



Holocene Bond Cycles – real or imaginary?

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There is a lively debate whether multi-centennial to millennial scale climate variations during the Pleistocene and the Holocene were cyclic or not. Based on petrologic tracers of drift ice in the North Atlantic Ocean Bond et al. (2001) postulate the existence of a quasi-regular “~1500 year cycle” during the Holocene being the equivalent of the Pleistocene Dansgaard-Oeschger cycles. The discussion is strongly triggered by the discussion about the most recent transition from the Medieval Warm Period to the Little Ice Age (LIA).

We analysed several long-term proxy data sets and reviewed the available literature investigating the spectral behaviour of proxy timeseries spanning the last 6000 years, the period after the retreat of the big continental ice sheets. With the exception of Australia, multi-century to millennial scale climate cycles in proxy data sets of all continents are interpreted to be associated with the Bond Cycle phenomenon, although a simultaneity can normally not be guaranteed, and the underlying processes are mostly unknown. The overview of our own spectral analyses as well as of those found in the literature shows that a significant enhancement in the number of spectral peaks with a 1500 year period can only be detected in the Northern Hemisphere. An analysis of the solar activity, based on the spectra of two new ^{14}C and ^{10}Be timeseries, shows a significant peak of 208 years (De Vries - Suess Cycle), but no significant spectral power at 1500 years. Based on recent simulation results we postulate that the last “Bond event”, the LIA, was an outstanding phenomenon, likely because of the low orbital forcing in the NH summer, as well as the low solar and high volcanic activity

between AD 1256 and the 19th century. Therefore, the LIA is well suited to study whether or not fluctuations of the Arctic sea ice, and of the thermohaline circulation caused long-term continental or even global climate swings.

Bond, G., Kromer, B., Beer, J., Muscheler, R., Evans, M.N., Showers, W., Hoffmann, S., Lotti-Bond, R., Hajdas, I., Bonani, G., 2001. Persistent solar influence on North Atlantic climate during the Holocene. *Science* 278, 1257-1266.