

SPACE EVENTS AND EVOLUTION OF THE CONODONTS

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Introduction: Geologists draw attention to cosmic dust particles in connection with the study of degree for cosmic processes influence on biotic events in geological history and the prospects of conducting correlations for different facies stratum. Our study is devoted to the possible influence of cosmic events on the evolution of conodonts - the most important group of fauna for the Paleozoic Era. The object of research is the Usolka section, located in the Southern Urals, Russia. We have previously studied here the distribution of cosmic microspheres [1, 2] from the sediments of the Pennsylvanian Series Carboniferous System (302-310 million years ago). The importance of joint study of cosmic and biotic events is due to the fact that the Usolka section is a candidate of the Global Boundary Stratotype Section and Points (GSSP) of the lower boundary of the Kasimovian and Gzhelgian Stages.

Methods: The microparticles were analyzed on the field emission scanning electron microscope "Merlin" Carl Zeiss equipped with an energy-dispersive spectrometer "AZTEC" X-MAX Oxford Instruments and using differential thermomagnetic analysis. Studies of the chemical and isotopic composition of rocks were carried out on the X-ray fluorescence wave dispersion spectrometer S8 Tiger of the company Bruker, isotopic mass spectrometer DeltaVPlus (Thermo Fisher Scientific, Germany) with the prefix FlashHT. All analyzes were performed in laboratories of Kazan Federal University.

Results: In Usolka section, there are negative carbon anomalies ($\delta^{13}C_{V-PDB} = -4 - -9 \text{ ‰}$), positive yttrium anomalies (up to 400 ppm) and a sharp increase in the number of microspheres in separate intervals (Fig. 1).

Discussion: A joint analysis of paleontological data, distribution of chemical elements and magnetic microspheres showed that the intervals of increasing the number of microspheres in the Usolka section coincide with the Stages of renewal of the species composition of conodonts in the Moscovian – Kasimovian boundary and at the base of the Gzhelgian Stage.

Conclusions: The development of conodonts is considered for the first time in connection with the amount of space dust entering the Earth. These processes can lead to significant climate changes (cooling, the development of anoxic, lowering the temperature of ocean waters, etc.), which can affect the development of marine organisms. These factors acted simultaneously or closely on a geological time scale.

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References: [1] Sungatullin R.Kh. et al. 2017. Meteoritics & Planetary Science, 52, Is.: A336. [2] Sungatullin R.Kh. et al. 2017. Russian Geology and Geophysics, 58: 59-69.

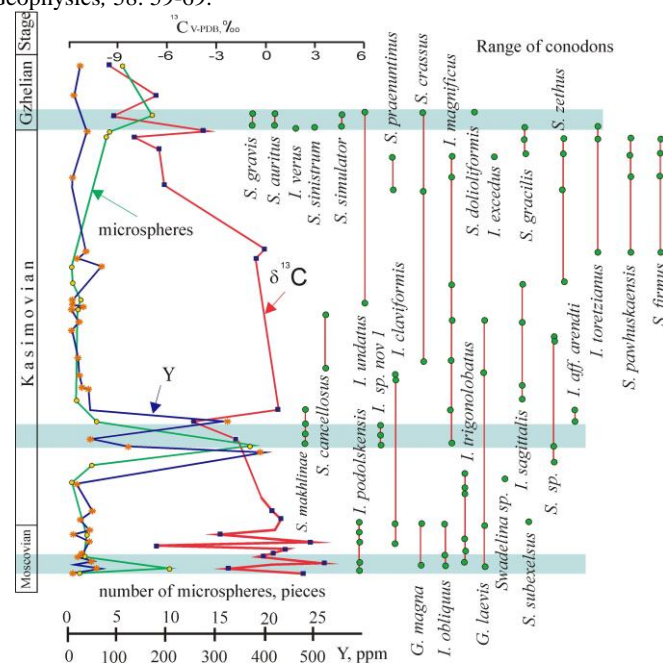


Fig. 1. Distribution of conodonts, geochemical anomalies and cosmic microspheres in the Usolka section