



## **Polygonal sandstone ridges networks origin and glaciodynamic implications : a case study from hirnantian glaciation, Djado basin (Niger).**

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The Late Ordovician glaciation was characterized by the setting of an extensive grounded ice sheet, on the Gondwana continental shield. The ice sheet was centered near the southern pole. Numerous evidences of this glaciation has been reported from Sahara and particularly in northeastern Niger, in the Djado basin, an asymmetrical intracratonic syncline-shaped basin. In the studied Djado basin area, evidences of the Hirnantian glaciation are recorded in the Felar-Felar Complex. The Felar-Felar Complex is bounded by two glacial unconformities. This complex overlapped original structures which are sandstone ridges several meters high, about ten meters wide and hundreds meters long. These structures have not been mentioned in the saharan glacial litterature. These sandstone ridges are organised in polygonal networks, their upper surface is rounded and convex-up. They consist of homogeneous massive sandy glacial abrasion products and they occasionally present climbing ripples, flute casts and dessiccation cracks alongside their steep flanks. The Felar-Felar Complex consists of microconglomeratic clays and overlapped on sandstone ridges. The complex is related to the interglacial period and documents an ice sheet melting event. Detailed analysis evidences that the second glacial unconformity surface, located in the sommital Felar-Felar Complex, documents an later ice front advance on a soft bed. Structural analysis demonstrate that some sandstone ridges have been deformed during the later glacial event, which is related to the activity of a paleo-ice stream. The deposition of the silurian marine clays marked complete deglaciation. Sandstone ridge polygonal networks have been described in glacial environments and are specified as

crevasse-squeeze ridges. According to recent analogues, these structures correspond to the moulding of basal ice crevasses. They are generated by subglacial overburden sediments squeezing-up into glacial crevasses. Recent crevasse-squeeze ridges are likely to be formed in post-glacier surge or ice stream quiescence periods, and ice radial extension periods during ice melting. They are also related to paleotopographies. However, their preservation requires ice *in situ* melting. These structures evidenced in the Djado basin are an example of former crevasse-squeeze ridges, generated by the Late Ordovician ice sheet.