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Evidence for an Upper Palaeozoic North-Palaeotethyan succession in Central Iran: The Siah Godar Complex of Jandaq

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The Upper Palaeozoic successions exposed SW of Jandaq, Central Iran, have been studied in the frame of the DARIUS PROGRAMME. These successions, different from the typical passive margin succession of Gondwanan affinity of the Central Iran block, represent keystones for the reconstruction of the convergence (latest Palaeozoic) and docking (Triassic) of Iran to the margin of Eurasia, despite their original relationships have been modified by Mesozoic to Quaternary tectonics, hampering Palaeozoic palaeogeographic reconstructions.

In the Jandaq area, three isolated Upper Palaeozoic outcrops, different for tectonic deformation and lithological composition, are preserved close to amphibolite-facies metamorphic rocks of the Jandaq Complex. The southernmost of these outcrops (Chah Rizab) consists of a succession of volcanics interbedded with severely deformed carbonate layers, Fammenian-Tournaisian in age (Bagheri and Stampfli, 2008) according to conodonts, unconformably covered by conglomerates with volcanic and granitoid blocks.

The intermediate outcrop is characterized by deformed massive limestones (Early to Late Carboniferous, Sharkovski et al.; 1984) yielding crinoid ossicles, brachiopods (Choristites aff. C. mosquensis, Orulgania sp.)and bryozoans. They are associated with cherty limestones, fine-grained siliciclastics and bedded limestones rich in isolated corals. Shallow marine sedimentation with local episodes of deeper water facies can be inferred.

A lithologically different, poorly deformed succession occurs slightly to the north: it consists of alluvial plain sandstones and conglomerates containing marble, volcanic and sedimentary pebbles, as well as granitoids and granophyres. U-Pb radiometric dating on zircons from these rocks are in progress. In the upper part of the unit, marine ingressions are documented by coastal well-selected quartzarenites and a thin limestone intercalation containing brachiopods (Choristites aff. C. mosquensis, Choristites sp., Orulgania sp. , Cleiothyridina sp., Deltachania sp.), corals, smaller foraminifers and fusulinids (Bradyina cf. magna, Pseudoacutella, cf. grozdilovae; Ozawainella sp., Neostaffella ozawai; Fusulinella (Moellerites?) sp., Profusulinella (Ovatella?) sp. and Eoschubertella/Schubertellina sp.) of Moscovian (Kashirian) age.

Despite the discontinuity of the outcrops, two different lithological assemblages can be identified: the older is dominated by carbonates with volcanic layers (southern and central outcrops), whereas the younger consists of siliciclastic litharenitic deposits.

Fusulinids and brachiopods indicate a North-Palaeotethyan affinity as they are mostly similar to assemblages from Spain, the Donbass, the Urals, as well as the Yukon Territory, Canada, documenting deposition along the northern margin of the Palaeotethys. This confirms the palaeogeographic interpretation by Bagheri & Stampfli (2008), based on the occurrence of several foraminiferal taxa, especially Quasiendothyra kobeitusana (determination D. Vachard). For the moment, this taxon was not recovered in the successions under study, but our assemblages confirm a North-Palaeotethyan origin

Despite the outcrop discontinuity, the occurrence of 1) North Palaeotethyan type fossils and 2) of a succession with lithological associations and petrographic composition (northern outcrop), significantly different from the classical upper Palaeozoic succession of Gondwanan affinity of Central Iran, is documented. These data support a complex palaeogeographic evolution for the studied outcrops with respect to the surrounding regions, suggesting a more complex evolution than expected for the Iranian block (e.g., collision of different terranes, preserved arc-related basins, displacement of blocks by transform faults).

Bagheri, S. & Stampfli, G.M. 2008. The Anarak, Jandaq and Posht-e-Badam metamorphic complexes in central Iran: New geological data, relationships and tectonic implications. Tectonophysics, 451, 123-155.

Sharkovsky M., Susov. M., Krivyakin B., 1984. Geology of the Anarak area (Central Iran). Explanatory Text of the Anarak Quadrangle Map 1:250000. Geological Survey of Iran, V/O “Tecnoexport” USSR Ministry of Geology Reports, 19.