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Magnitude of Sea Level Changes: A perspective from the Paleozoic

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A global synthesis of Paleozoic sequence-stratigraphic and sea-level data has led to the awareness of various problems associated with estimating the magnitude of eustatic events in the past where stable isotopic data used as ice-volume proxy is either rare or replete with diagenetic changes. In addition, tectonic and sedimentary backtracking that has its own, often large, inherent errors, may not be always possible. In such cases what solutions can be offered to reconstruct a meaningful eustatic curve for the Paleozoic and what lessons can be learned that are relevant to Meso-Cenozoic? For the Paleozoic an approach can be undertaken to address two separate issues. 1) The long term envelope of the sea-level changes driven by long-term tectonic processes; and 2) The third- and higher-order eustatic sea-level changes (driven by glacial and other, unknown, processes) that can be documented widely (i.e., gleaned from the world-wide data). Although individually each data-set on which the long-term envelope can be based is relative, a long-term curve based on global continental flooding estimates and stacked regional sea-level data, as well modeling results for mean age of the oceanic crust seem to yield consistent results. For the shorter-term eustatic changes, estimates from reference districts (or sections) for various time slices (at localities where tectonic quiescence prevails or corrections can be made for local tectonics and where the eustatic signal is thus more likely to be preserved) seem to be the best approach. In addition, categorizing third-order sea-level changes as major, medium and minor may be the only meaningful solution, considering the margin of errors involved. Eventually, the designated sections could be back-tracked, where possible, for more refined estimates in future. These and other issues related to the magnitude of eustatic changes as they relate to the Paleozoic but also contain lessons for

the Mesozoic and Cenozoic will be discussed.