from the Scottish Fjords show the potential for monitoring past decadal changes linked to the NAO.

Zone 8: The Atlantic-Indian Ocean connection in relation to South African climate was discussed in the context of new sediment records from the Agulhas Current and a submitted IODP drilling proposal.

Future group activities will involve new workshops focusing on specific regions such as the N. African and W. Mediterranean regions and the British Margin, to work on future drilling proposals. We also plan a thematic workshop on the geographical distribution of Heinrich event signatures across the N. Atlantic region by September 2007. An associated workshop on "Fjord Environments: Past, Present and Future" (post Challenger 2006 meeting; www.sams.ac.uk/challenger/) will be held in Oban, UK from 15-16 September 2006.

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# Monitoring Indonesian throughflow variability: Challenges and perspectives

**Kiel, Germany; 19-22 July, 2006**

The transport and thermohaline stratification of the Indonesian Throughflow (ITF, Fig. 1) influence the heat and freshwater budgets of both the Pacific and Indian Oceans, and alter patterns of heat and water vapor exchange with the atmosphere on a global scale. The ITF, which is tightly linked to regional climate systems, such as the El Niño Southern Oscillation (ENSO) and the Australasian monsoon, also plays a central role in the global "conveyor" circulation thereby exerting a critical control on Earth's climate. It is likely that the ITF was substantially modulated by changes in the geometry of the Indonesian pathways due to sea level changes during the Pleistocene and tectonic reorganizations of the archipelago during the Cenozoic. Because of its close link with regional climate systems, it may have also experienced more subtle changes during the Holocene. The processes driving ITF variability and its magnitude are, however, not very well constrained nor is the effect of ITF variability on tropical and extra-tropical climate fully understood.

To address these issues a thematic workshop was held from 19-22 July 2006 at the Institute of Geosciences, Kiel University, Germany, attended by 22 scientists from the U.S., Switzerland, France, Germany, China, India, Indonesia, Timor Leste and Australia. The goal of the meeting was to present an overview of the latest research initiatives on oceanography and paleoceanography in the ITF region, and to outline urgent research goals for the next few years.

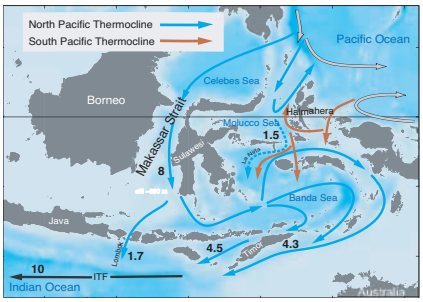


*Figure 1: Main pathways of present-day Indonesian Throughflow at thermocline depth and estimates of total volume transport (in Sverdrups). Modified from Gordon (2005)*

Proxy studies that target the reconstruction of inter-ocean gradients and the transfer of heat, salt and nutrients are crucial. These reconstructions can be accomplished by providing reliable estimates of (1) thermocline structure and temperature in the ITF region, and; (2) ITF circulation changes (intensity, vertical structure of flow and temperature weighted flow). Ultimately, time slice reconstructions should be integrated with modeling studies to evaluate the influence of changing boundary conditions on the ITF (i.e., insolation, volcanic episodes, geometry of passages, sea level), and the linkages between ITF variability and fluctuations in regional and global climate. Time slices of specific interest are:

- Last 50 years
- Little Ice Age (1500-1900) including Tambora eruption (1815) as a marker event
- Medieval Warm Period (1000 AD±200)
- Early Holocene (9 ka)
- Last Glacial Maximum (19-23 ka)
- Specific Marine Isotope Stage (MIS) 3 events
- MIS 5e (122 ka)
- MIS 11 (400 ka)

Longer time series will provide insight into (1) the phasing between ITF variations and other factors: warm pool changes, monsoons, atmospheric $CO_2$ and sea level, and; (2) the ITF response to the "mean state of the tropical Pacific" ("ENSO" thermocline tilt, SST distribution). New IMAGES coring initiatives will focus on regions that still have poor core coverage: Makassar Strait, the southern Celebes Sea, east and west of Halmahera, Molucca Sea, Ninetyeast Ridge and West of Sumatra. Since only a few piston cores in this high accumulation rate region will reach back to MIS 12, the drilling of new IODP Sites in the Timor Sea and Makassar Strait will be crucial for evaluating the impact of tectonic and orbital forcing on regional and global climate.

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