
Data Repository

**Figure DR1.** Age-depth model for core 4A constructed using the IntCal13 calibration curve (Reimer et al., 2013) and the Bayesian modelling software Bacon (Blauuw and Christen, 2011). Depths do not include the thickness of turbidites and megaturbidites in the core because they were deposited instantaneously (e.g., Enkin et al., 2013). The stratigraphic positions of the four megaturbidites (A-D) and the Mazama tephra (Egan et al., 2015) are shown with vertical, dashed lines. The blue envelopes are probability distributions of the calibrated ages shown as violin plots. The red line denotes the weighted mean age of the model and dotted gray lines the 95% confidence intervals on the age model. Top panel shows (left to right) the log-likelihood of the model fit for the saved iterations of the model, the prior (dashed) and posterior (solid) distribution of accumulation rate, and the prior and posterior distribution of the autocorrelation in accumulation rates (memory).

**Figure DR2.** Age-depth model for core 6A constructed using the IntCal13 calibration curve (Reimer et al., 2013) and the Bayesian modeling software Bacon (Blauuw and Christen, 2011). Depths do not include the thicknesses of turbidites and megaturbidites in the core because they were deposited instantaneously (e.g., Enkin et al., 2013). The blue envelopes are probability distributions of the calibrated ages shown as violin plots. The red line denotes the weighted mean age of the model and dotted gray lines the 95% confidence intervals on the age model. Top panel shows (left to right) the log-likelihood of the model fit for the saved iterations of the model, the prior (dashed) and posterior (solid) distribution of accumulation rate, and the prior and posterior distribution of the autocorrelation in accumulation rates (memory).

**Figure DR3.** CHIRP seismic profiles from tracklines 5, 15, and 16 in the southern basin of Lake Crescent (Fig. 2). Five acoustically transparent units of seismic facies 2, correlated to megaturbidites sampled in piston cores, are labeled A through E. Note that megaturbidite C is more readily apparent in these profiles than in those from the northern lake basin (Figs. 3 – 6). Mass wasting deposits along the lake margin slopes (seismic facies 3), outlined with white dashed lines, underlie and grade into the megaturbidites. Vertical tick marks on profiles represent 2 m and horizontal marks represent 100 m, assuming an acoustic velocity of 1500 m/s.

**Figure DR4.** Photomicrograph of sediment smear slide from the center of turbidite 10 in piston core 6A (Fig. 9). The abundance of planktonic diatoms, predominantly of the genus *Auloacoseira* (J. Anderson, personal communication, 2018), is consistent with turbidite genesis resulting from the remobilization of lacustrine sediment derived from the margins of the lake.
rather than from fluvial sediment input (e.g. during meteorologic floods). Field of view is approximately 4 mm across.

**Figure DR5.** Correlation of turbidites between the southern (cores 5A, 6A, 6B) and northern (cores 7C, 2A, 8A) basins of Lake Crescent. Dates shown are cal yr BP. Cores are missing strata deposited in the past hundreds to over a thousand years due to disturbance during the piston coring operation. The thinner turbidites in the northern compared to the southern basin reflect lower rates of background fluvial sediment input, and the resulting thinner sedimentary cover on subaqueous slopes available for remobilization and transport to the deep lake floor during earthquake shaking.

**Table DR1.** Core locations.
Core 6A

Event-free depth (cm)

Age (cal yr BP)

Megaturbidite A

acc.shape: 1.5
acc.mean: 10

mem.strength: 4
mem.mean: 0.7
105 2cm sections
Aulacoseira sp.