ADDED ABSTRACTS

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THE NEW CONCEPT OF THE ORBITAL THEORY OF PALEOCLIMATE

(Poster no. 132)

There were published very many papers which supported or improved Milankovitch theory (MT) during the last 30 years. However nobody of the authors did the obvious conclusion that MT is wrong because it contradicts the empirical data (ED). Similar conclusion was made about 100 years ago in regard to Croll theory, but our contemporaries did not do it as if they shut their eyes on the contradictions between MT and ED. There are the next ED, which MT can't explain.

1)A prevalence of the 100-kyr climatic cycle for the last million years (Ma). 2)A differences between the quantities and ages of the Late Pleistocene glaciations according to MT and to ED. 3)The correspondence of the ice ages to the intervals of the decreased eccentricity values. 4) The simultaneity of the glaciations in both Hemispheres. 5)The main period of climatic cyclicity changed from 41 ky to 100 ky at a time of about 1 Ma. However, this disagrees with Milankovitch theory, because the periods of orbital elements variation almost did not change at that time.

It is important to understand that ED support only the hypothetic orbital theory of paleoclimate (OTP) but not MT. MT is only one of the versions of OTP. The main idea of the OTP is the postulated connection of the ice ages with the Earth's orbital elements variations.

The acknowledgement that there are some mistakes in the theory of the outstanding scientist M.Milankovitch is very important. It allows to reject some commonly adopted but incorrect principals, such as: "The variations in *seasonal* insolation have the prevalence influence on the global changes"; or: "The *semiannual* insolation variations for *alone latitude* (i.e. 65°N summer insolation) have a global paleoclimatic influence". Actually, it seems rather odd to think that the insolation has a climatic influence during one half of the year and is inert during the other. Moreover, the semiannual (summer and winter) insolation variations related to precession are in antiphase. Certainly, employment of the monthly insolation for paleoclimatic reconstruction and modelling is yet more incorrect.

These contradictions of MT led to the necessity of the new OTP concept elaboration. The crucial points of the new concept are as follows. (1) The extent and type of the climatic effect of variations in orbital elements depend on the global paleoclimatic state of the Earth (ranging from glacial epochs to thermal epochs); this state is most probably determined by both terrestrial and cosmic factors. (2) The determination of the climatic significance of variations in individual orbital elements should take into account the following aspects: a) specific character of the related to the variations in all three orbital elements continous in time and space insolation variations, and b) terrestrial climatic conditions and feedback mechanisms transforming orbital signals into global climatic changes.

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HOLOCENE PALEOENVIRONMENTS IN THE FOREST-STEPPE OF KARGALY MINNING AREA (ORENBURG): A SIMULATION MODEL THROUGH GIS APPLICATIONS

(Poster no. 71)

Kargaly is one of the most important centers of mining and metallurgy in the great Eurasian steppe. Dr. E.N. Chernykh and his team (Institute of Archaeology, Russian Academy of Sciences, Moscow) and various researches at the CSIC and other Spanish institutions - together with Dr. P. Tarasov - have developed a joint project to undertake a comprehensive study of the palaeoenvironment and the impact of metallurgical activities of the site's two main phases of occupation, the Bronze Age (2nd millenium AC) and the first Russian industrialization (1745-1900 AD). The Russian members of the joint team are in charge of the archaeological investigations, while the Spanish members ara studying metallurgical and mining technology and production, on the one hand, and the environmental context and impact of these activities, on the other. Smelting experiments have evaluated the efficiency of copper recovery and charcoal consumption that feeded theoretical models of copper production and its environmental impact. The palaeoenvironmental research consisted of both sampling programs of archaeological sites and natural deposits supported by radiocarbon dates and the contextualization of that evidence by studying the present-day landscape. The methodology places the practice of palynology within the framework of Landscape Archaeology combining study of the pollen rain with mathematical modelling of the landscape. To put it into practice we used modern methods of observation of the Earth, such as satellite imagery, grounded in the use of Geographical Information Systems (GIS) and global positioning (GPS) technology.

