Astronomical climate theory
from the point of vortical physics

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Astronomical climate theory is important for sustainable
development of civilisation. Enthusiasm of interested scientists
has kept theory idea alive during decades of doubt. However,
here is danger coming from exaggerated role of mathematics.
We can find physics behind the mathematics with introduction
of vortical celestial mechanics and vortical thermodynamics
as basis of astronomical climate theory.
   Three levels of astronomical climate theory- that of Croll/
Milankovitch/Berger, that of Blizard/Landscheidt/Charvátová
and galactic level are discussed here in brief from the point of
DesCartes celestial mechanics and long-range cosmic influences
phenomena.

The root of current crisis in science is that we physicists so easily and so completely believe that the mathematical component in our education endows us, in some mysterious way, with a deeper and more profound understanding of nature. I don't believe it does. It is my firm conviction, that... nothing belongs solely to [an] unapproachable [mathematical] elite.

Hilton Ratcliffe

Highly specialised nature of science does not eliminated need for natural philosophers. That thinkers must have a broad viewpoint, good intuition and type of reasoning, what is completely different from that of ordinary scientist. Scientist should not ignore contradictionary evidence, philosopher often has to- in order to save idea. This was the case of Hegel, Mendeleev, Croll/Milankovitch- and also of Wegener, Velikovsky and Hapgood.
   Let us read some heretic passages from Charles Hapgood first.

„Professor George W. Bain, of Amherst, has applied his method to the study of the climates of two periods, the Jurassic-Cretaceous and the Carboniferous-Permian. He has concluded, first, that climatic zones, representing the different distributions of solar heat, existed in those periods just as at present. This is proved by the specific remanent chemicals included in these rocks, which differ exactly as do the sediments of the different zones at the present time. This is, of course, fatal for the theory of universal equable climates.
His second conclusion, of even greater importance, is that the directions of the climatic zones have changed enormously in the course of time. He finds the equator running through the New Siberian Islands (in the Arctic Ocean) in the Permo- Carboniferous Period, and North and South America lying tandem along it. The evidence he uses seems to establish his essential point (and ours) that the climatic zones themselves have shifted their positions on the face of the earth".
   „As I have already mentioned, the principal obstacle to a shift of the earth on its axis lies in the existence of the earth's equatorial bulge, which acts like the stabilizing rim of a gyroscope.

The early writers on this question, such as Maxwell and George H. Darwin, all recognized that a shifting of the planet on its axis to any great extent would require a force sufficient to overcome the stabilizing effect of the bulge. Fortified by their very strong conviction that a shift of the planet on its axis was impossible, astronomers and geologists insisted that all this evidence, such as fossil corals from the Arctic Ocean, coal beds and fossil water lilies from Spitzbergen, and many other evidences of warm climates in the vicinity of both the poles, simply must be interpreted in accordance with the assumption that the poles had never changed their positions on the face of the earth.
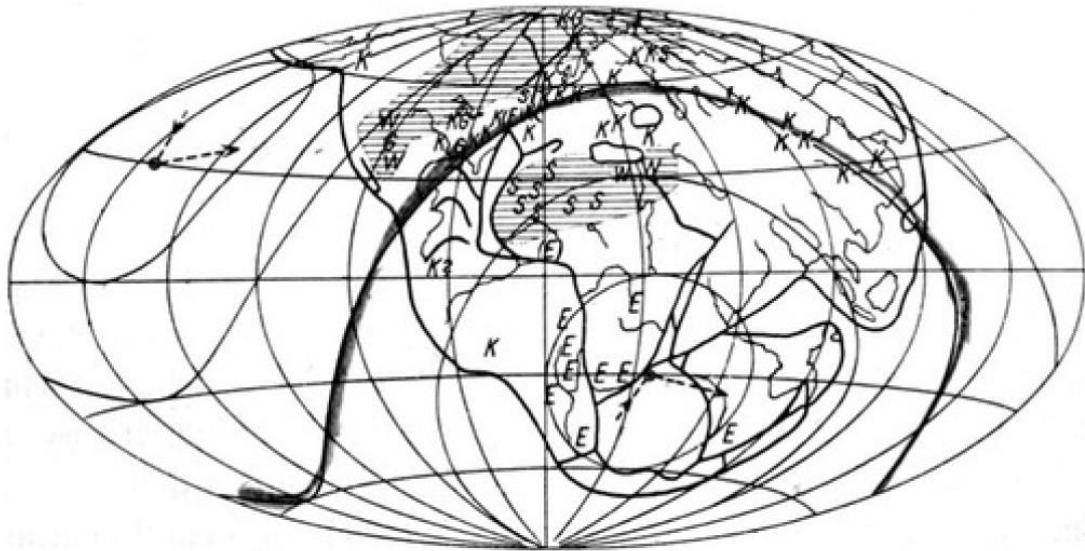

Fig.1 Tracking ancient equator/poles by positions of different minerals. Carboniferous period. E =traces of ice ; K = coal; S = salt; G = gyps; W = (desert) sandstone, hatching= dry areas. After *Köppen-Wegener*. Note dry areas, which do not coincide with equator, as present

   This placed quite a strain upon generations of geologists, but their imaginations were usually equal to the task. They were fertile in inventing theories to account for warm climates in the polar zones at the required times, but these theories were never based on substantial evidence. Moreover, they never explained more than a small number of the facts, while essentially they conflicted with common sense".

„All the above-mentioned theories and hypotheses fail if they cannot meet a most important condition: In order for ice masses to have been formed, increased precipitation must have taken place. This requires an increased amount of water vapor in the atmosphere, which is the result of increased evaporation from the surface of oceans; but this could be caused by heat only. A number of scientists pointed out this fact, and even calculated that in order to produce a sheet of ice as large as that of the Ice Age, the surface of all the oceans must have evaporated to a depth of many feet. Such an evaporation of oceans followed by a quick process of freezing, even in moderate latitudes, would have produced the ice ages".
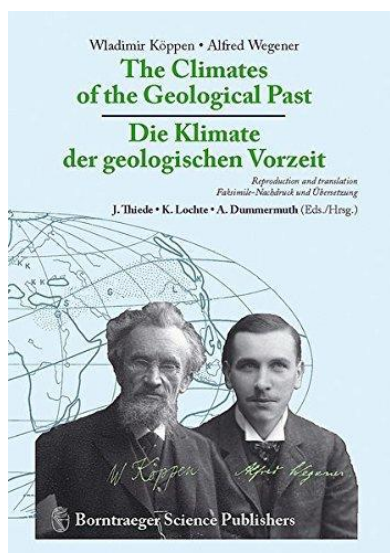
Fig.2 Cover of facsimile edition of paleoclimatic book of Köppen and Wegener (1924). Wladimir Köppen, an authoritative meteorologist, is said to gave critical support to Milankovitch theory.

