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Modern and past periglacial features in Central Asia and their implication for paleoclimate reconstructions

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In the cold and continental areas of Central and High Asia periglacial landform assembles, sediment structures and processes are mainly influenced and determinated by the existence of soil humidity during the freeze-thaw cycles. This results in cryogenic processes and periglacial landforms such as earth hummocks, patterned ground or solifluction. The distribution of rock glaciers as clear indicators of permafrost is also determined by rock fall or moraine debris composed of large boulders (e.g. granite). Periglacial features and landforms have been used to reconstruct past climatic conditions, e.g. relict involutions and ice-wedge casts provide evidence for the distribution of former permafrost, e.g. for the Last Glacial Maximum. Past temperatures, e.g. mean annual air temperatures, can be estimated from these periglacial features. Examples from late Holocene solifluction activity in the Altai, Khangai, and north-eastern Tibetan Plateau show different intensity of solifluction processes during the Late Holocene and Little Ice Age by decrease of temperature and more soil humidity. The distribution of past permafrost in some regions is still a matter of debate due to different interpretations of sediment structures: Sometimes features described as ice-wedge casts may be caused by roots or desiccation cracks due to drying of clay rich sediments. Seismically deformed unconsolidated deposits (seismites) can also be misinterpreted as periglacial involutions. The lack of certain landform assemblages and sediment structures does not necessarily mean that the area had no permafrost as moisture conditions also to a large degree govern periglacial landform generation and not only temperature. They can be ordered in Central Asia as follows (from highest moisture availability to lowest): solifluction - rock glacier – permafrost involutions – ice-wedge casts – sand wedge casts.
Reference:
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