

Southern Hemisphere Climate Modes: ENSO and Indian Ocean Dipole

8TH ICP CONFERENCE, BIARRITZ, FRANCE, 6-10 SEPTEMBER 2004

During the 8th International Conference for Paleoceanography, a special workshop (Conveyor: Anne Müller, University of Queensland, Australia) was held over two afternoons on Southern Hemisphere Climate Modes. The workshop, with approximately 50 participants over two days, had a strong focus on the ENSO and Indian Ocean Dipole modes. Speakers included Luc Beaufort (Cerege Marseille, France), Tom Koutavas (MIT, USA), Rosalind Rickaby (University of Oxford, UK), Anne Müller (University of Queensland, Australia), Masanobu Yamamoto (Hokaido, Japan), Helen McGregor (Bremen University, Germany), Timothee Ourbak (Bordeaux University, France), and Miriam Pfeiffer (GEO-MAR Kiel, Germany). The outcome of this workshop was a summary of current knowledge and gaps in the understanding of Southern Hemisphere climate modes. As an example figure 1 provides an overview of Holocene records of climate change. It was agreed that a focus of future research should be frequencies of ENSO-like climate mean states over glacial cycles, the occurrence of the Younger Dryas in the Southern Hemisphere, the possibility of La Niña-like sea surface patterns, for example, during the Early Holocene, the theory of a suppressed ENSO system during the mid-Holocene, the timing of the onset of the modern ENSO, and the interaction and teleconnection of ENSO and

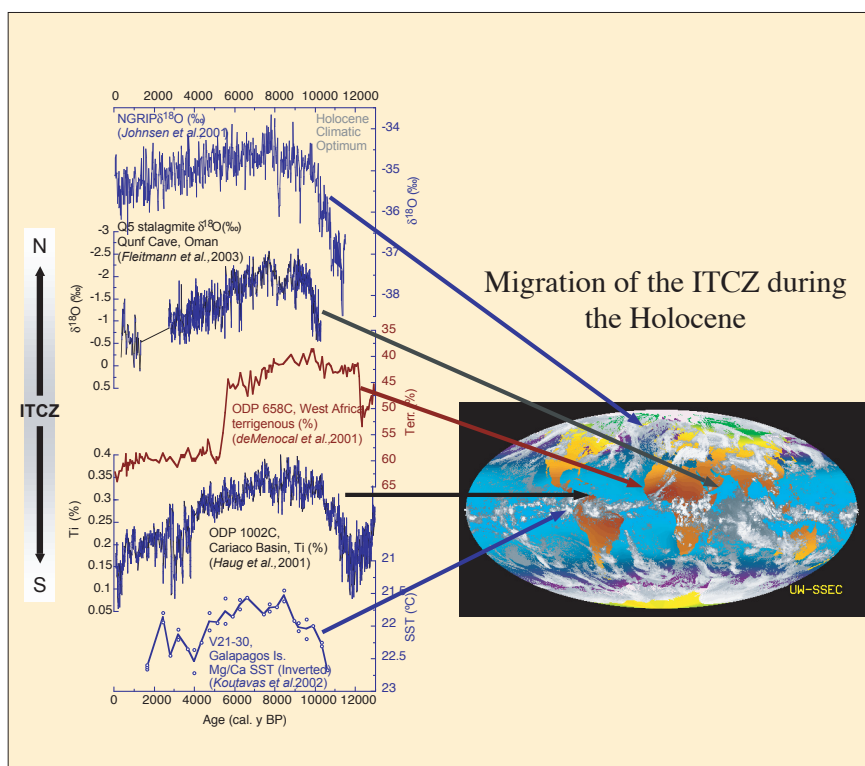


Fig. 1: Holocene records of climate change from (top to bottom) Greenland (Johnsen et al., 2001), the Arabian Peninsula (Fleitmann et al., 2003), West Africa (deMenocal et al., 2000), the Cariaco Basin (Haug et al., 2001) and the Galapagos Islands (Koutavas et al., 2002). The cooling trend over Greenland is accompanied by trends to more arid conditions in the northern tropics since the early-middle Holocene. Specifically, oxygen isotopic enrichment of stalagmites from Oman, rising aeolian inputs in marine sediments off West Africa, and decreasing titanium in Cariaco basin sediments, all indicate an effective decrease in rainfall over the course of the Holocene. These trends are consistent with a progressive southward migration of the Intertropical Convergence Zone (ITCZ) over the Atlantic and Indian Oceans. Cooler sea surface temperatures near the Galapagos Islands between 4,000 and 9,000 years ago indicate increased upwelling and support a more northerly ITCZ in the Pacific as well. The base map shows cloud observations during April 1998, with a prominent circum-global ITCZ near the equator.

Indian Ocean Dipole modes over geological time, and in particular recent time periods covered by paleoproxies such as corals. The participants also agreed that special attention should be given in the future to the use of, and differentiation between, terminology

such as ENSO-like mean states and ENSO-variability

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Holocene Climate Variability and Climate Forcing

HOLIVAR WORKSHOP, KASTANIENBAUM, SWITZERLAND, 23-25 SEPTEMBER 2004

On 23 September 2004, some 40 scientists met for 2.5 days in Kastanienbaum, Switzerland, to discuss Holocene climate variability and climate forcing within the framework of the HOLIVAR (Holocene Climate Variability) project.

The main objectives of this workshop were to identify and quantify

the major forcing factors during the Holocene, to collect evidence for forcing from paleoclimate data, to discuss the role of models in linking climate forcing with climate response, and to develop strategies on how to improve our knowledge of past forcing. The climate system is driven by solar radiation. At the

top of the atmosphere, about 30% of the total incoming solar power is reflected back into space, the rest is dissipated within the Earth system and eventually reemitted as infrared radiation. Since the largest input of solar radiation occurs in the equatorial region, the climate system continuously transports