*   *   *

From above passages one can see enormous task for astronomical climate theory. Astronomy is not able to tell us about forces behind of current Earth's orbital parameters (Mathis, Ginenthal, 2015), therefore in fact here is also inverse task for science- development of theory of history of Solar system from paleoclimatic data. Classics were allowed to use only insolation as factor of Ice Ages development (fig.3, cf.Petrovic and Markovic, 2010), what is inadequate.
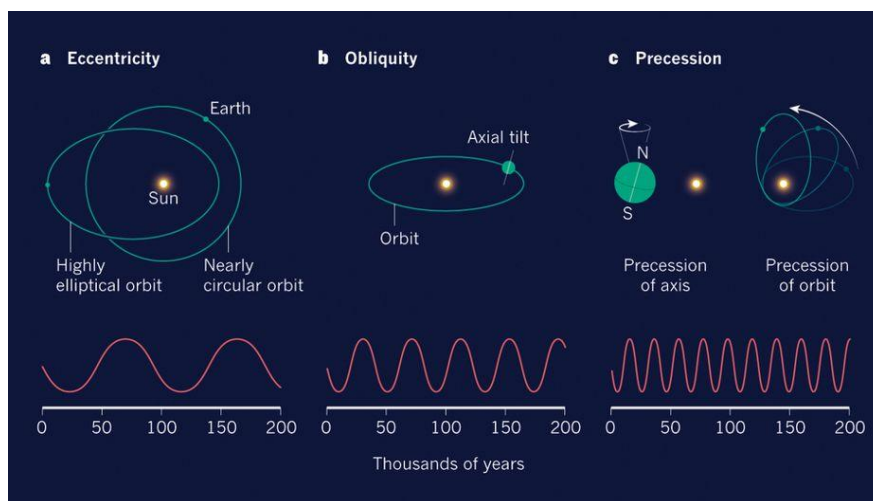

Fig. 3 Milankovitch cycles of glaciation. Credit: NASA

Interesting for our further analysis is the fact, that Milankovitch (and some other early investigators) considered possible influences from Earth's mantle to climate. Despite absence of sound physical background, Milankovitch cycles are increasingly used for chronologic purposes in oceanology (Berger W., 2012). Recent find, that such cycles could be singled out from 1.4 billion year old sediment sample (Zhang et al, 2015) tells us, that astronomical climate theory is here to stay, indeed - and question is only about it's improvement. Needless to say, sharp, cyclic climate changes present big challenge for Standard Model of physics. As physicists are not able to explain even „geomagnetism", it is no wonder. Weakness of astronomical climate theory leads to criticism from different positions (Winograd et al, 1992;

Neeman, 1993, Muller and MacDonald, 1997; Karner and Muller, 2000; Muller and MacDonald, 2000; Bol'shakov, 2003; Wunsch, 2004; Ruddiman, 2006; Huybers and Aharonson, 2010; Bol'shakov and Kapica, 2011; Kaper and Engler, 2013; Maslov, 2014; Bol'shakov, 2015, Kotulla, 2015), all of which, however, also have their weak points.

Intriguing in this connection also are sophisticated stone observatories, erected by ancient civilisations, which are too complex for observing only solstice and equinox points or lunar cycles, but appropriate for monitoring larger astronomical cycles. Thus in ancient Arkaim city-observatory in southern Ural mountains one can reportedly monitor 18 astronomic factors.
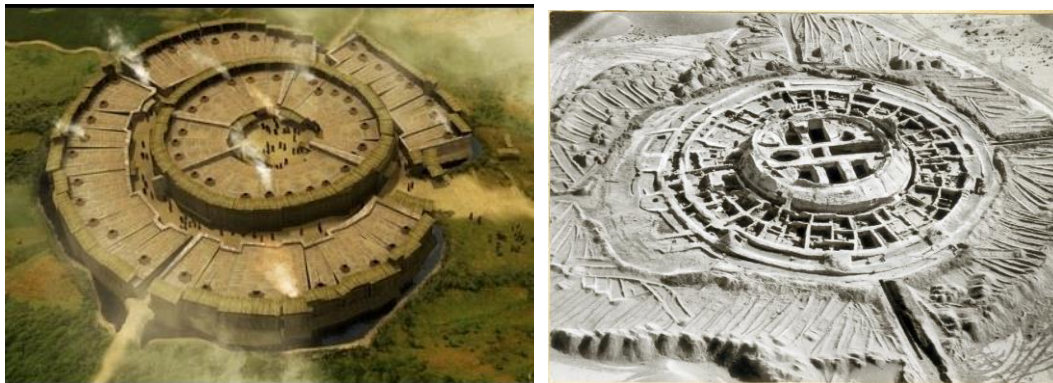

Fig. 4 Presumed ancient observatories. Left- reconstruction of Arkaim (Southern Urals), right- of Koi Krylgan Kala object in Central Asia.

First, we have to praise scientists, work of which do not allowed astronomical climate theory to fall out of consideration during years of doubts (Sharaf and Budnikova, 1968; Kukla, 1975; Hays et al, 1976; Vulis and Monin, 1979; Berger, 1981; Saltzman et al, 1984; Fischer, 1991; Berger and Loutre, 1992, Imbrie et al, 1993; Emiliani, 1993; Kutzbach, 1994; Kent and Olsen, 1999; Sloan and Huber, 2001; Vakulenko, 2003; Raymo and Nisancioglu, 2003; Clement et al, 2004; Beckmann et al, 2005; Roe, 2006; Vakulenko, 2007; Melnik and Smulskij, 2009; Cooke, 2012; Smulskij, 2013; Wundt, Winguth and Winguth, 2013; Fedorov, Maslin, 2014, 2016; Moseley et al, 2016 and others) **Second**, we should remind that, according to Bol'shakov (2015), Hays et al (1976) do not confirmed Milankovitch (fig.5). Same judgment Bolshakov makes about paleoclimatic model of Berger and some other scientists. Mentioned astronomical factors, which changed insolation, had worked also in eons, when there had been no Ice ages found.
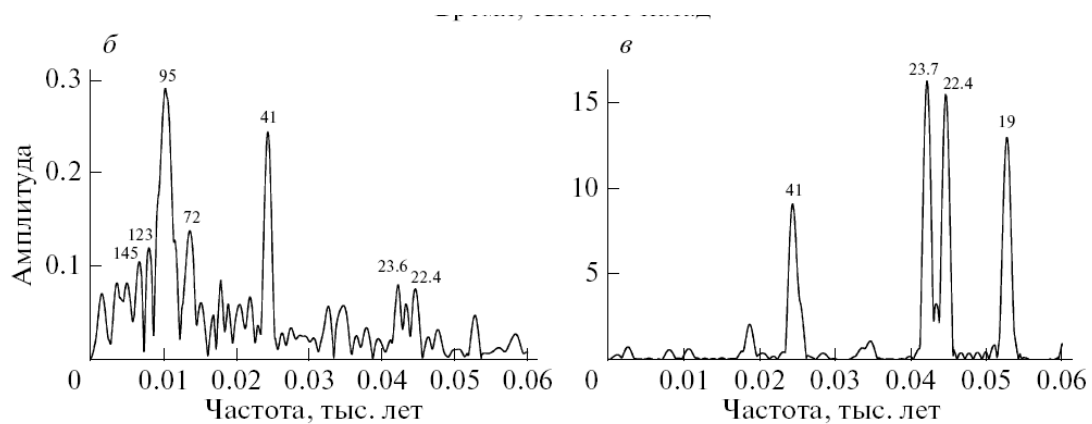

Fig.5 Very poor correlation in spectral analysis between oxygen-isotopic record LR04 (left) (Lisiecki, Raymo, 2005) and July insolation of 65^0N (right) for last million years.

Normalised values of LR04 are showed here with „minus" sign for better comparison. X-axis-frequency, 1/1000 of years, Y axis- amplitude. From Bol'shakov and Kapica, 2011.

Third, celestial mechanics, on which astronomical climate theory rests, also needs upgrade (Mathis, Ginenthal, 2015). This perhaps is right point for considering „100 000 year problem" when about a million years ago, ice age intervals changed from every 40,000 years to every nearly 100,000 years. Discovery of hot Jupiters, free-floating planets and exotic shapes of exoplanetary systems have actually disproved textbook celestial mechanics version.

Mythological record tells us about some five celestial situations:

1) Earth is governed by the Moon
2) Earth is satellite of Uranus
3) Earth is satellite of Saturn,
4) Earth is satellite of Jupiter,
5) Earth is satellite of the Sun.

Earth reportedly stopped to rotate around it's axis some four times during it's history, that fits in scheme.

Fourth, basic postulate, that solar energy on Earth's surface exceeds terrestrial one almost 4000 times is correct within physics Standard Model only. If we finally get right measuring instruments for vortical plane of nature, mentioned number should change substantially. In fact, if below certain territory of Earth's surface in moderate latitudes mantle turbulence ceases, Ice age could start soon- and vice versa.

