Geophysical Research Abstracts,
Vol. 10, EGU2008-A-11134, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-11134
EGU General Assembly 2008
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Rapid climate change explained by the Tiamat Hypothesis

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The Tiamat Hypothesis postulates that planetary climates are non-linear dynamical systems, with varying negative and positive feedbacks which switch the systems between stable and unstable states.

On Earth, the climate system is dominated by a positive feedback loop caused by the greenhouse effect of water vapour on sea surface temperatures. When the sea surface temperature exceeds a threshold due to solar energy, the result is a runaway situation which is stabilized by clouds cutting off the solar flux. This happens daily in the tropics.

In polar regions that type of runaway does not happen due to the low water vapour pressure of ice. However, if the ice exposing the ocean beneath, a rapid warming can develop, since in polar region there can be continuous solar flux throughout summer.

At the end of the Younger Dryas stadial (YD), northern polar sea ice stretched as far south as Ireland. When that ice melted, it would have happened rapidly due to the positive feedback from the ice-albedo effect. The reduction in albedo would have lead to an warming which would have been amplified by positive feedback from water vapour. This could account for the rapid warming recorded in the ice cores from Greenland when northern hemisphere temperatures rose by about 5K within three years.

The positive feedback from water vapour could also account for the rapid cooling at the start of the YD, and could also explain the rapid warming and cooling that happen during Dansgaard-Oeschger events.

The record melting of the Arctic sea ice in 2007, caused by anthropogenic greenhouse

gases, could be start of a new warming event similar to that which ended the YD.