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Foraminiferal proliferations in the Alborz Basin (northern Iran): global responses to Early Carboniferous glaciations

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Abstract

© 2017 Senckenberg Gesellschaft für Naturforschung and Springer-Verlag Berlin HeidelbergThe Tournaisian interval of the Mobarak Formation in the Alborz Basin (Iran) preserves a specific bed with Earlandiidae and three foraminiferal zones that are restricted to specific intervals within the late Tournaisian and correlate with northern Eurasian biostratigraphic units. The bed with Earlandiidae dates to the early Tournaisian and corresponds with the lower Tournaisian and lower part of the upper Tournaisian of the Russian Stratigraphic Scale. The Granuliferella latispiralis–Latiendothyranopsis zone dates back to the earliest Ivorian (MFZ4?–MFZ5) and correlates with the G. latispiralis and Spinoendothyra costifera zones of the Urals. The Eotextularia diversa zone is of earliest late Ivorian age (MFZ6) and corresponds to the lower part of the E. diversa zone of the Russian Stratigraphic Scale. The Endospiroplectammina venusta–Eoparastaffella ex gr. rotunda zone is of latest Ivorian (MFZ7–MFZ8) age and correlates with the upper part of the E. diversa zone and the E. rotunda zone of the Russian Stratigraphic Scale. The entire early Tournaisian (Hastarian) portion is devoid of recognisable foraminiferal material, which is likely linked to a faunal shift of subtropical and temperate taxa to tropical latitudes in response to the glaciations at the Devonian–Carboniferous boundary. The establishment of the G. latispiralis–Latiendothyranopsis zone coincides with the first mondial Tournaisian foraminiferal radiation. The second and third episodes of foraminiferal diversification (E. diversa and E. venusta–Eoparastaffella ex gr. rotunda) are congruent with major foraminiferal shifts from Tethyan realms to higher latitudes in response to thermal periods. The occurrence of specific foraminiferal taxa in Alborz is strongly linked to transgressions and migrations of North Palaeotethyan biotic elements. The described Tournaisian cyclic patterns in the Alborz Basin share significant similarities with those in the North American, western European and Siberian realms, indicating a link with large-scale palaeoclimatic patterns. This cyclic system correlates directly with the pacing of global eustatic sea-level fluctuations caused by climate oscillations and follows the fourth-order ocean-level fluctuations as described from other, independent proxies.

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Keywords

Alborz Basin, Calcareous foraminifera, Carboniferous glaciations, Mobarak Formation, Tournaisian climate