
Strontium, Oxygen and Carbon Isotopes to Date and Investigate Permian Events in Arabia

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Dating of important Permian events in the Arabian Peninsular is difficult due to imprecision of, and inconsistency between, different biostratigraphic disciplines. Absolute radioisotopic dating cannot be applied because the succession lacks volcanics. To resolve this, isotopic ratios of brachiopod shells from the Saiwan Formation, Haushi Limestone and Khuff Formation of Oman, and from the Khuff Formation of Saudi Arabia were studied (a) to resolve conflicting biostratigraphic ages suggested for the Saiwan Formation and the Haushi Limestone; (b) to understand, through integration of sedimentary organic $\delta^{13}\text{C}$ data, palaeoclimatic change after the Permo-Carboniferous glaciation; and (c) to obtain a precise age for the base of the Khuff Formation in Saudi Arabia and Oman, and therefore investigate the degree of diachroneity of the Khuff transgression on the Arabian platform. SEM ultrastructural analyses of brachiopods indicate they are pristine and capable of recording the original seawater signal, and $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ suggest normal Permian seawater within the accepted range. $^{87}\text{Sr}/^{86}\text{Sr}$ ratios from the Saiwan brachiopods indicate an age range of Sakmarian -Artinskian. Microfacies, palaeoecology, $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ from shells, palynology, and sedimentary organic $\delta^{13}\text{C}$ all indicate climate change through the Lower Permian succession. $^{87}\text{Sr}/^{86}\text{Sr}$ ratios from brachiopods near the base of the Oman Khuff Formation confirm a Wordian age, as suggested by previous biostratigraphic work. Those from the Saudi Khuff Formation (Midnab Member) indicate a Capitanian-Wuchiapingian age in agreement with the presence of the conodont *Jinogondolella cf. altaduensis*, but in conflict with other biostratigraphic age dates. Saudi Aramco is acknowledged for partial funding analyses.
