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## Geochemical and palynological assessment of Oligocene Mezardere formation: Implications to petroleum source potential and paleoenvironmental link to eastern paratethys, thrace basin of NW Turkey

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**Statement of Problem:** Paratethys extent from western Central Europe to Mangslak area in Kazakhistan. Clastic and organic rich Oligocene Mezardere Formation (MF) is located on this framework but its link to Paratethys have not established yet. The MF is relatively thicker (1000-1500 m) than its coeval source rocks in the Paratethys.

**Aim:** The purpose of the study is to select the most organic-rich intervals of the MF and to evaluate their hydrocarbon source potential and to investigate the link between Paratethys and the MF.

**Methodology:** In this paper, the early/marginally mature cutting samples of the MF are geochemically, petrographically and palynologicaly analyzed and utilized.

**Findings:** The MF was informally subdivided into Solenovian transgressive UMF upper MF and Psekhian regressive LMF lower MF, based on the distinct differences in geochemical proxy indicators for sea level variations as well as Palynological data. The UMF is characterized by abundant Wetzeliella gotchti and Pediastrum spp. occurrences that suggest fresh water (rainfall) input as happened the source rocks of the Central and Eastern Paratethys, whereas, the LMF without Wetzeliella gotchti is characterized by normal marine conditions. Organic-rich layers are observed in UMF that showed a fair to good source rock potential (Average TOC=1.14 wt.%; HI=283 mg Oil/g TOC) and low to moderate genetic petroleum potential (GP=3.65 mg oil/g rock) and source potential index (SPI=1.44 t Oil/$m^2$). The LMF was not evaluated due to their apparently low organic-richness.

**Conclusion & Significance:** Organic geochemical data may be utilized to select transgressive and organic-rich units when the source rock candidate has considerable thickness. The UMF shows both conventional and unconventional oil potential. The results achieved provide a much-improved understanding of paleoenvironment of the Eastern Paratethys and will be useful in integrating information from this unique locality with that from the extensively studied Central-Eastern Paratethys.

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## Effect of polymer additives as foam stabilizer for $CO_2$ foam flooding

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Polymer enhanced foam (PEF) provides an additional strength over conventional $CO_2$ foams for mobilizing oil from the unswept low permeable oil rich zones during an enhanced oil recovery process. The efficiency of the process depends on two major factors i.e., stability and apparent viscosity of PEF. In this study, an experimental investigation of apparent viscosity and stability of polymer enhanced $CO_2$ foam is presented with an objective to access the polymer performance and to identify the best performing polymer under reservoir conditions of 1500 psi and 80°C. For this purpose, a conventional standard HPAM polymers and an associative polymer i.e., Superpusher P329 were used in combination with a widely used foamer i.e., alpha olefin sulfonate (AOS) and a foam stabilizer i.e., betaine. Foam stability tests were conducted in the presence of crude oil using FoamScan. Whereas for foam rheological study, a high pressure high temperature Foam Rheometer was utilized and the foam was sheared over the range of 10 to 500 sec-1 inside the recirculating loop. As compared to other HPAMs, an associative polymer i.e., Superpusher P329 significantly amplified foam longevity and provided a more prolonged liquid drainage. A shear thinning behavior was observed for the entire range of shear rate tested and for both kind of polymer. HPAMs were found ineffective and the PEF viscosity was found equivalent to that of polymer free foam. Superpusher P329 showed interesting combination with AOS and significant viscosity enhancement has been reported in this paper.

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