

Multiple LIP Pulses of the Central Iapetus Magmatic Province (CIMP) and Link with Glaciations during the Ediacaran-Cambrian

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The 620-520 Ma CIMP was emplaced in multiple pulses (likely representing multiple LIPs) during Ediacaran-Cambrian time and has been linked to the disruption of the Rodinia supercontinent leading to the opening of the Central Iapetus Ocean. CIMP is well represented in Laurentia and Baltica but also present on other formerly attached blocks such as the West African craton, Amazonia craton, Saharan metacraton, Arabian-Nubian Shield, Congo craton, Australia, Qilian-Qaidam/Tarim (China) among other blocks. Based on a global U-Pb (zircon and baddeleyite) compilation we distinguish at least four CIMP pulses (including both mafic and silicic units): CIMP-1 (620-600 Ma), the “Egersund-Long Range-Novillo Event/LIP”; CIMP-2 (590-580 Ma), the “Ouarzazate-Dokhan-Grenville-Qilian-Qaidam” Event/LIP; CIMP-3 (570-555 Ma), “Volyn-Catoctin Event/LIP”; CIMP-4 (530 Ma), “Wichita LIP”. Most previous $\delta^{13}\text{C}$ profiles of the Ediacaran Period show at least three negative anomalies, which in ascending order are; cap dolostone immediately above the Marinoan Snowball Earth related tillite (EN1), a negative anomaly in the middle Ediacaran (EN2), and the long-term negative $\delta^{13}\text{C}$ values of the late Neoproterozoic Shuram-Wonoka excursion (EN3). Assuming that these mark global/regional glaciations, we propose that there are at least three regional Ediacaran glaciations: Hankalchough Quruqtagh (ca. 614 Ma), Gaskiers (ca. 580 Ma) and Fauquier/Weesenstein-Orellana/Kahar (ca. 570-565 Ma). We propose also a causal link between these glaciations and CIMP-1, CIMP-2 and CIMP-3, respectively. A Cambrian glaciation could be linked with CIMP-4.