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Are the stair case terraces in the Inylchek Valley (Central Tien Shan, Kyrgyzstan) of neotectonic or sedimentary origin?

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In 2011 we performed fieldwork at the Global Change Observatory "Gottfried Merzbacher" east of Gribkov Base. High-resolution satellite images show at least six ridges which can be traced on the northern slopes of the Inylchek Valley. These ridges parallel each other and are intersected by smaller erosional valleys. Detailed mapping of outcrops in the tributary valleys revealed intensively folded Paleozoic formations overlain by glacial and fluvioglacial deposits of a thickness of tens of meters. From the sedimentological point of view we differentiate between kame terraces (KT), which are defined as depositional terraces perched on valley sides, deposited by meltwater streams flowing between lateral glacier margins and the adjacent valley wall, and fluvial terraces (FT), deposited above the niveau of the present Inylchek River.

In the investigated sector of the Inylchek Valley we mapped FT1 and FT2 above the recent valley floor of the braided Inylchek River. These terraces intersect with the debris fans of the tributary streams. Up the northern hill we mapped at least four higher ridges, which are interpreted as remnants of kame terraces. The first and second of these higher ridges do not differ significantly in altitude and are therefore considered remnants of KT1a & b, followed up by two higher kame terraces KT2 and KT3. Each kame terrace represents one distinct stage of deglaciation of the valley glacier in the Southern Inylchek Valley. When another lower kame terrace was deposited, the higher terrace partly eroded along the valley wall and finally turned into a ridge. The observation that former fluvioglacial terraces today form ridges between incised valleys provides an example for an inverted relief.

From the morphology of six ridges on the northern slope of the Inylchek Valley we derive the following succession of glacial and periglacial processes:

1) The highest kame terrace 3 (KT3) was deposited between the glacier margin of the former Inylchek Glacier at 4000 m altitude and the adjacent valley wall.
2) The next lower kame terrace (KT2) at about 3920 m altitude documents the deglaciation of the Southern Inylchek Glacier by 80 metres.
3) The lowest kame terrace (KT1) is preserved at an altitude of 3850 m a.s.l., indicating that the Southern Inylchek Glacier melted down another 70 metres.
4) After the retreat of the Glacier at least two fluvial terraces document proglacial sedimentation in a braided river system of the Inylchek Valley (upper fluvial terrace FT2 and lower terrace FT1).
5) In the studied Gribkov sector the recent Inylchek River eroded FT1 by three meters.

Despite the fact that many recent, historical and paleo-earthquakes have been recorded in the Northern and Central Tien Shan, and that many scarps and even terraces may have resulted either from slides or from neotectonic tilting, we do not interpret the set of multiple ridges on the northern slope of Inylchek Valley as of tectonic origin but present arguments for their fluvioglacial evolution.