Micro-hole and multigrain quartz luminescence dating of Paleodeltas at Lake Fryxell, McMurdo Dry Valleys (Antarctica), and relevance for lake history

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Abstract	Relict (perched) lacustrine deltas around the perennially ice-covered lakes in the Taylor Valley, Antarctica, imply that these lakes were up to 40 times larger in area than at present since the last glacial maximum (LGM). These deltas have been used to constrain ice-margin positions in Taylor Valley, and the boundaries of the proposed LGM ice-damned Glacial Lake Washburn. The timing of these high lake levels has depended on 14C chronologies of algal layers within relict lacustrine deltas. To provide additional geochronometric data for the post-LGM lake-level history, we applied photon-stimulated-luminescence (PSL) sediment dating to polymineral fine silt and sand-size quartz from 7 perched-delta and 3 active-delta sites of different elevations along 3 major meltwater streams entering Lake Fryxell. Our PSL dating of 4 quartz-sand samples from core tops in the seasonal ice-free moat of Lake Fryxell (elevation ?18 m a.s.l.) and two core-top moat samples from the seasonal moat of Lake Vanda in nearby Wright Valley establish that adequate PSL clock zeroing (by daylight) occurs in regional, modern shoreline deposits. Minimum-age micro-hole PSL results from the moats are consistently near 100 a. Minimum-age micro-hole age estimates for the deltas range from ?50 to 100 a near the present lake level up to 13.4 ± 1.3 ka at 240 m. These are systematically younger than the comparable, reservoir-uncorrected, 14C ages that range from 7 ka (cal yr BP) to 13 ka (cal yr BP) near lake level up to 20 ka (cal yr BP) at 220?240 m elevation. Our results indicate the occurrence of a dramatic discrepancy between PSL minimum-age and 14C age estimates that is presently unresolved.
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