

AN UPDATED GEOCHRONOLOGICAL SYNTHESIS OF THE WORLD'S NEOPROTEROZOIC GLACIOGENIC DEPOSITS

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Neoproterozoic glaciogenic deposits are identified on all present continents and nearly all of the cratons in existence at that time, and may indicate two or more globally engulfing ice ages. Nonetheless, reliable geochronological constraints for these units are generally lacking or one-sided, permitting the alternative possibility of many episodes of merely regional-scale glaciation. A recently updated geochronological database (rejecting whole-rock determinations on shale) pertaining to about 80 allegedly glaciogenic Neoproterozoic deposits forces revision to the previous notion of three broadly identified glacial eras at ca.900 Ma, 800 Ma, and 650 Ma (Hambrey and Harland, 1985). Within present constraints, a minimum number of two globally extensive ice ages may have occurred, at ca.740 Ma (Sturtian) and sometime between 650 and 550 Ma (Varangian or Marinoan). Many of the glaciogenic deposits on the Congo-Sao Francisco cratons, formerly thought to have an age of ca.950-900 Ma, are now demonstrably younger than 900 Ma and may correlate with either of the younger glacial intervals. It is noteworthy that all purportedly glaciogenic deposits with ages definitively in the range 600-550 Ma lie within the Cadomian-Avalonian belt and bear merely circumstantial evidence for alpine ice contact; thus I propose that ages from these regions do not reliably constrain the Marinoan glacial interval (cf. Grotzinger et al. 1995). Near-equatorial paleomagnetic latitudes from representatives of both Sturtian and Marinoan intervals support, but do not prove, the notion of globally engulfing ice ages and correlation of most of the world's Neoproterozoic glaciogenic deposits into only these two episodes.