Implication and Response of Permian Conodonts to Climate Changes

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Distribution patterns of Permian conodonts suggest that Vjalovognathus, Gondolelloides and Merrillina are cool water residents, and Diplognathodus, Sweetognathus and Iranognathus are warm water residents. Neogondolellids, Hindeodus and Sweetina are cosmopolitan and the most temperature tolerant. Neogondolellids persist as Mesogondolella with a big cusp and low and discrete blade in bipolar temperate zones during Kungurian through Lopingian. In the equatorial areas they differentiated into Mesogondolella with small cusp, tightly spaced to fused carina, and high and fused blade during Kungurian, Jinogondolella during Guadalupian and Clarkina during Lopingian. Permian conodont provincialism patterns reflect glaciation in Gondwana during Asselian and Sakmarian, global warming during Artinskian, cooling in North Pangea during Kungurian and later Permian, slight amelioration during Guadalupian, warming during Wuchiapingian, and cooling during Changhsingian in peri-Gondwana. The climate changes may ultimately be related to Pangea generally moving north and rotating clockwise and the resulting alternation of oceanic circulation patterns. The Early Permian conodont crisis is associated with the Artinskian warming and the replacement of Jinogondolella and Sweetognathus respectively by Clarkina and Iranognathus is associated with the Wuchiapingian warming. The extinction of Iranognathus is probably associated with Changhsingian cooling. Permian conodont lineages ended with the Late Griesbachian conodont crisis, which is associated with early Triassic global warming.