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Glacial chronologies along the Andes (15-40˚S) based on 10Be Surface Exposure Dating

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We applied 10Be Surface Exposure Dating on moraines along a N-S transect from Bolivia (∼15˚S) to the Chilean Lake District (∼40˚S), in order to determine timing and extent of the last glaciation. In the Cordillera Real and the Cordillera Cochabamba, Bolivia, exposure ages indicate that glacial advances occurred ∼20 ka ago and again at ∼12 ka. We suggest that reduced temperatures played an important role in triggering the glacial advances. Precipitation was probably not a major limiting factor. To the west and to the south, in the rain shadow of the Cordillera Occidental, glaciers become more precipitation-sensitive and advanced synchronous to lake transgressions phases, i.e. during the Late Glacial (Tauca and Coipasa). There is no evidence for glacial advances during the global LGM (Last Glacial Maximum: ∼20 ka). Exposure ages from northern Chile at ∼30˚S (15-12 ka BP) indicate that glacial advances were probably still triggered by increased tropical precipitation, but a more extensive glaciation could be dated to ∼30 ka. This earlier advance clearly predates the LGM and is attributed to increased moisture advection from the Pacific. We tentatively suggest a northward shift and/or an intensification of the westerlies at that time. In the Valle Rucachoroi (39˚S, Argentina) the most extensive moraine also dates to ∼30-35 ka. Apparently, conditions were too dry to trigger significant glacial advances during the LGM. Valleys became ice-free, however, only by ∼15 ka, which we interpret as evidence for rapid warming. A minor re-advance may have occurred at ∼11 ka, probably indicating a short temperature reversal just before the beginning of the Holocene warm conditions. Only south of ∼40˚S, the westerlies seem to have provided sufficient moisture to allow local LGM advances being triggered by low temperatures (i.e. ∼20 ka).