Fifth, current definition of temperature is clumsy. If physical vacuum exist, temperature definition should run into trouble. That likely is the right point, how to understand sentence from W.Berger (2012) "**it turned out that, when explaining the ice-age fluctuations, the problem is *not* how to make ice in a warm world; instead, it is how to *get rid of the ice in an unusually cold world*"**. That is, real world is cooler than Standard Model spectacles show.

Sixt, there should be permanent Ice ages on poles of rotation axis. Besides differences in insolation, remote heating effects from Earth's mantle turbulence (Alksnis, 2018) here are minimal (fig. 6)
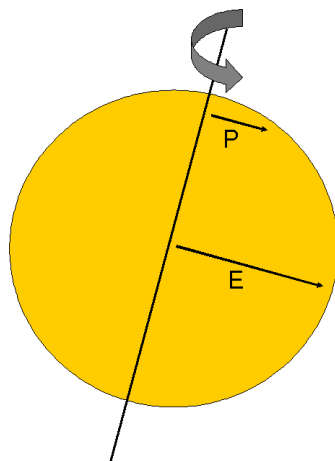

Fig 6. Polar Ice ages as deficiencies of "torsion field" heating from Earth interior.

Mentioned heating should be proportional to liquid, turbulent mass in corresponding segment of the sphere. As poles can thaw, this shows that other factors there are at play. Those factors should be behind of seemingly illogic polar amplification hypothesis, when high latitudes respond to external forcing with greater sensitivity than do the tropics.

Seventh, mythological time-counting is catastrophe-centered. Geological and paleoanthological ones are similar. Geological periods and great extinctions (explosions) of biota should be driven by astrogeophysics.

Eighth, if one want to compare *Vostok* cores and *Devil's Hole* cores, he should remember, that Devil's hole is in complex geopathic zone and Vostok station- near to another, perhaps, different one. Properties of water might be different in both places (cf. Moseley et al, 2016).

Differences of water structure in both places should be checked, also shielding properties for geopathic radiation by ice in *Vostok* station case. Influence from cosmic rays also is different in both places.

   Ninth, if we hear from Kirkby (2009) that "*clouds (and oceans) are poorly simulated in climate models*"- understandable, because these are basis of vortical energy, which do not exist, according to Standard Model. Here is also alternative look to problem, based in energy of spinning magnetic fields (PSI).

   Tenth, if Milankovitch cycles correspond with changes in „geomagnetism", that this in fact mean- with periods of volcanism, when mantle vortical energy imprint the rocks more intense, than „geomagnetism" could.

   Eleventh, increment of biosphere in global climate regulation could be underestimated. First conceptual thoughts here perhaps are that of Timofeev-Resovsky in 1968. Interesting also are thoughts about central role of water in feedbacks to orbital forcing. (Perevedencev, 2009)

   Twelft, there are some additional factors, which typically stays outside of long range climate models- 1)certain more dense regions in path of solar system trough the galaxy, 2) rotation of the Earth around the barycenter of Earth-Moon system and 3) thermal Earth radiation. Vortical celestial mechanics concept allows us to see, that Earth's- Moon distance should be variable during history of solar system, reflecting changing properties of Earth's vortex (Alksnis, 2018). That factor should understandably cause variable level of global volcanism.

   Thirteenth, modern instruments allow sub-optimal sensing of factors, which are outside of Standard Model. In this connection interesting is, for example, finding of Pahomov and Uspenskij, (Perevedencev, 2009) that here is rising trend of long-wave Earth radiation in equatorial belt, starting from 1980-ties. Not for surprise, Russians concluded, that here are certain „energoactive zones" on surface of ocean and land with maximal annual variability of long-wave radiation anomalies.

   Fourteenth, short-term climatic cycles with periods of 4.6, 5.8, 7.8, 12.6, 22 and 60-70 years, which correspond to North-Atlantic oscillation index spectra, should be caused by interplay of planets and the Sun and can be understood perhaps within vortical theory only (cf. Landscheidt, cf. Charvátová, 2007; cf.Zanchettin et al, 2008).
While rewieving connection of solar activity and North-Atlantic oscillation (NAO), Johansson (2015) correctly remarked that „*even though the forcing of solar activity is not apparent all the time, it might not necessarily mean that the sun is not affecting the NAO. It could be that other mechanisms are more strongly affecting the NAO during certain time periods instead*".

   Recently Spratt (2016) reminds us, that basic parameters of "two body problem" in celestial mechanics can be interpreted other way. In advanced vortical celestial mechanics of DesCartes (Schuster) movement of planet according Kepler's 3-rd Law arises as a consequence of solar rotation.
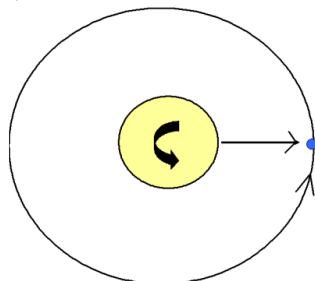

Fig.7 Real cause of Kepler's 3-rd law- DesCartes vortex.

   Recently Wang (2012A) confirms Kepler's Third Law geometry in experiment with water vortex, created in a bowl. Departure from Newtonian point-masses and geometrical abstractions gives us draft equation

$$V*d*\omega*k = 4*\pi^2*A^3/P^2$$

were **V** and **d**- volume and density of central body, **ω**- equatorial spinning speed of central body and **k**- coefficient, which shows, how effective is vortex, produced by spin of central body, in putting an orbital movement to satellites (influence of internal properties of central body), **A**- mean orbital distance of secondary, **P**- orbital period of secondary.

Numerical analysis (table 1) show, that Sun is poor cosmological standard here- it's vortex is very active, reflecting perhaps not only liquid (Robitaille, 2013) but also supercritical state of it.

Primary	Volume V, m^3	Equatorial rotating speed, ω_{eq} rad/sec	Secondary	Mean orbital distance A, m	Period P, sec	k* d
Earth	1.08E+21	7.29E-05	Moon	3.84E+08	2.36E+06	5.10E-03
Jupiter	1.43E+24	1.76E-04	Io	4.22E+08	1.53E+05	5.04E-04
Sun	1.41E+27	2.90E-06	Mercury	5.79E+10	7.60E+06	3.26E-02

Table 1. Proportional calculations in Cartesian tradition.

Earth has also active vortex (more efficient than that of Jupiter). Internal parts of Jovian planets now are spinning just like solid bodies. *Juno* probe actually has confirmed this for Jupiter (Guillot et al, 2018). It should not have been the case of the past. **Thus both Earth's orbital distance and solar luminosity depend from solar rotation's angular speed** (table 2).

G class star	Relative mass, M⊙	Relative radius, R⊙	Luminosity, L⊙	Relative rotation, ω_{eq}⊙	$\dfrac{M*R^2*\omega_{eq}}{L}$
Mu Cassiopeiae	0.74	0.791	0.442	4.90	5.13
Sun	1	1	1	1	1
Epsilon Ophiuchi	1.85	10.39	54	0.27	0.98
Beta Herculis A	2.9	17	151	0.06	0.32
Alpha Reticuli	3.11	12.8	240	0.22	0.46
Lambda Pegasi	1.5	28.5	390	0.14	0.42
104 Aqr A	4.23	69.5	447	0.10	4.77
Beta Draconis	6	40	1000	0.16	1.51
δ Cep A	4.5	44.5	2000	0.10	0.44
Epsilon Gem.	19.2	140	8500	0.03	1.33

Table 2. Luminosity of G-class stars depends from stellar angular momentum.

So here is no active Sun and passive Earth in vortical plane- rather interaction of two vortices with special kind of overheating possible (in line with Eastern natural philosophy systems and ideas of Bielorussian Academic-dissident Veinik).
Millions of years ago the Sun should rotate faster (what gyrochronology principles could accept), thus repulsing planets significantly further. This should have affected also axial tilts and inclination of orbits.

