Ice sheet surge and 25 m rapid sea level rise at YD 13,000 years ago

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As the great continental polar ice sheets of the last ice age retreated the climate moderated while the rate of sea levels rise, over millennia, appeared unremitting and steady. However, over shorter timescales there were episodic surges in sea-level and rapid climate reversals. Younger Dryas (YD) was such a period when warming stalled for over a thousand years and Northern winter temperatures dipped close to ice age colds. It lasted for over a millennium, from about 12,900 to 11,600 years ago. Its effects were wide ranging and global in extent. Speculation on the causes of YD mostly involve, catastrophic, stochastic events. However, YD most likely originated from perturbations in the North Atlantic flow, when deep-water formation through the thermohaline circulation slowed, or at times, completely stopped. Abrupt, severe climate changes similar to YD are well known as last glacial Heinrich events, associated with ice discharge and rapid sea-level rises. At coral islands and tropical continental margins, throughout the Indian and Pacific Oceans, there are two sets of prominent coral reef structures 50m and 100m below present sea-level. They have been identified as drowned reefs where coral growth could not keep up with high rates of sea-level rise. They are also present at the shelf-edge of the Great Barrier Reef. From here, the IODP Expedition 325 was able to recover fossil coral samples. Their uranium-thorium ages indicate a rapid ~25 m surge in sea levels which is likely to have precipitated the YD cold reversal. The rapidity and magnitude of the sea-level rise precludes fresh meltwater cap as the cause and points to substantial ice discharge (Younger-Dryas-Ice-Surge, YD-IS) which also led to heavy winter ice cover and severe seasonality down to mid-latitudes in North Atlantic.