

Rift-to-drift transition in the Early Carboniferous of north-eastern Siberia: the evidence from the sedimentological record

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The study area is located on the northeastern margin of the Siberian Craton. Here at the end of Devonian (Frasnian-Famennian) evolution of previously existed east Siberian Craton passive margin was interrupted by intense rifting event accompanied by eruption of mafic volcanics and formation of local fault-bounded uplifts and depressions. The Early Carboniferous time was marked by a marine transgression. Carbonate sedimentation was widely distributed with accumulation of a 200-metres thick complex of Tournaisian limestones. Visean deposits are found only in the northeastern part of the study area, where they unconformably overlie Tournaisian limestones. Lower Visean Krestiakh and Atyrdakh formations are composed of sandy turbidites (up to 200 m thick) and cherts (up to 50 m thick) respectively, pointing to reactivation of the Late Devonian rift-related uplifts and depressions. New rifting phase resulted in uplifted shoulders, steep topography and intense sediment input. During early Visean, the northern part of Siberia shelf was incised by a system of submarine valleys.

In the latest Early Visean significant changes in depositional environments occurred. Siltstones with interlayers of sandstones were deposited (thickness is up to 150 m) primarily in prodelta environment during Late Visean- Early Serpukhovian. They conformably overlie different types of the Lower Visean deposits showing disappearance of local uplifts and depressions. This shift in sedimentary environments corresponds to rift-drift transition and point to the initial phase of passive margin evolution.

This conclusion is also supported by provenance study (U/Pb dating of detrital zircons, bulk-rock chemistry and thin sections analyses). According to these data significant changes in the provenance area occurred in the Late Visean showing substitution of local provenance area which was the main source for clastics in the Early Visean to the distal source of clastics prevailed during Middle and Late Carboniferous.

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