Eccentricity of stable orbit of rocky planet within Cartesian celestial mechanics is explained along the idea of Leibnitz- as action of separate central force. (Orbital elongation term could be offered instead of eccentricity, to mark departure from mathematical nonsense of mainstream celestial mechanics). This force should come from uneven position of planet against solar equator during orbital cycle. Analysis of orbital elongations of four rocky planets (table 3) generally conform this conclusion.

Planet	Accepted mass, kg	Orbital elongation, m (Δ)	m * Δ
Mercury	3.3 *10^{23}	2.38*10^{10}	7.85*10^{33}
Venus	4.87*10^{24}	1.40*10^{9}	6.81*10^{33}
Earth	5.97*10^{24}	5.00*10^{9}	2.99*10^{34}
Mars	6.42*10^{23}	4.26*10^{10}	2.73*10^{34}

Table 3. Proportional calculations for rocky planets. Note effect of Earth's vortex (which indicate it's semi-liquid state) and effect of weakening gravity.

Interplay of such a central force with so-called gravitomagnetism, which makes solar system relatively flat (fig.8), and angular momentum of planet should determine both **orbital inclination** and **axial tilt** of planet (fig 9). Physics has no idea about mechanics of that.
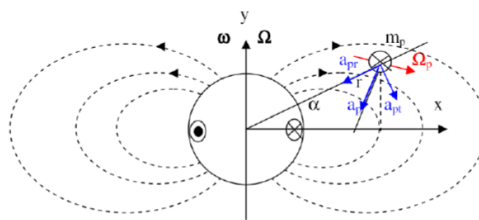

Fig. 8 **Non-mainstream gravitomagnetic analogy explanation for relative flatness of planetary orbits.** From (DeMees, !!!),
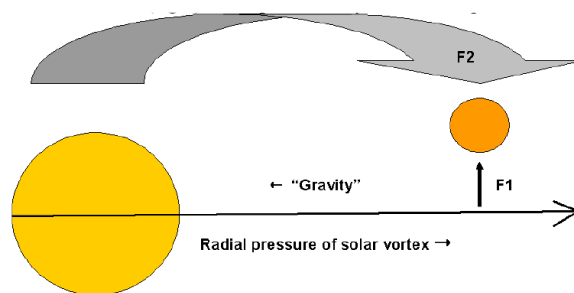

Fig. 9 **Presumed causes for orbital inclination of stable orbits and axial tilts of rocky planets.**

   Planets are not able to cause elongation of Earth's orbit. If inclination of Earth's orbit against solar equator reduces, planet received more vortical energy and repulsion from the Sun. Could be, this leads to periods of volcanism and than- global cooling.

   For climatic meaning of **precession** of Earth's spin axis and orbit an overlooked factor is galactic centre- strong source of vortical energy (with far infrared luminosity 20 million Sun's). Currently Sagittarius A* is in conjunction with the Sun around winter solstice, thus making summers hotter. Perihelion now is in first week of January.

   Another factor in vortical astrogeophysics is **distant mutual heating** of two spinning liquid bodies- clearly observable in case of Sun-Jupiter (great red spot), Sun- Saturn (great white spot), Sun- Neptune (great dark spot). Enigmatically Saturn's innermost moon Mimas is solid, but second one- Enceladus- liquid which signals about influence of initial liquid state of Enceladus. Scientists can sense vortical energy here as pseudomagnetism (fig.10). Thus stronger vortex of Jupiter causes heat flux from it's satellite Io around 1.1*10^{14}W, vortex of Saturn- heat flux from it's satellite Enceladus 5.1*10^{10} W.
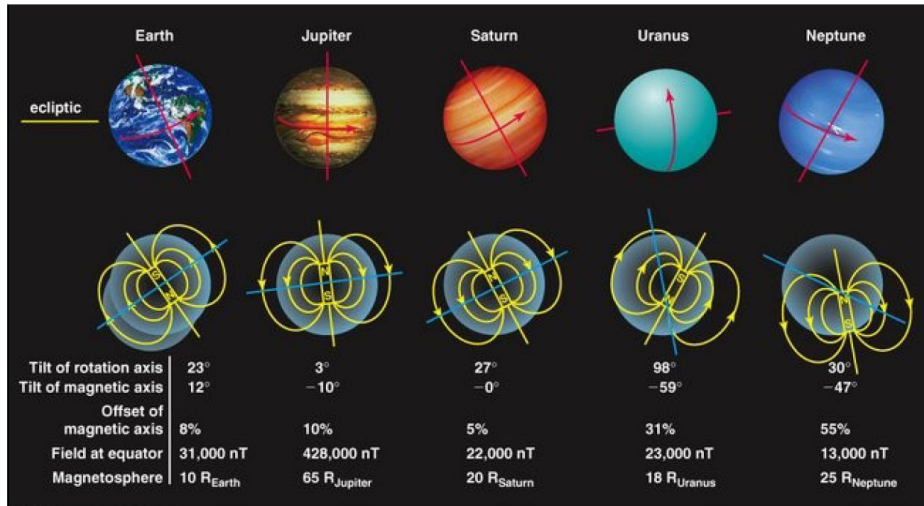
Fig. 10 Mainstream do not want You to see picture of "magnetic" fields of planets like that- scientists have no idea about physics behind all that. Image credit: Thomson higher education.

Guess of Wladimir Köppen, that northern part of moderate latitudes are key point for ocurrence of Ice Ages, also could be understood within vortical interaction of two bodies. Similarity of atmospheric circulation of the Earth with that of Jupiter (fig.11) signals about
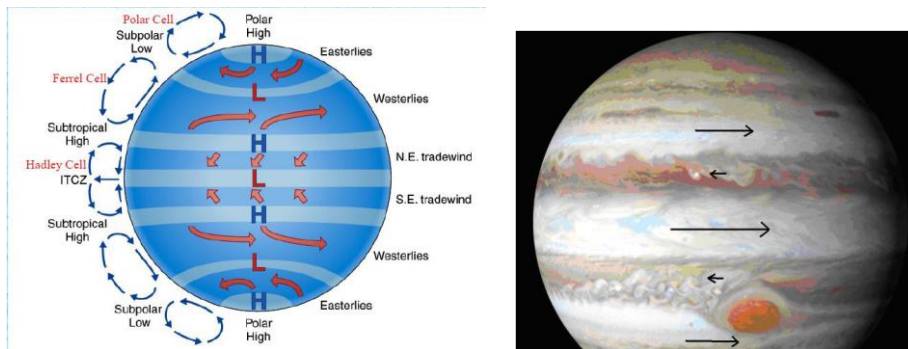

Fig. 11 Earth's atmospheric circulation (left) is too complex for solid Earth, here are similarities with that of Jupiter (right) (Alksnis, !!! IISTAIS). Left picture: !!!, right-adapted from NASA video.

semi liquid state of the Earth with according sublitospheric currents. In this connection enigmatic are positions of some "extraterrestrial cyclones", for examples, storm on Saturn (fig.12) (in comparison with Earth's atmospheric jet stream bo 60 degrees N).
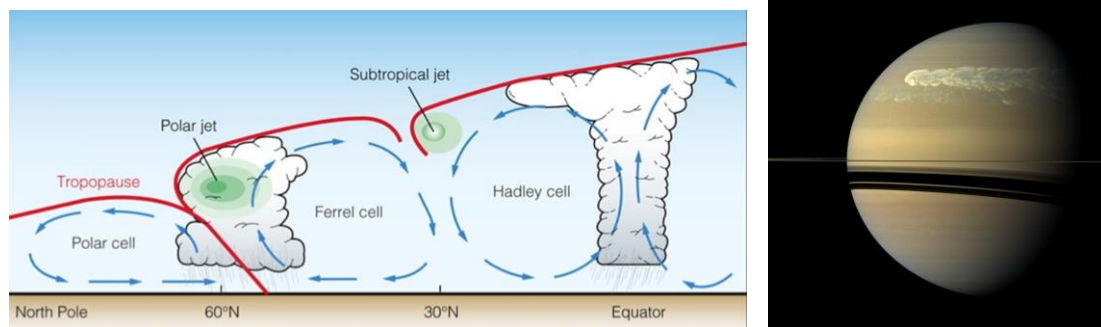

