction in system the Earth—the Moon. Periodic power exchange processes generated it include all mobile shells of the Earth and its atmosphere. In is possible to show that if as own frequencies of system the Earth—the Moon to accept average frequency Chandler fluctuation ($\omega_1 = 0.839c/y$) and frequency of fluctuation of a line of sites of a lunar orbit ($\omega_2 = 1.054c/y$) interaction the Earth and the Moon on a degree of transfer of energy will cause the change of chandler fluctuation with the period $P = 4.65$ year ($2\pi/(\omega_2 - \omega_1)$).

3. CONCLUSIONS

1.In complicated processes of change of parameters of the Siberian anticyclone there are the determined fluctuations generated by power exchange processes in system the Earth–the Moon.

2.The global period of variation of different geophysical processes and variation of the distance between the Earth and the Moon is the period close to 4.4 years.

3.Redistribution of energy in fluctuations of close frequency creates the conditions for occurrence of trigger effect. The determined geodynamic processes may serve in a role of the trigger mechanism.

4.For a prediction of extreme atmospheric and other geophysical deviations it is necessary to take into account influence of the determined gravitational interaction, at least, the Earth and the Moon.

4. REFERENCE

1. G.Kurbasova, A.Korsun' et al. *Statistical interrelation of ten years variations of the mean-annual data on change of some geodynamic, geophysical parameters.* Astron. Journal in russian v.74, 1,139-145.
2. A.Sorkina. *The specified data on intensity and positions of the centers of action of an atmosphere in northern hemisphere.* The Works GOIN, 114, 1972.

I – channel	II – channel	P , year	Squared coherence %	Phase Coherence Shift ,year.
$\rho_{\min}$	Z	21.79	92	5.23
		8.39	87	1.15
		4.38	76	1.53
		4.10	82	1.27
	ΔD	12.49	60	3.59
		4.45	81	-1.62
	I	8.68	76	1.94
		5.54	79	0.81
		4.43	96	0.66
	E	4.43	88	0.17
		3.07	55	-0.21
	S_λ	20.48	62	-2.46
		4.34	89	0.18
	S_φ	4.36	99	0.63
		3.51	91	-1.56
	S_a	4.38	89	1.73
		3.86	81	0.11
$\rho_{\max}$	Z	27.68	81	8.83
		8.75	93	0.08
		4.34	68	0.17
	ΔD	9.43	70	3.2
		4.39	78	0.75
	I	8.26	86	1.95
		4.45	77	-1.27
		3.78	79	-0.26
	E	22.76	65	-11.33
		4.45	89	-1.95
		3.66	63	0.31
	S_λ	19.32	67	0.28
		7.94	81	1.03
		4.47	79	-1.63
	S_φ	7.16	89	1.09
		4.39	96	-1.22
	S_a	7.42	64	2.30
		4.18	68	-0.74