

Rhythms and cycles

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Ритмы и циклы

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Practically all phenomena and events studied by the modern science are not casual or single against the general background of development of nature. Lakes are either overfilled or nearly dried up; climate is getting more humid, more chilly and dry. Deserts either advance or compress to widen again, and so happens many times... All these processes reflect dynamics of some higher orders, which are not observed by us, but however exist objectively.

The thought on presence of certain cycles of periodical changes of natural medium, in accordance with some general regularities of development, was for the first time recorded with the ancient Hulds, under the name of "Great Years".

All varieties of changes can be divided into two extensive classes, depending on whether they pass near a certain average position or they have not such positions. All fluctuations pertain to the first class of motion. Therefore, oscillatory motion is the motion, which has the ability of recurrence. There appeared even special science "theory of fluctuations", studying physical bases of these processes. However, we will be interested less in physical aspects of this problem and more in the forms of manifestation of oscillatory motion and revealing their periods and stages in different systems.

The system of planetary geologic-landscape recurrence is only a small fragment of rhythmic structure of the Universe. Different phenomena in the given system have different periods of repetition (see Fig.1).

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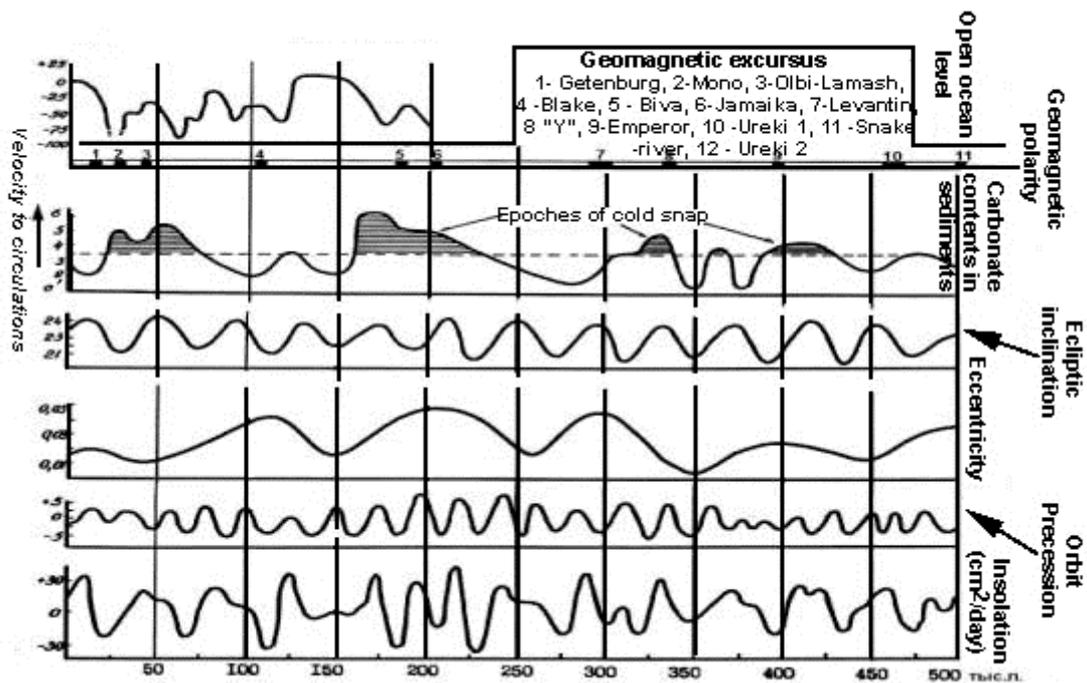


Fig. 1. Rhythmicity of natural processes

Thus, climatic fluctuations have clearly denominated groups of periods:

- a) small - 11- and 36-years old (Brukners)
- b) average - 100-years old,
- c) long years - 11,5 " 12 thousand" years and 19 - 23 thousand years,
- d) planetary - 40 - 43 thousand years and 100 thousand years.

Geomorphological cycles are characterized by the largest and varied gamma: from microcycles (3,1-5,2 - 60 years) up to planetary (80,200,500 million years). Let's compare these figures with the data of some solar system parameters and the Sun itself. The period of activity of our central luminary is characterized by two optimums - 11 and 100 years. The period of turning the solar system for the spiral drawing and диполя magnetic field of the Galaxy - 352 million years. And our planet itself has planetary cycles. Thus, the period of changing of the angle of slope of the earth's axis to the ecliptic planes is 41 thousand years, the period of precession-of the earth's axis - 21thousand years, the period of changing eccentricity - 413 thousand years.

As can be seen from the analysis of the phenomena participating in oscillatory movements of the matter of our Universe (period of turning of greater and small planets, planets-satellites, comets, the Sun itself, etc), they all correlate with changes of parameters of the separate components of the earth's geo-sphere. Consequently, they present themselves a united whole, reflecting different sides of one and the same process of development.

For the first time, the thought on presence of close-connection between the solar activity and different biological objects occurred to the creator of heliobiology A.L. Chizhevskiy, as far back as at the turn of the 20th century. Since then, this direction finds more and more followers. And this is quite natural, particularly if we take into account that arrival of energy in the system of biogeosphere of the earth occurs, basically at the expense of activity of the Sun. Optical radiation of the Sun has a value of order 4×10^{26} J/sec, but full energy forms 7×10^{41} J/sec. To the external border of the atmosphere it makes about 1×10^{24} J or at the average, 250 Cal/cm² years.