Fig. 12 Comparison of positions of Earth's atmospheric jet streams (left) with that of storm on Saturn. Left image credit: Wiki. Right image credit: NASA/JPL-Caltech/SSI

The angle of the Earth's **axial tilt** with respect to the orbital plane is thougth to vary between 22.1° and 24.5°, over a cycle of about 41,000 years. The current tilt is 23.44°. The tilt last reached its maximum in 8,700 BCE. It is now in the decreasing phase of its cycle, and will reach its minimum around the year 11,800 CE (Wiki) (fig.13).
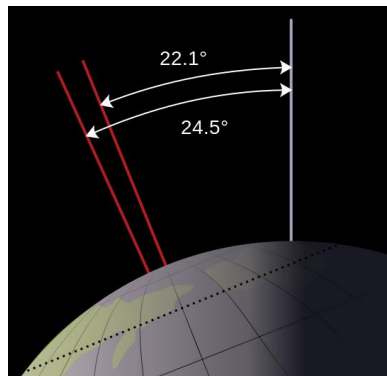

Fig.13 Assumed periodic changes of Earth's axial tilt.
By NASA, Mysid - Vectorized by Mysid in Inkscape after NASA image

For mutual heating of two vortices (Earth and Sun) more axial tilt mean- less heat. That was the case 8700 BCE, when climate of North Africa was wet (and Great Sphinx was weathered by rains).

<p style="text-align:center">*   *   *</p>

Here are a lot of data about connection of solar activity with climate. Besides the connection of solar cycle with effects from cosmic rays in troposphere or atmosphere (Usoskin *et al.* 2004; Eichkorn *et al.*, 2002; Yu, 2002; Harrison and Stephenson, 2006, Stozhkov et al, 2017) here could be also direct vortical heating of sea surface. Kalenda *et al* (2018) tell us that "*the result of our analysis was the finding that the Earth's crust as a whole has a long-term ability to accumulate the incident solar radiation in various forms of energy (thermal, elastic, seismic, deformation), and then release this accumulated energy into the space. The parameter the half-life of the accumulation / release of energy is about 270 years. Then the correlation coefficient between the released (= accumulated) heat and the mean average temperature on the Earth's surface (climate change) is greater than 0.86*".

As solar variability is influenced by positions of planets (Blizard, Landscheidt, Charvátová, beyond Landscheidt) here is mechanism for short-term astronomical climate theory.
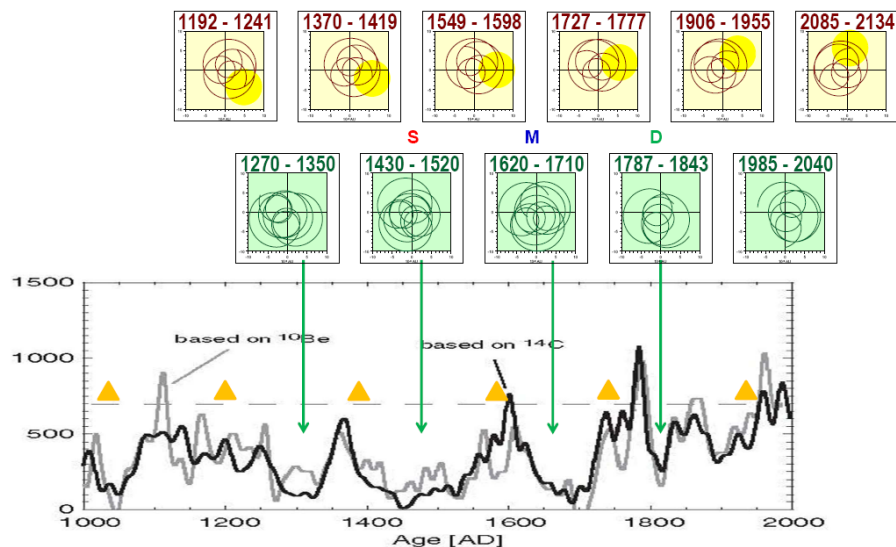
Fig. 14. Influence of type of solar motion around the barycenter of solar system [planetary influence to the Sun] to Earth's climate. Ice ages: S- Spoerer, M- Maunder, D-Dalton. *From Charvátová and Hejda*, 2014.

From analysis of grand solar minima and maxima (fig.15), Usoskin et al (2007) drew conclusion that "*the occurrence of grand (solar) minima/maxima is not a result of long-term cyclic variations but is defined by stochastic/chaotic processes*".
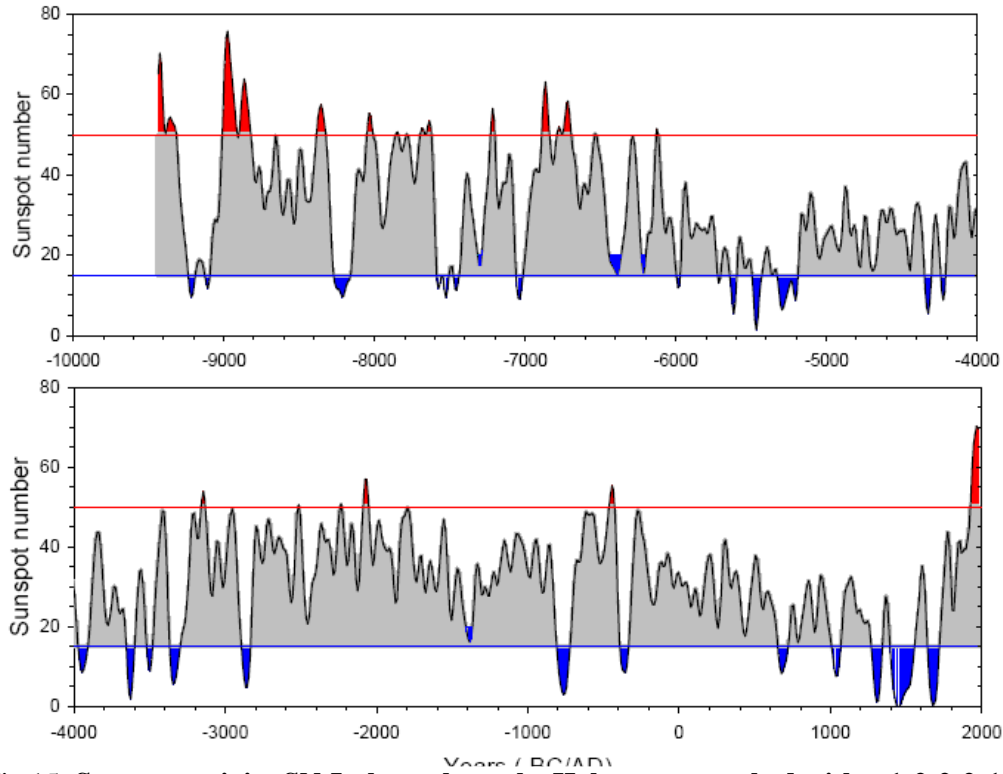

Fig.15. **Sunspot activity SN-L throughout the Holocene smoothed with a 1-2-2-2-1 filter**. From Usoskin et al (2007)

Simply speeking, here is certain normal level of irritation of the Sun from galactic sources with relative rare extrema in both directions. Sun is machine, as per Kozyrev.

