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On the Mesozoic deformations of the Central and Southern Taimyr fold-thrust belt

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The Taimyr fold-thrust belt is located to the north from the Siberian platform and separated from the latter by the Enisey-Khatanga depression. The Taimyr fold-thrust belt contains sedimentary and magmatic rocks varying in age from Neoproterozoic to Mesozoic with several rifting and orogenic events. Although tectonic evolution of the Taimyr fold-thrust belt was strongly revised since the first compilation presented by Pogrebitskiy (1971), most tectonic models are based on the predominance of Precambrian and Hercynian orogenic events with some tectonic reworking during Mesozoic, most typical for the Southern Taimyr (e.g. Pogrebitskiy, 1971, 1998; Vernikovskiy, 1996). However, Zonenshain et al. (1990) argued for a strong Mesozoic tectonic event.
During 2005-2012 authors participated in extensive structural studies of the Central and Southern Taimyr supported by the State geological mapping project and by TGS ompany. The main results are summarized in the following points:
1. Pre-Vendian rock units contain numerous complex folds of different scale with evidence for refolding. Folds in the overlying Vendian and younger rock units have much more simple geometry.
2. The only clear angular unconformity in the sedimentary succession of the Central and Southern Taimyr is between Vendian and underlying rocks. Vendian – Triassic succession does not contain unconformities, although some hiatuses may occur.
3. Pre-Rhaetian unconformity (previously interpreted as pre-Jurassic – see Liutikov et al. 2009, Sobolev et al. 2009) that is very small and often is not recognized in natural outcrops (e.g. on Tsvetkova Cape) may be related to extension event as well as to compression event.
4. Folds in Cambrian up to Upper Permian rock units have very similar geometry and do not show evidence for multy-stage deformation. Deformations greatly decrease southward and in the Southern Taimyr Permian and Triassic rocks are folded more gently than lower Paleozoic rocks.
5. Stress axes orientation estimated from the fracture study in Riphean rocks in the Central Taimyr and Permian up to Upper Jurassic sediments in the eastern part of Southern Taimyr (The Tsvetkova Cape Area) is very similar.
6. In the eastern part of Southern Taimyr all compression-related structures were affected by a younger extension (Khudoley et al., 2009; Zastrozhnov, 2012)
Thus, structural data confirm occurrence of at least one regional-scale compressional event within the Central Taimyr during pre-Vendian time. Locally several stages of deformation are recognized. However, no structural evidence for Hercynian orogeny in the Central and Southern Taimyr has been found. Granite intrusions, previously interpreted as Carboniferous, are ca. 250 Ma and may be presumably linked to the Norilsk trap LIP magmatic event. Similarity in fold geometry and stress axes orientation shows that Vendian and younger rocks up to Permian in the Central Taimyr as well as Permian and Mesozoic rocks of the Southern Taimyr were mainly deformed during Mesozoic (Early Cretaceous) compressional event, also recognized by brittle fractures in the Riphean rock units. The final extension best documented in the Tsvetkova Cape area likely reflects opening of the Laptev Sea rifted sedimentary basin in Late Cretaceous-Cenozoic.