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Eustatic, geodynamic and palaeoclimatic controls on organic-rich facies development: insights from the western former Soviet Union

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Determining the controls on the spatial and temporal distribution of ancient organic-rich sedimentary deposits are of great importance to our understanding of palaeoceanographic and palaeoclimatic processes. Equally, understanding the development of organic-rich facies is critical for the optimal exploration and exploitation of petroleum systems. In the stratigraphic record of the western former Soviet Union a number of organic carbon-enriched horizons are known, many of which can be correlated using biostratigraphically-constrained sequence stratigraphy with similarly organic carbon-enriched horizons in other parts of the world. Here, we demonstrate how eustatic, geodynamic, and transient palaeoclimatic processes can explain the spatial and temporal distribution of these facies.

In the western former Soviet Union, organic-rich facies are known from a number of key stratigraphic intervals, including the Late Oligocene-early Miocene (the Maykop and Diatomaceous Suites), the Upper Jurassic-Lower Cretaceous (the Bazhenov Formation and equivalents), the Upper Devonian (Domanik type facies), and the early Toarcian (the Togur Formation).

The development and distribution of dysoxic/anoxic conditions during the deposition of the Oligocene-Miocene Maykop facies of the Para-Tethys region, and the Jurassic-Cretaceous Bazhenov Formation of West Siberia, is most readily explained as a consequence of palaeoceanographic changes (such as basin isolation) controlled by regionally important geodynamic processes. By way of contrast, the development of the Upper Devonian and early Toarcian organic-rich facies owes more to transient

global palaeoceanographic and palaeoclimatic events which led to globally distributed oceanic anoxia and enhanced preservation of organic carbon.

2^{nd} and 3^{rd} order sea-level fluctuations can be shown to have exerted an important depositional control on the development of organic carbon-enriched horizons. Furthermore, in the case of the early Toarcian, we can also demonstrate that palaeoclimatic changes associated with the development of global oceanic anoxia may have been responsible for *driving* global eustatic change.