Planetary theory of solar variability had predicted next little Ice age right now (fig. 16) (cf. Landscheidt1, Wang et al, 2010; Sharp, 2013 and others).
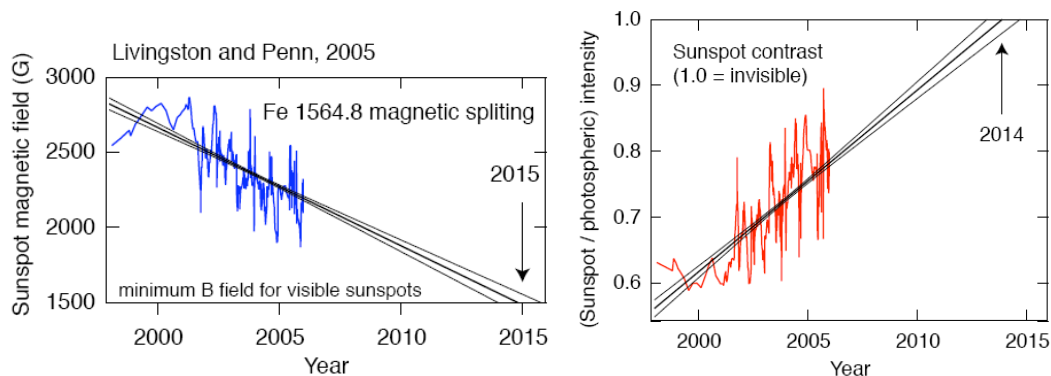

Fig 16 Data from rejected publication of Livingston and Penn "*Sunspots may vanish by 2015*". From Kirkby, 2009.

Effects from mentioned predictions obviously are neutralised so far by galactic heating of solar system.

<center>*   *   *</center>

In last forty years several galactic influences to geophysics has been proposed. Initial interest highlighted short-term influences (Sedov, 1946; LaViolette, 1997; Klacka, 2009; GSA, 2002; Bailer-Jones, 2009; Vasiliev, 2012) but also that from interstellar clouds (Shapley, 1921; Hoyle and Lyttleton, 1939; McCrea, 1975; Eddy, 1976; Dennison and Mansfield, 1976, Begelman and Rees, 1976, McKay and Thomas, 1978).

Mysterious cyclic sea level changes, which proceed even in absence of detected Ice Ages (fig. 17) prompt cyclic changes in Earth's self rotation speed, overlooked underground sea and periodic deformations of lithosphere or periodicities in sublitospheric current pressure.
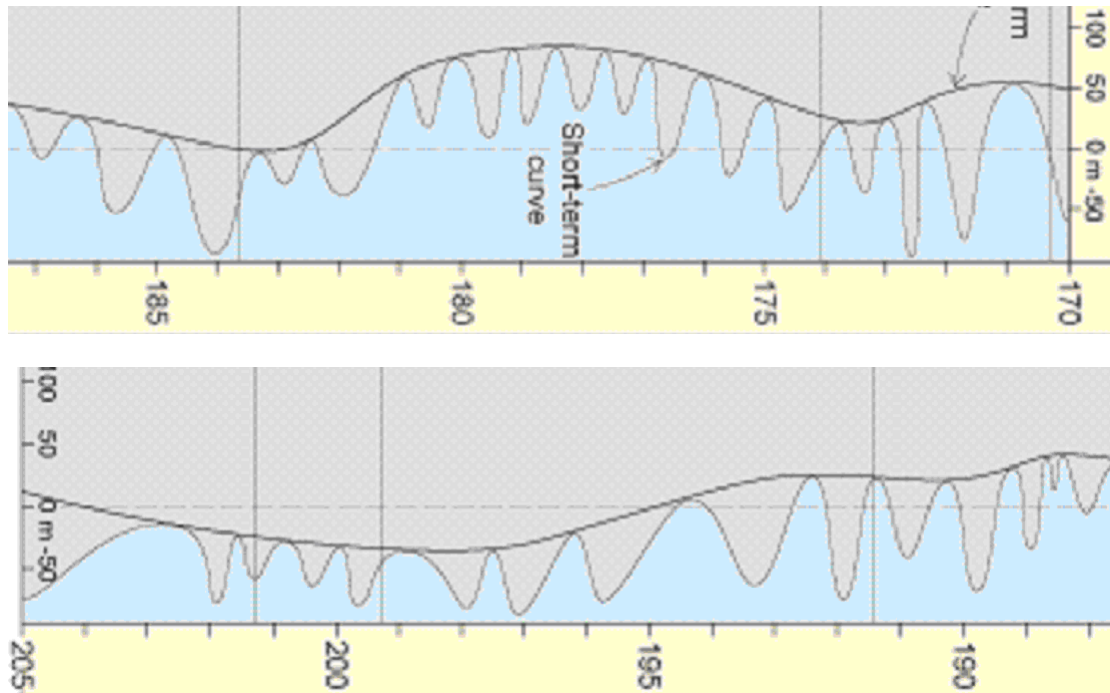

Fig. 17 Sea level changes in early Jurassic. Short and long time trends. X- axis- time, millions of years, before present, Y axis- sea level changes, m, against to present level. Modified from Haq, 2017.

In line with this, Zubakov had singled out certain „cosmic winters" and „cosmic summers" with millions of years scale (Perevedencev, 2009).

Possible effects from crossing of solar system of the galactic plane (Schwartz and James, 1984) and to the passage through galactic spiral arms (Leitch and Vasisht, 1998) had been discussed. Shaviv and Veizer (2003) have found a correlation between the cosmic ray flux and Earth temperature for the last 500 million years that can be related to the spiral arm crossings of the heliosphere occuring with a quasi-period of about 135 million years.

Authors concluded that „*Because there is no reason to expect that solar activity and, in turn, solar irradiance is triggered by spiral arm crossings or interstellar environment changes, any cosmic ray climate correlation on such time-scales is a strong argument in favour of cosmic ray forcing*". Within vortical, DesCartes-Kozyrev Universe, solar activity should be affected by spiral arm crossings or interstellar environment changes.

Similarly, Yeghikyan and Fahr (2003, 2004) ascribe solar system movement in generally empty Universe of Newton's disciples, thus missing vortical level. Continuing in that vein, Sackmann and Boothroyd (2003) predicted more luminous young Sun with a stronger wind-perhaps mostly for explaining warm temperatures on ancient Earth and Mars. In Descartes-Kozyrev Universe young Sun should be faster rotating and causing bigger vortical heating.

Existance of longer cycles of fluctuation in biodiversity had been traditionally explained as threedimensional motion of solar system in galaxy (fig 18). Abstract and simply wrong newtonian celestial mechanics however do not allow to see all dangers in solar system path.

Fig. 18 Long period hypothetic galactic influence to catastrophic events on the Earth. From Deniston et al, 2012.

Scientists found that biodiversity, uplift/collapse of entire continents and periods of large-scale continental volcanism fluctuate with the same periods- around 60 million years and around 143 million years (Rohde and Muller, 2005). From the point of solar system overheating equally important as position against galactic plane could be more direct exposure of the Earth to "black star" in centre of Milky Way (Z axis movement). Next possible overlooked mechanism could be- crossing of region of perturbed physical vacuum.

Mechanism for uplift/collapse of regions of litosphere could be understood within intense Earth mantle turbulence concept. Sublitospheric currents exert real pressure, which balance "gravitationally disbalanced" regions (fig.19). Mentioned pressure changes with time, depending also from astrogeophysics.
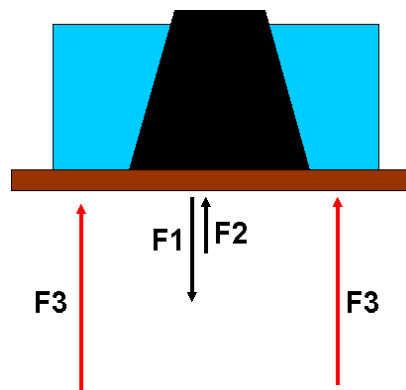

Fig.19 Hidden forces behind „isostatic disbalance" cases. Forces F1 and F2 are from Unified field (Mathis, 2010), which are balanced with Archimedes force and changing sublithospheric current pressure F3.

