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Climatic - biotic continuum – a few examples from the Pennsylvanian – Early Permian

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The subdivision of the Pennsylvanian Epoch based on the great difference in the biota composition and evolution. Extensive grows of the continental ice sheets near the Mississippian-Pennsylvanian (mid-Carboniferous) boundary expanded a large area comparative with Pleistocene (106 km2) (Crowley and Baum, 1991). One of the possible models is the restructuring of the oceanic circulation patterns (Saltzman, 2003). The Mid-Carboniferous boundary in the Urals demonstrates regional inconformity trigged by strong fall of the basin depth. Possibly following circulation was the reason of the positive carbon and isotope shift documented in the one of the Askyn key section of the South Urals. Renovated biota appeared far above the unconformity (Brand, Bruckschen, 2002, Kossovaya, 2009, 2010). The next level of biota replacement was found near by Mid-Pennsylvanian boundary. The isotope and microfacies fluctuations are traced in the Late Myachkovian –Kasimovian transitional in the “Kasimov quarry. The top of the Domodedovo Fm. is marked by double paleosoil profile emphasized by Microcodium crust (Leontiev, Kossovaya, 2011) and is characterized by δ 13C negative shift from +2,2 ‰ (sample Ks-23) up to –4,4‰ (sample Ks -24) and possibly is reinforce by the presence of Microcodium.
The extinction of the most of colonial rugosa (Petalaxidae) at this level in the Moscow Basin together with strong restriction of diversity of the other warm –water organisms is considered as biotic event which abiotic affinities are still not clear. The basin level fall is documented by a few erosion surfaces both in the Domodedovo and Peski Fms (Uppermost Myachkovian). Diachronic extinction embraced Perski interval. Data on stable isotope allows to propose the El-Nino scenario fro the first phase of the fauna replacement. Following diminishing of the carbon is indirectly relevant by change of carbonate to clay sedimentation at the beginning of the Voskresensk Fm. It is confirmed by low value of δ13C 0,5-1,0 ‰ in the overlay limestone. The taxonomic diversity is very low. The recovery of bentic biota is characteristic for the Asselian –Lower Artinskian and ended by abrupt extinction at the Late Artinskian or Kungurian. The paleoclimatic affinities of this event are rather controversial. In the Southern hemisphere the restriction of the glacial cover is supported by the appearance first temperate biota – forams, small solitary rugosa, bryozoan, rare bivalves and brachiopods, that are characteristic for the temperate water. This level coincides with colonial corals flourishing in the subtropical area. The average value within Asselian – Lower Artinskian in the Most section (Central Urals) is δ 13C 4- 5‰The end of Early Artinskian coincides with the minimum value both δ13C and 18O probably mirroring Late Sakmarian deglaciation (Kossovaya et al., 2011). The obtained data in spite of the difference in the absolute value show the similar trend with published data (Korte et al., 2005). Following “small biotic event” fixed in the Northern Hemisphere is characterized by disappearance of Kleopatrinidae and Durhamihidae (Rugosa), other reef-building organisms, diversification of ostracods and replacement of the brachiopod genera composition. Possible trigger could be collision processes in the Eastern part of Pangea challenged the circulation change.