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THE INFLUENCE OF POWERFUL VOLCANIC ERUPTIONS ON RADIAL GROWTH OF LARCH IN THE NORTHERN HEMISPHERE DURING THE LAST 2000 YEARS

(Poster 41)

It is well known that powerful volcanic eruptions throwing out particles and aerosols to the atmosphere that decreases it’s transparency and reduces incoming solar radiation. It can lead to disturbance of temperature balance with the consequence of cooling. There are several investigations to compare the data of volcanic eruptions with significant temperature changes pointed by different indirect sources like ice cores and lake deposits (Zielinski, 1994, 1996; Briffa et al., 1996). However these researches were limited on the one side by the length of instrumental measurements of temperature and on the other side by the time resolution of indirect sources. For the comparison of volcanic events with time series it is necessary to have high time resolution of the indirect data up to one year, as we can get out from tree rings (Vaganov et al., 1996).

We analysed the variability of radial tree growth in relation to powerful volcanic eruptions for the last 2000 years, totally 108 events. To built continuous tree-ring chronologies of the Eastern Taymir and the lower Indigirka River, disks and cores from living trees and fragments of subfossil wood from alluvial permafrost deposit were used. The comparative analysis of tree-ring chronologies and other indirect sources of the natural-climatic information (including historic data and sulfate content in GISP2 - Greenland ice core) were made (Zielinski, 1994). This analysis allowed founding of common response in changes of temperature in the investigating area of the Northern Hemisphere to the powerful volcanic eruptions. For this investigation we selected powerful volcanic eruptions with index of volcanic activity higher then 4 (VEI>4) (Zielinski, 1994; Bradley et al., 1996; Hughes, 2001).

In indexed chronologies we select 5 years before and 10 years after known volcanic eruption (method of lap epochs). For this period we set the mean value of chronologies to 0 and standard deviation to 1. Then we were looking for the minima, which point the influence of eruption to tree growth in the normalized curve. We found out that the influence of volcanic activity can be observed during 4 years and only in the year 536 up to 24 years. In a second step we combined our chronologies with chronologies from Sweden and Yamal made by Briffa (1992) and Hantemirov (1998) and did the same analysis for the last 1000 years (20 known events with VEI higher than 4). Final results show also as mean growth depression for 4 years after volcanic event. We established that volcanic eruptions caused synchronous depressions of tree growth in several years (536/37/38, 627/28, 854/855, 1259, 1641/42, 1783/84, 1812/13, 1815/16, 1883, 1912 AD) over huge area. Annual variability of tree growth in Northern Eurasia point out the information of global anomalies in climate due to volcanic activity.

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DENDROCHRONOLOGIC STUDIES ON "FOREST-STEPPE" CONTACT ZONE AS A SOURCE OF PALEOCLIMATIC INFORMATION OF HIGH RESOLUTION (BAIKAL REGION)

(Poster 67)

In a contact zone (biobinary field) of forest with steppe original ecosystems are formed, having featu_es both forest and steppe processes. Characteristic feature of this zone is fluctuacion of vegetation caused by supra - secular and secular cycles of variability of a climate and as a result a forest comes on steppe or steppe comes on forest. Therefore this zone cannot unequivocally be attributed to taiga natural complexes or to steppe. Most likely it is an independent natural formation, with its own rhythms and interactions between its components.

The investigated trees on «forest - steppe» contact zone, as well as the trees in the top border of a forest zone of mountains, have high sensitivity to the climatic factors, especial to amount of precipitation.

The studies carried out in various sites of the Baikal region (on the Olkhon island, of the basin Selenga river) a have given an opportunity to obtain tree-ring chronology of duration up to 1000- years on larch and 300- years on pine on alive and subfossil trees.

In the obtained tree-ring chronologies stable 50-year cycles are revealed probably determined by change of amount of precipitation in the summer periods. Their amplitude reflects strong reaction of trees to insignificant increase of precipitation on the given territory. Revealed inner cycle with average duration of 24-26 years probably also has climatic nature, namely the variability of temperatures for the summer months, but their contribution to general variability of the trees growth is less significant.

As a whole, dendroclimatological research in a «forest - steppe» contact zone seem good for paleoclimatic reconstructions.

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