*　　　*　　　*

I want to encourage interdisciplinary teams to look to whole complexity of astronomic climate theory- with upgraded celestial mechanics, solar, terrestrial and interstellar elements and proper measuring instruments.

References

Alksnis E. (2018) *How variable Earth- Moon distance really could be?* viXra
Alksnis E. (2018) *Global atmospheric circulation in the light of liquid turbulent Earth's interior idea.* viXra
Bailer-Jones C. (2009) The evidence for and against astronomical impacts on
climate change and mass extinctions: A review. *International Journal of Astrobiology*, **8**, 213.

Beckmann B. et al (2005) Orbital forcing of Cretaceous river discharge in tropical Africa and ocean response. *Nature* **437**, 241–244.

Begelman M., Rees, M. (1976) *Nature* **261**, 298.

Berger A. (Ed) (1981) Climatic variations and variability – facts and theories. – Dordrecht. – Reidel, 1981. – 795 p.

Berger A. et al. (1984) *Milankovitch and Climate Part 1*. Riedel, Dordrecht, The Netherlands.

Berger A., Loutre M. (1992) Astronomical solutions for paleoclimate studies over the last 3 million years. *Earth Planet. Sci. Lett.*, **111**, 369.

Berger W. (2012) Milankovitch Theory - Hits and Misses. *UC San Diego Scripps Institution of Oceanography Technical Report*.

Bol'shakov, 2003- see: Большаков В.А. Новая концепция орбитальной теории климата. – М.: 2003. – 256 с.

Bol'shakov and Kapica- see: Большаков В.А., Капица А.П. Уроки развития орбитальной теории палеоклимата // Вестник РАН, 2011. – т. 81. – № 7. – с. 603 – 612.

Bol'shakov, 2015- see Большаков В.А. Орбитальные факторы долгопериодных колебаний климата Плейстоцена. *Фундаментальная и прикладная климатология*. 1/2015.

Brathauer U., Abelmann A. (2010) Late Quaternary variations in sea surface temperatures and their relationship to orbital forcing recorded in the Southern Ocean (Atlantic sector). *Paleooceanography and paleoclimatology*, **14**, 135.

Charvátová I. (2007) The prominent 1.6-year periodicity in solar motion due to the inner planets. *Ann. Geophys.*, **25**, 1227–1232.

Charvátová I., Hejda P. (2014) Responses of the basic cycles of 178.7 and 2402 yr in solar–terrestrial phenomena during the Holocene. *Pattern Recogn. Phys.*, **2**, 21–26.

Clement A. et al (2004) The importance of precessional signals in the tropical climate. *Clim Dyn* 22, 327–341.

Cooke A. (2012) Astronomy and the Climate Crisis. *Springer*.

Croll J. Climate and time in their geological relations: a theory of secular changes of the Earth`s climate. – London.: Edward Stanford, 1875. – 577 p

Deniston B. et al (2012) Planetary defense. *EIR*, **39**, No 15, p.4.

Dennison, B., and Mansfield, V. N.: 1976, *Nature* **261**, 32.

Eddy, J. A.: 1976, *Science* **192**, 1189.

Eichkorn S. et al (2002) *Geophys. Res. Lett.* **29**, 43.

Emiliani C. (1993) Extinction and viruses. *Biosystems*, **31**, 155.

Fedorov V. FLUCTUATIONS OF SOLAR CLIMATE AS THE BASIS OF REMODELING, ANALYSIS AND PREDICTION OF CHANGES IN GLOBAL CLIMATE OF EARTH. Internet.

Fischer A. (1991). Orbital cyclicity in Mesozoic strata. In: G. Einsele, W. Ricken and A. Seilacher (eds.) *Cycles and Events in Stratigraphy*. Springer, Berlin Heidelberg, pp. 48-62.

GSA: see Catastrophic Events and Mass Extinctions: Impacts and Beyond. SPECIAL PAPER (GEOLOGICAL SOCIETY OF AMERICA) (Book 356) (September 1, 2002)

Giese B. et al (2008) Enceladus: An estimate of heat flux and lithospheric thickness from flexurally supported topography. Geophys. Res. Lett., **35**,

Ginenthal C. (2015) *Newton, Einstein and Velikovsky*. Kindle

Grotzinger J. (*1986*) Upward shallowing platform cycles: A response to 2.2 billion years of low-amplitude, high-frequency (Milankovitch band) sea level oscillations. *Paleoceanography* **1**, 403–416.

Guillot T. et al (2018) A suppression of differential rotation in Jupiter's deep interior *Nature* **555**, 227–230.

Haq B. (2017) Jurassic Sea-Level Variations: A Reappraisal. *GSA Today*, Oct 24, 2017.

Harrison R., Stephenson D. (2006) *Proc. R. Soc. A* 1.

Hays J., Imbrie J., Shackleton, N. (1976) *Science* **194**, 1121–1132.

Hilgen, F.J., 1991. Astronomical calibration of Gauss to Matuyama sapropels in the Mediterranean and implication for the geomagnetic polarity time scale. Earth Planet. Sci. Lett. 104, 226-244

Hoyle F., Lyttleton R. (1939) The effect of interstellar matter on climatic variation. Proc. Camb. Phil. Soc., **35**, 405.

Huybers P., Aharonson O. Orbital tuning, eccentricity, and the frequency modulation of climatic precession. PALEOCEANOGRAPHY, **25**, PA422.

Imbrie J. et al (1993) On the structure and origin of major glacial cycles, 2. The 100,000-year cycle. *Paleooceanology*, **8**, 699 – 735.

Johansson I. (2015) *Is there an influence of solar activity on the North Atlantic Oscillation? A literature study of the forcing factors behind the North Atlantic Oscillation*. Thesis, Lund university.

Kalenda P. et al (2018) The solar activity and the energy accumulation in the Earth´s crust decide about the climate. *Conference: 24. celoštátný slnečný seminár, 24th National Solar Physics Meeting. Kežmarok 21-25 May, 2018*

Karner D., Muller R. (2000) Paleoclimate: A Causality Problem for Milankovitch, *Science* **288**: 2143-2144.

Kaper H., Engler H. (2013) How Good is the Milankovitch Theory? Internet.

Kent D., Olsen P. (1999). Astronomically tuned geomagnetic polarity timescale for the Late Triassic. *J. Geophys. Res.* **104**, 12831-12841.

Kirkby J. (2009) Cosmic rays and climate. *CERN Colloquium*, 4 June 2009

Klacka J. (2010) *Galactic tide*. Internet.

Kotulla M. (2015) SEDIMENTFOLGEN UND IHRE INTERPRETATION: ZYKLO-STRATIGRAPHIE UND DAS MILANKOVITCH-ZYKLEN-SYNDROM. W + W special paper G-15-1.

Kutzbach, J., (1994). Idealized Pangean climates: Sensitivity to orbital change. In: G.D. Klein (ed.) *Pangea: Paleoclimate, Tectonics and Sedimentation during Accretion, Zenith and Breakup of a Supercontinent. Geol. Soc. America Special Paper* 288, 41-55.

Kukla G. (1975) Missing link between Milankovitch and climate. *Nature*, **253**, 600.

Landscheidt T. *Solar Eruptions Linked to North Atlantic Oscillation*. Internet

Landscheidt T.(1) *New Little Ice Age Instead of Global Warming?* Internet

LaViolette P. (1997) *Earth Under Fire*. Starlane Pubns.

Leitch E., Vasisht G. (1998) *New Astronomy* **3**, 51.

Maslin, M. A. *et al.* (2014) *Quat. Sci. Rev.* **101**, 1–17.

Maslin M. (2016) Forty years of linking orbits to ice ages. *Nature,* **540**, 208–210.

Maslov L. (2014) Self-organization of the Earth's climate system versus Milankovitch-Berger astronomical cycles. *arXiv*

Mathis M. (2010) *The Un-unified Field*: *And Other Problems*. Autor house.

