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Developing precise and accurate records of mountain-glacier variations between the hemispheres can help to discriminate among hypothesized drivers of ice-age climate, glacial terminations, and sub-millennial interglacial climate oscillations. Such records are important for placing industrial-age global warming and glacier recession into a meaningful palaeoclimatic context. Here, I present records of mountain glacier behavior and climate change at middle latitudes of the polar hemispheres spanning the past ~30,000 yrs in order to examine interhemispheric phasing of snowline variations during and since the last ice age on orbital, millennial, and sub-millennial timescales. These new records were constructed by employing important advances in ^{10}Be surface-exposure dating techniques, detailed glacial geomorphologic mapping, and glacier snowline modeling. Key conclusions are as follows. (1) There is close correspondence at northern and southern middle latitudes in timing and magnitude of snowline-inferred temperature depression during the last glacial maximum (LGM), suggesting that ice age cooling was synchronous in both polar hemispheres. One possibility is that lower atmospheric CO_2, coupled with the effects of polar-ocean stratification, produced global cooling during the LGM. (2) Rapid rise of Southern Hemisphere glacier snowlines beginning about 18,000 yrs ago was coeval with the northern Heinrich Stadial-1, implicating a bipolar seesaw mechanism for initiating the southern termination. (3) Southern mid-latitude glaciers registered the Antarctic Cold Reversal in antiphase with the northern Bølling-Allerød interstadial, suggesting that a bipolar seesaw mechanism operated in the south over a large geographical footprint. (4) Asynchronous Holocene glacier behavior in the Southern and European Alps reflects southward migration of Earth's thermal equator on orbital and submillennial timescales. (5) Such persistent climate asynchrony since the end of the last ice age implies that globally synchronous warming and glacier recession during the past century is anomalous in the context of detected post-glacial climate changes, and corresponds with the rise of fossil CO_2 in the atmosphere since the beginning of the industrial age.