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A first ^{10}Be cosmogenic glacial chronology from the High Atlas, Morocco, during the last glacial cycle.

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Glacial geomorphological mapping, ^{10}Be cosmogenic exposure ages of 21 erratics from cirque-valley systems and paleo-glacier climate modelling in the High Atlas Mountains, Morocco (31.1˚N, 7.9˚W), provides new and novel insights as to the history and evolution of the largest desert region on Earth. The Atlas Mountains display evidence of extensive and multiple Late Pleistocene glaciations whose extent is significantly larger than that recognised by previous workers. The largest glaciers formed in the Toubkal massif where we find 3 distinct phases of glacial advances within the last glacial cycle. The oldest moraines occurring at the lowest elevations have yielded eight ^{10}Be ages ranging from 30 to 88 ka. Six of eight samples from moraines at intermediate elevations gave ages of 19 to 25 ka (2 outliers) which correlates well with the global Last Glacial Maximum (*ca.* 26-21 ka) and the last termination during marine isotope stage 2. Five erratics from the youngest and most elevated moraines yielded a suite of normally distributed exposure ages from 11 to 13 ka which supports a correlation with the northern hemisphere Younger Dryas (12.9-11.7 ka). The glacial record of the High Atlas effectively reflects moisture supply to the north-western Sahara Desert and can provide an indication of shifts between arid and pluvial conditions. The plaeo equilibrium line altitudes (ELA) of these three glacier phases was more than 1000 m lower than the predicted ELA based on today's temperatures. Glacier-climate modelling indicates that for each of these glacier phases climate was not only significantly cooler than today, but also much wetter. The new evidence on the extent, timing and palaeoclimatic significance of glaciations in this region has major implications for understanding moisture transfer between the North Atlantic Ocean and the Sahara Desert during Pleistocene cold stages.