McCrea, W. H.: 1975, *Nature* **255**, 607.

Melnikov and Smulskij, 2009 see: Мельников В.П., Смульский И.И. (2009) Астрономическая теория ледниковых периодов: Новые приближения. Решенные и нерешенные проблемы. – Новосибирск.: ГЕО.

Melott A., Bambach R. (2009) A Ubiquitous ~62 Myr Periodic Function Superimposed on General Trends in Fossil Biodiversity: Part II. *arXiv*.org preprint.

Moore W. et al (2007). The Interior of Io. In: R. M. C. Lopes; J. R. Spencer. *Io after Galileo*. Springer-Praxis. pp. 89–108.

Moseley g. et al (2016) Reconciliation of the Devils Hole climate record with orbital forcing. *Science, 351*, 165-168.

Mörner N.-A. (2013) Solar Wind, Earth's Rotation and Changes in Terrestrial Climate. *Physical Review & Research International,* 3, 117.

Muller R., MacDonald G. (1997) Spectrum of 100-kyr glacial cycle: Orbital inclination, not eccentricity. PNAS, 94, 8329

Muller R., MacDonald G. (2000). *Ice Ages and Astronomical Causes*. Heidelberg: Springer-Verlag.

Neeman B. (1993) Orbital Tuning of Paleoclimatic Records: A Reassessment (Lawrence Berkeley National Laboratory, Berkeley), CA, Rep. LBNL-39572.

Perevedencev- see. Переведенцев Ю.П. (2009) Теория климата: учебное пособие. – 2-е изд. перераб. и доп. – Казань: Казан. гос. ун-т, 2009. – 504 с.

Peters S. (2008) Environmental Determinants of Extinction Selectivity in the Fossil Record.

Robitaille P.-M. (2013) Forty Lines of Evidence for Condensed Matter— The Sun on Trial:Liquid Metallic Hydrogen as a Solar Building Block. *Progress in Physics*

Ratcliffe H. (2008) The Virtue of Heresy: Confessions of a Dissident Astronomer. Second Edition. *BookSurge Publishing*

Raymo M., Nisancioglu K. (2003) The 41 kyr world: Milankovitch's other unsolved mystery. *Paloceanography*.

Rohde & Muller (2005) Cycles in fossil diversity. *Nature*, 434,

Petrovic A., Markovic S. (2010) Annus mirabilis and the end of the geocentric causality: Why celebrate the 130th anniversary of Milutin Milanković? *Quaternary International* 214, 114-118**.**

PSI (2017) *Why Space Scientists Must Re-assess Magnetic Field Energy*. http://principia-scientific.org/why-space-scientists-must-re-assess-magnetic-field-energy/

Raymo M., Nisancioglu K. (2003) The 41 kyr world: Milankovitch's other unsolved mystery, *Paleoceanography*, **18**.

Roe G. (2006) In defense of Milankovitch. *Geophysical Research Letters*, **33**, Issue 24

Ruddiman W. (2006) Orbital changes and climate. *Quaternary Science Reviews* 25, 3092

Sackmann I., Boothroyd, A. (2003) Our Sun. V. A bright young Sun consistent with helioseismology and warm temperatures on ancient Earth and Mars, *Astrophys. J.*, **583**, 1024.

Saltzman B. et al. (1984) The late Quaternary glaciations as the response of a three-component feedback system to earth-orbital forcing. *J.Atmos. Sciences* **41**, 3380

Schuster J. (2005) *'Waterworld': Descartes vortical celestial mechanics*. Internet

Sedov, L. (1946) *Dokl. Akad. Nauk SSSR* **42**, 17.

Shapley, H.: 1921, *J. Geology* **29**, 502.

Sharaf and Budnikova- see: Шараф Ш.Г., Будникова Н.А. Колебания солнечного облучения Земли, вызванные вековыми изменениями элементов земной орбиты // *ДАН СССР*, 1968. – т. 182. – № 2. – с. 291 – 293.

Sharp G. (2013) Are Uranus&Neptune responsible for solar grand minima and solar cycle modulation? *International Journal for astronomy and Astrophysics*, **3**, 260.

Shaviv N. Cosmic Ray Diffusion from the Galactic Spiral Arms, Iron Meteorites, and a possible climatic connection. *Physical Review Letters*, **89**,

Shaviv N., and Veizer J. (2003) *GSA Today* **13** (7), 4.

Sloan L., Huber M. *(*2001*)* Eocene oceanic responses to orbital forcing on precessional time scales. *Paleoceanography* **16**, 101–111.

Smulskij (2013) see: Смульский И. (2013) Анализ уроков развития астрономической теории палеоклимата. *Вестник РАН*, **83**, 40 – 44.

Spratt J.-S. (2016) The Descartes-Newton paradox: Clashing theories of planetary motion at the turn of the eighteenth century. Vassar College. *Senior Capstone Projects.* Paper 609.

Stozhkov Y. et al (2017) Cosmic rays, solar activity, and changes in the Earth's climate. *Bulletin of the Russian Academy of Sciences Physics*, **81,** 252-254**.**

Svensmark H.(2007) *Cosmoclimatology: A New Theory Emerges*. A&G, **48**,

Schwartz and James (1984) *Nature* **308**, 712.

Usoskin I. et al (2004) *Geophys.Res. Lett.* **31**, 6109.

Usoskin I. et al (2007) Grand minima and maxima of solar activity: new observational constraints. *Astronomy & Astrophysics* manuscript no. 7704

Vakulenko et al, 2003- see: Вакуленко Н. et al (2003) Об определяющей роли амплитудной модуляции прецессионных циклов в чередовании ледниковых эпох позднего плейстоцена. *Доклады РАН*, **391**, 817 – 820.

Vakulenko et al, 2007 see: Вакуленко Н.В. et al (2007) Синхронность ледниковых циклов позднего плейстоцена с ходом инсоляции на экваторе и ее перераспределение между высокими и низкими широтами. *Известия РАН. – серия географическая*, № 5, 45 – 57.

Vasiliev S. (2012) The Classical Concept of Long-range Action Fields Existence. *Applied Physics Research* **4**, 167.

Vulis, I., Monin A. (1979) A contribution to the astronomical theory of variations of the climate of the Earth. *Izv. Acad. Sci. USSR, Atmos. Ocean. Phys.*, № 15. – Pp. 3 –11.

Wang S. et al (2010) Global cooling in the immediate future? *Chinese Science Bulletin* **55**, 3847–3852.

Wang (2012) Vortex and Kepler's Third law. *viXra*

Winguth A., Winguth C. (2013) Precession-driven monsoon variability at the Permian-Triassic boundary—Implications for anoxia and the mass extinction. *Global Planet Change* **105**, 160–170.

Winograd I. et al (1992) Continuous 500,000-Year Climate Record from Vein Calcite in Devils Hole, Nevada. *Science* 258, 255-260.

Wundt W. *Neuentwicklungen zur Strahlungskurve von Milankovitch*. Internet

Wunsch C. (2004) Quantitative estimate of the Milankovitch-forced contribution to observed Quaternary climate change. *Quaternary Science Reviews* **23**, 1001–1012.

Zanchettin, D. et al (2008) Impact of variations in solar activity on hydrological decadal patterns in northern Italy, *J. Geophys. Res*., 113, D12102.

Zhang, S. *et al.* (2015) Orbital forcing of climate 1.4 billion years ago. *Proc. Natl Acad. Sci. USA* 112, E1406–E1413.

Yeghikyan A., Fahr, H. (2003) Consequences of solar system passage trough dense interstellar clouds. *Ann. Geophys.* **21**, 1263.

Yeghikyan A., Fahr, H. (2004) Effects induced by the passage of the Sun trough dense molecular clouds: Flow outside of the compressed heliosphere, *Astron. Astrophys.* **415**, 763.

Yu F. (2002) *J. Geophys. Res.* **107**, 248.