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Reconstructions of the last deglaciation in the Cantal and the Aubrac mountains (Massif Central, France) and paleoclimatic implications

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During the 20th century, the last glaciation in the Massif Central, France, was documented by several geomorphologists based on intensive field investigations. Seven paleoglaciers were identified, ranging from cirque glaciers in the Velay (4 km^2) to coalescent ice caps (3500 km^2) covering the Cantal, Cézallier and Monts Dore mountains. The associated glacial chronology relied mainly on morphostratigraphic observations and indirect age determination, such as radiocarbon ages from organic sediments in freshly deglaciated landscapes. Our study aims to improve this incomplete glacial chronology in order to reconstruct the paleoclimatic conditions that controlled these glaciations. We focused on the Cantal Mounts (45.0°N, 2.7°E) and Aubrac Mounts (44.6°N, 3.0°E) in the western Massif Central. Glacial landform assemblages and associated morphostratigraphy were re-investigated in the field and updated by new observations, e.g. the identification of end moraines. Three glacial stadials were recognized: the Local Last Glacier Maximum (LLGM) and two glacier re-advances. A final cirque glaciation was identified in the Cantal. We obtained an original set of exposure ages from erratic boulders and depth profiles in till at key sites using *in situ* produced Terrestrial Cosmogenic Nuclides ^{10}Be, ^{26}Al and ^{36}Cl. Our results show comparable glacial chronologies for the Cantal ice cap and the Aubrac plateau icefield suggesting that the majority of glacial landforms and sediments were deposited during the global Last Glacial Maximum (LGM; 26.5 to 19.5 ka) and the Last Glacial-to-Interglacial Transition (LGIT; 19.5 to 11.7 ka). Advances and retreats of these two paleoglaciers were synchronous with regional climatic events reported from independant paleoclimatic proxies, especially the Heinrich Stadial 2 and the Heinrich Stadial 1. We combined two glacier modelling procedures, the theoretical glacier surface profiles and the Positive Degree-Day method, to constrain the paleoclimatic conditions (i.e. paleotemperatures and paleoprecipitations) that controlled these glacial fluctuations. The results showed changes between past and current climatic gradients with a probable enhancement of southerly moisture advection from the Mediterranean during the Heinrich Stadial 2 and drier conditions during the Heinrich Stadial 1.