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OXYGEN ISOTOPE, SEQUENCE STRATIGRAPHIC AND BIOSTRATIGRAPHIC CONSTRAINTS ON PALEOTEMPERATURE AND PALEO ICE VOLUME DURING THE TERMINAL ORDOVICIAN GLACIAL EPOCH

Previous work in the Ely Springs Dolomite (Nopah Range, CA) identified several potential sequence boundaries. Carbon isotope variation and biological assemblages provide additional constraint for precise correlation of these sequence boundaries to other Late Ordovician successions in the Great Basin and elsewhere, supporting an eustatic origin. Of particular importance are the initiation and termination of the final phase of glaciation, which can be correlated within ~1m on the basis of carbon isotopes to the Hanson Creek Formation in the Monitor Range (NV).

Oxygen isotope ratios ($\delta^{18}O$) from the lower two-thirds of the Nopah Range Ely Springs Dolomite succession vary within the range -3 to -2‰ (vs. PDB), with no resolvable pattern of variation. The $\delta^{18}O$ values display a positive shift of ~0.8‰ at 175m-in precise coincidence with a major sequence boundary-and remain near this level through the next 27 meters. The $\delta^{18}O$ values drop nearly 4‰ through the interval 202-209 meters, returning to -2.5‰ at the top of the studied interval (217m). The $\delta^{18}O$ variation shows no correlation with the limited mineralogical variation found in the section.

The precise coincidence of major sequence stratigraphic levels with resolvable shifts in $\delta^{18}O$ values suggest that $\delta^{18}O$ variation in the upper Ely Springs Dolomite records secular variation in paleotemperature and/or paleo ice volume during the Late Ordovician glacial epoch. The positive $\delta^{18}O$ shift at the 175m level suggests approximately 3ºC cooling of sea surface temperature, or the onset of major continental ice accumulation with more limited temperature change. The rapid negative shift in $\delta^{18}O$ recorded at 202 m suggests massive influx of glacial meltwater during continental deglaciation. Analysis of additional samples (in progress) from high-resolution transects through these key intervals may provide a more accurate basis for evaluating the relative importance of temperature and ice volume change as interpreted from the $\delta^{18}O$ record.