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LGM and Late Glacial glacier advances in the Cordillera Real and Cochabamba (Bolivia) deduced from ^{10}Be surface exposure dating

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Abstract. Surface exposure dating (SED) is an innovative tool already being widely applied for moraine dating and for Late Quaternary glacier and climate reconstruction. Here we present exposure ages of 28 boulders from the Cordillera Real and the Cordillera Cochabamba, Bolivia. Our results indicate that the local Last Glacial Maximum (LGM) in the Eastern Cordilleras occurred at ~22–25 ka and was thus synchronous to the global temperature minimum. We were also able to date several Late Glacial moraines to ~11–13 ka, which likely document lower temperatures and increased precipitation ("Coipasa" humid phase). Additionally, we recognize the existence of older Late Glacial moraines re-calculated to ~15 ka from published cosmogenic nuclide data. Those may coincide with the cold Heinrich 1 event in the North Atlantic region and the pronounced "Tauca" humid phase. We conclude that (i) exposure ages in the tropical Andes may have been overestimated so far due to methodological uncertainties, and (ii) although precipitation plays an important role for glacier mass balances in the tropical Andes, it becomes the dominant forcing for glaciation only in the drier and thus more precipitation-sensitive regions farther west and south.

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