Elevated large-scale dust veil originated from the Taklimakan Desert: Intercontinental transport and three-dimensional structure captured by CALIPSO and regional and global models

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For an extreme dust storm occurred during 19-20 May 2007 over the Taklimakan Desert in northwest China, space-based Lidar CALIOP (Cloud-Aerosol Lidar with Orthogonal Polarization) tracks that very thin (1 km), high-elevated (at 8-10 km), horizontally large-scale (about 1000 km) dust layer is transported over East Asia, the Pacific Ocean, and North America, and reaches Atlantic Ocean. By integrating regional and global aerosol transport models, ground-based observations, and passive and active satellite observations, we investigate emission procedure, intercontinental transport and 3-dimensional structure of the dust veil.

The 3D analysis with CALIOP cross-sections (Figure 1) reveals that the dust veil is transported from the Taklimakan Desert to North Atlantic Ocean with at 8-10 km height in twelve days. Both regional and global models also capture the long-distance transport of the dust veil. Detailed analysis over the Taklimakan Desert reveals that strong surface wind associated with a low-pressure sweeps large amount of dust up, and forms strong updraft wind along the slope of the Tibetan Plateau. Lifted dust particles are brought up to 9000 m above by the upslope wind and captured by westerly jet. Because dust veil travels for long distance at high altitude, it is highly possible that it affect climate and background aerosol concentration.

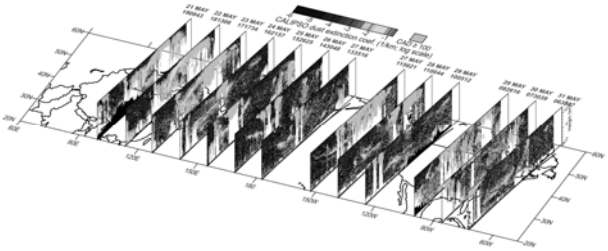

Figure 1: 3D analysis of the dust veil with CALIOP cross-sections.

Epigenetic mineralization of mummified skin of Permian *Stegocephala*

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Mummified fossil remains are extremely rare and represent a great interest as direct sources of paleobiogeochemical information. In the Inta coal basin (Rpb, Komi, Russia) in 1948 the unique deposits of Early Permian (P_1k) amphibiotic fossils were discovered. Later the numerous fragments of mummified skin of *Stegocephala* with area to 100 cm^2 were found there. We studied a scrap of the animal's head skin (Fig. 1). The primary structure of skin preserved very well. The composition (%): C – 45.4 – 66.37; H – 5.10 – 8.32; N – 2.5 – 4.00; amino acids: Gly, Glu, Ala, Pro, Val, Leu. On the lower side of the skin the inclusion of argillaceous mineral of host rocks is found.

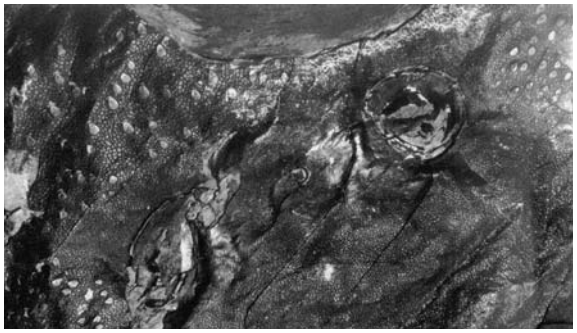

Figure 1: Fragment of *Stegocephala* mummified skin.

In the process of skin mummification and its epigenesis the numerous framboids of pyrite formed (Fig.2), which are characterized by a minor redundancy of sulfur over iron and Zn and Cu impurities, hydroxylapatite, rare-earth Ce-La-Nd-Th-phosphate, glauconite and other alumosilicates. The high alkalinity of the environment and sharply reducing conditions in the diagenesis resulted in mummification and preservation of the skin probably shed during the molting period of *Stegocephala*.

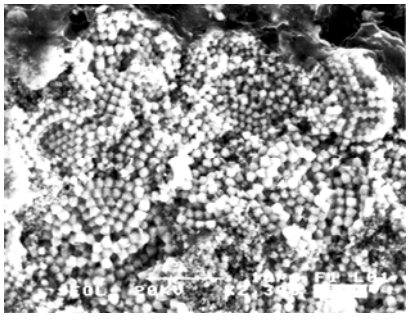

Figure 2: Framboidal pyrite.