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Timing and extent of glaciation since the LGM in the Kalguty Basin, Ukok Plateau, Russian Altai mountains

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Located in Asia where Russia, China, Mongolia, and Kazakhstan share a border, the Altai Mountains are composed by high ranges peaking at 4,506 m (Belukha), still glaciated large plateaus and deep valleys. With more than 1000 km^2, the Altai glaciers represent 50 % of the glaciated area of North Asia. Although because of repeated occurrences of glacial megafloods during the Pleistocene have been intensively studied in Russian Altai, the chronology and extent of its glaciations are poorly understood compared to other Central Asian regions.

In relation with archaeological researches developed by the Russian-French team ARTEMIR, we investigated the upper Kalguty basin located in the south-eastern part of the Ukok Plateau, Russian Altai. Along the border with Mongolia, the elevation of this very dry area (100 mm/a) ranges from 2300 to 3500 m. Although current glacier area is < 0.25 km^2, many glacial landforms allow reconstructing past glaciations in the upper Kalguty basin. A detailed geomorphological study was carried out on the field in July 2015, and rock samples were taken on scoured bedrock and erratic boulders at one key site for surface exposure dating using in situ-produced cosmogenic nuclides.

The maximal extent of the Kalguty valley glacier in the upper basin occurred shortly before 20.9 ka. As evidenced by moraines and kame terraces located higher on one valley side, larger and earlier, but not dated, glaciations occurred prior to the ∼21 ka Kalguty Glacier advance. On the other hand, three morainic complexes testify to smaller advances corresponding to a reduced Kalguty glacier and two smaller valley glaciers. Reconstructed ELAs of these former glaciers were used to infer their Late Glacial extents ages and the corresponding regional palaeoclimatic conditions.
The results regarding the chronology and extent of the Kalguty Basin glaciations since the LGM are discussed by relating them to other regional studies in the Altai Mountains and Central Asia.