Silurian facies and paleogeography in the broader Black Sea region: implications for shale gas exploration

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Silurian black shales in Poland attracted lately a lot of companies interested in unconventional shale gas exploration. Whereas these shales have been previously studied in details in Poland, considerably less known about the extension of the Silurian basin towards the Black Sea region in the SE, in Ukraine, Romania, Moldavia and Bulgaria.

The challenge to compile a regional-scale understanding of the Silurian paleogeography only partially stems from the fact that the area belongs to so many different countries. Another issue is that the present day collage of Silurian basin fragments is the result of several orogenies in Central and Eastern Europe.

However, the distal segments of a large Silurian foredeep basin, trending NW-SE can be reasonably followed along strike from Poland to Ukraine and Moldavia, all the way to the Black Sea coast. The foredeep basin sequence is onlapping to the NE on top of various basement units and its flexural origin, besides typical subsudence curves, is also supported by the influx of distal turbidites into the basin from southwest sources. There appears a lateral shift along strike as well which corresponds to the facies transition of deepwater shales to neritic carbonates along the perimeter of the foredeep basin.

The proximal parts of the Silurian basin are much harder to reconstruct. However, considering a recent model of the Jurassic evolution of the European passive margin appears to simplify the paleogeography of the Silurian considerably. In particular, a minimum closure reconstruction of the Bohemian (Austria, Czechia, Slovakia and Poland) and Moesian (Romania and Bulgaria) passive margins prior to the opening of the oceanic Magura Basin is fairly well constrained by the geometry of these conjugate margins. Moesia, as a microplate, was separated from the European (Bohemian) margin during the middle Jurassic and drifted to its present day position some 800 km towards the SE by mid-Cretaceous times. Therefore, the proper paleogeographic reconstruction of the very large Silurian foredeep basin has a major impact on the unconventional shale gas potential of Central/Eastern Europe.