



Devonian shallow water deposits at Northern margin of Gondwana: case study from Central Iran, Isfahan province

Девонска плитководна седиментация в северната граница на Гондвана: примери от Централен Иран, провинция Есфахан

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Iranian plate is regarded as marginal fragment of Gondwana, which was splitted from Gondwanan-Arabian plate during the Late Paleozoic or Early Triassic and it was connected with Eurasian-Turan plate at the end of Middle Triassic (Stöcklin, 1974; Soffel, Förster, 1984; Davoudzadeh, Schmidt, 1982). The Paleozoic facies of Iran has been considered for monotonously continental or epicontinental because of the great tectonic activities (Stöcklin, 1974). One of the main characteristic of Devonian sedimentation in Iran is permanence and iteration of movements related to the Caledonian orogenetic event. Based on results from palynology and description of stratigraphic characteristics, Devonian rocks of Iran can be put in 2 groups – the Lower Devonian mainly silica-clastic Padeha Formation reproduces an extensive shelf embayment with shallow water, which deepens toward the east, and mainly carbonate rocks during Middle–Late Devonian (Weddige, 1984). The sedimentary facies analysis show that the regression continues since the Emsian, but culminates during the Eifelian, most probably during the Late Eifelian, when all Iranian areas had been desiccated (Eifelian hiatus). The Givetian time interval is characterized by relative transgression-regression episodes which are observable by the difference in depositional sedimentary facies and fossil contents. The presence of fossils, such as brachiopods, corals and conodonts pertaining to Eifelian, demonstrate that marine conditions began since the Middle Devonian and reached to maximum amount in the Late Devonian. Devonian deposits of Isfahan area (Central Iran) crops out mainly in the mountains NE of Isfahan, Kuh-e Kaftar and Kuh-e Zard mountains (Chahriseh-Zefreh sections), the Soh area (110 km NE of Isfahan), and Natanz area (90 km NE of Isfahan).

Devonian sediments are related to Bahram Formation and contains limestones, shales, quartzitic sandstones and dolomites. The age of the Bahram Formation in Isfahan area comprises the Givetian, Frasnian to different stages of Famennian (Yazdi et al., 2000; Gholamailan, 2003, 2005, 2007; Adhamian, 2003; Boncheva et al., 2007; Bahrami et al., 2014, 2015; Königshof et al., 2016; Ernst et al., 2016).

Generally the sections in Central and East Iran exhibit an evolution from a shallow carbonate-dominated shelf in the Silurian, which was transformed into a siliciclastic shelf during the Early Devonian. Fully marine (mainly shallow marine) conditions occurred during the Middle Devonian to the Early Frasnian and persisted into the early Late Carboniferous. Correlation between all the studied profiles of Isfahan province with presence of sandstones, sandy limestones, dolomites including: brachiopods, tentaculids, ostracods, gastropods, vertebrate micro-remains, crinoid remains, corals, trilobites and conodonts, show that the Central Iranian plate has been placed at the marginal part of the Gondwanan lands with shallow depositional facies. Epirogenic movements of Hercynian phase in North Gondwana acted as pre-Permian erosions in all referenced records that show the sea level fluctuation effects due to the vertical movements of Hercynian phase.

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