

## **Devonian stratigraphy and Depositional environment of the Moesian Platform, NE Bulgaria**

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The Devonian sequence of the Moesian Platform in Bulgaria and Romania represents a part of the pre-Variscan sedimentary cover which overlies the Proterozoic metamorphic basement. A total of sixteen boreholes have been run in different parts of the Devonian.

The Lower Devonian, together with the Silurian, consists of dark shales, siltstones, and minor limestones and sandstones (calcareous-terrigenous-clayey formation). The age assignment of this formation is based on chitinozoans, acritarchs, miospores, graptolites, and conodonts.

Predominantly carbonate rocks (limestones and dolostones) and rare evaporites (anhydrites) build the Middle and Upper Devonian successions. They were subdivided into the following formations from bottom to top: carbonate-sulphate formation, dolomite formation, formation of banded limestones, formation of intraclastic and peloidal limestones, and formation of organogenic limestones. The lower clayey-carbonate package of the carbonate-sulphate formation consists of clayey limestones and shales of Eifelian age and the upper parts of this unit consist of Givetian dolostones, limestones, anhydrites, and scarce shales. The dolomite formation includes mainly dolostones and limestones, also of Givetian age. The formation of banded limestones consists of banded micritic limestones related to Upper Givetian and Lower Frasnian. The uppermost part of the Devonian is represented by the formation of intraclastic peloidal limestones (Frasnian-Famennian) and the formation of organogenic limestones (Famennian). The Middle and Late Devonian ages of these formations were mostly proved by conodont faunas and less commonly by brachiopods and foraminifers. Sedimentary features and conodont evidence indicate the presence of numerous erosional surfaces and stratigraphic hiatuses within the Middle and Upper Devonian carbonate sequence.

The siliciclastic sediments of Silurian and Early Devonian age (calcareous-terrigenous-clayey formation) are regarded as formed in deep-water open-marine to shallow shelf settings. Middle Devonian successions are interpreted as inner- and mid-ramp deposits developed in a shallowing-upward sequence. Eifelian carbonate sedimentation (clayey-carbonate package of the carbonate-sulphate formation) occurred in an open-marine setting below normal wave base (mid-ramp zone) which is gradually replaced by a shallow open-marine environment above normal wave base (inner-ramp zone). The shallowing tendency continued during the Givetian when carbonate-evaporite sediments precipitated under arid climate conditions (carbonate and evaporite packages of the carbonate-sulphate formation). Deposition took place in a low-energy tidal-flat setting (back ramp) with restricted or semi-restricted water circulation and locally developed supratidal sabkha evaporites. Repeated alternation of subtidal, intertidal, and supratidal successions observed in the well sections suggests a cyclic character of the Givetian sedimentation. Tidal-flat deposition continued later during the Givetian and Frasnian (dolomite formation, formation of banded limestones and formation of intraclastic and peloidal limestones) but without distinct evaporite precipitation. However, carbonate pseudomorphs after gypsum crystals observed in some intertidal/supratidal sediments indicate that arid climate conditions still existed. Finally, the Famennian carbonate deposition (part of the formation of intraclastic and peloidal limestones and the formation of organogenic limestones) reflects a gradual transition to open-marine shallow and deeper-water settings.

With the final of the carbonate sedimentation in the Early Carboniferous, the whole Devonian underwent intense folding, vertical and horizontal displacement as a result of the Variscan orogenic events.