



A Permian glacial episode in Oman: palynologic study and of the Permo-Carboniferous glaciolacustrine Al Khlata Formation (Sultanate of Oman). Palaeoclimatic modelling and palaeoenvironmental context

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The Earth has known a particular paleogeography at the end of the Paleozoic. Most of continents joined during the Late Carboniferous and formed the Permian Pangea “supercontinent”. At the same time, the Earth suffered one of the largest glaciation which lasted from the upper Carboniferous to the lower Permian. Glacial and periglacial deposits found in many sites of the Carboniferous-Permian Gondwana (South Africa, Brasil, India, Australia) attest of such a glaciation. A lot of work has been done on the South African Dwyka Formation, which corresponds to one of the thickest glacial sedimentary formation corresponding to the Permo-Carboniferous glaciation.

To improve our knowledge about the Permo-Carboniferous glaciation, one of us (Fluteau) has performed a set of numerical experiment using a 3D climate model (LMDz atmospheric General Circulation Model). Accounting for boundary conditions (paleogeography, CO₂, solar constant, sea surface temperature), which appears to be reasonable for the Permo-Carboniferous epoch, we are able to simulate perennial snow over a large part of Gondwana, where glacial deposits have been found. The southern part of the Arabic Peninsula is located at the northern edge of the ice-sheet, at a latitude of about S40° during the Late Carboniferous and S30° during the Asselian-Sakmarian transition.

To better understand the environmental condition in which the ice-sheets in Oman

appeared, we have studied a flacustrine-glacial succession: the Al Khlata Formation located in central Oman. This succession lies on a well preserved striated pavement. Two glacial episodes have been dated by palynology: Late Stephanian and Asselian / Sakmarian. One question remains to be solved: what is the origin of the Asselian / Sakmarian glacial deposits? Such deposits are in accordance with the last climatic modelling but do they correspond really to the northernmost margin of gondwanan indlandsis, at a location of 30° south latitude calculated for this Permian period, or to isolated mountains glaciers.

To determine the paleoenvironmental modifications during this late Carboniferous - Early Permian time of deposition in central Oman, we sampled the outcrops of the Al Khlata Formation for palynological analyses. The rich palynologic contents (spores, pollen grains, and plant cuticles) have been studied to reconstruct the environments contemporaneous to the two recognized glacial episodes.

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