Geophysical Research Abstracts, Vol. 9, 05437, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-05437

1 Interhemispheric asynchronous phasing of deep sea ventilation at the millennial scale during the last glacial period

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Since the discovery of the so-called Dansgaard-Oeschger events (D-O-events) numerous studies from key locations around the globe have documented that Earth's climate witnessed rapid changes during glacial time periods occurring on a millennial scale. A pole-to-pole comparison using ice cores form Greenland and Antarctica showed a anti-phased behavior when comparing both polar regions. Dating uncertainties largely prevented to identify this bi-polar seesaw in the marine realm. Here, we present a study on asynchronous behavior of two major climate compartments as evidenced in a sediment core form the western Arabian Sea. Based on proxies representing surface and deep ocean variations extracted from the same sediment samples, we show that water mass changes at depth precede those at the sea surface. A comparison with suitable deep-sea records implies that Antarctic Intermediate Water driven ventilation maxima occurred along with the N-Atlantic Heinrich events and the cold phases of the D-O-cycles. This deep-sea ventilation change occurred in large parts of the Indo-Pacific and sharply contrasts the ventilation history in the Atlantic Ocean.