Rhythms and cycles

Parameters		Kinds of situations (the character of processes taking place in the system of earth geosphere) and duration of periods									The characters of time (cyclic) parameters		
Periods		1*	2*	3*	4*	5*	6*	7*	8*	9*	Earth	Sun	Solar system planets
The group of cycles	the measuring units												
small	year	-	3,1-5.2	-	-	2	-	-	-	-		Solar eclipse (total)	The period of Mars circulation Superposition of Venus on Solar disk
		11	11	-	11	-	-	-	-	-		activation of solar activity	the period of Jupiter circulation round the sun
		-	21	-	22	-	-	-	-	-			
		35	35	-	40	-	-	-	-	-			
		-	60	-	-	-	-	-	-	-			
		-	-	-	80	-	-	-	-	-	-		
middle	hundred years	1	1	1	-	1	-	-	-	1.5	The period of circulation of comet Gaul; The period of Uranus circulation	activation of solar activity	
		-	2	-	1,8	-	-	-	-	-			
		-	3,8	-	-	-	-	-	3	-	-		
long	thousand years	-	1-2	2	1-2	-	-	-	-	1,3-1,5			the gravitation inter action of planets
		11,5-12	12	11-13,5	-	-	-	-	-	-			
		19-23	20	23-25	24	25	-	-	-	-	the period of earth axis procession		
		40-43	40	40-41	42-43	40	-	-	40	-	the period of incidence change of earth axis to ecliptic planets		
		100	-	105-120	120	-	-	-	-	-	change of earth orbit eccentricity		
planetary	million years	-	20	-	-	-	-	-	-	-			
		-	40	-	-	-	-	-	-	-			
		-	80	-	-	-	-	-	-	-			
		-	200	-	150	-	100-150	-	-	-		the period of solar circulation round the Galaxy centre	
		-	300-500	-	-	-	-	-	-	-		the period of circulation of solar system towards the spiral illustration of Galaxy	

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- 1 - climatic
- 2 - geomorphologic
- 3 - paleomagnetic
- 4 - freezing
- 5 - the oscillation of sea level
- 6 - periods of geochemical landscapes replacement
- 7 - droughts
- 8 - the change of carbonateness
- 9 - social

Fig. 2. Rhythmicity of natural processes occurring in biogeosphere of the Earth and periodic phenomena of the solar system 1 - climatic, 2 - geomorphologic, 3 - paleomagnetic, 4 - glaciation, 6 - fluctuations of the ocean level, 7 - change of geochemical landscapes, 8 - change of carbonate composition of sediments, 9 - biological and ethnic-social processes

Certainly, it would be naive to expect that only one of the reasons or even groups of reasons (processes) define changing of the parameters of the rest of the processes. All of them are only echoes of not yet decoded by us the laws of rhythmicity of Space and superimposing on one another, like waves on the coast; they define their power, period, order and area of manifestation. But let's leave at rest hypothesis; as in any other branches of science as in this case they are much more, than the real variants of tackling the problem.

Specifically sensitive indicator of change of rhythmicity of natural-cosmic processes is the atmosphere- the most dynamic shell of our planet. Changing the external impact /influence/ stipulates changing the nature of atmospheric processes (transportation of the air masses, changing their temperature, moisture et al.) All this stipulates changing of climate, in its turn defining development of life on the planet.

At present it is possible to restore the nature of change of atmosphere circulation and particularities of the climate in the past. Time structure of climate of Early and Middle Pleistocene (1,17-0,245 million years) turned to be more complex, than it recently seemed. During this period there happened 10 to 12 global cold snaps, accompanied by distant advance of glacial shields to moderate latitudes and as much warming processes accompanied by glacioeustatic transgressions. More fractional schemes are given for boreal (8,5 ths. years.), Atlantic (6,5 thousand years), sub boreal (4,8 thousand years.), and sub- Atlantic (500 - 300years B.C.) periods.

The important role in cognition of development and forming of a person plays clarification of main stages in evolution of biosphere. Here we come close to the notion of biotic crises or epochs of type extinction. These crises are connected with sharp shifts of parameters of external medium and have a different amplitude and length.

One of the forms of rhythmicity of biosphere is existence of so called "waves of the number" of population, presenting itself sharp, drastic changing in a number of population of animal kingdom under the influence of biotic and non-biotic factors.

Nature of history of development the Homo sapiens itself turns out to be also bound to definite cycles of 11305, 5652, 2826 and 1884 years, defining the approach of radioecological and climatic peaks and optimums. For the last 15 thousand years two such moments took place - 11,5 ths.years and in IV century B.C. The bloom of Madlen culture is timed to the first ("culture of the Atlantes"), and antique classicists to the second.

In the opinion of L N. Gumilev, biological energy in Homo sapiens does not run short, but is accumulated and saved, and its use goes in the manner of a process, different from similar of all the rest type of beasts: phylogenesis is transformed into ethnogenesis i.e. develops not a single specimen, but all community of the given type of representatives. Track record of this process depends on a certain "Passionary"(?) climax of development, "... a certain push, appearing sometimes in definite areas of the earth's surface". Development of these works has allowed L.N. Gumilev to reveal 1500 year old cycle in the development of ethnosis, which sometimes revealed itself quite clearly in the manner of powerful migration processes of all peoples (for instance - the Hunni).

All this points once more to urgency of the problem of our conference and need for the most broad research of natural and social problems with characterized rhythmicity and cycles of their development.