

A NEW INQUA PALAEOCLIMATE PROJECT

‘Land-Ocean Correlation of Long Records from the Southern Hemisphere at Orbital and Sub-Orbital Scales’

Introduction

As Secretary of the new Commission on Palaeoclimate, I have been encouraged to become involved in project formulation. This proposal, that leads on from a previous southern hemisphere initiative, was submitted to the INQUA Executive Committee meeting in March and has been accepted as an official INQUA project for the inter-INQUA period (2003-2007). However, the precise nature and aims are totally open to discussion and modification. I would be pleased to receive comments on the proposal and particularly from those who would like to be involved in its final formulation and in its execution. There is the possibility of the project being expanded into a sub-commission and certainly there is the expectation that it will continue beyond 2007.

Rationale and aims

This project is proposed in response to growing interest in the particular climatic history of the southern continents and oceans. As a result of their association with ENSO and monsoon generation, and their role in the global thermohaline circulation, the southern oceans are critical to an understanding of global climate change. In terms of terrestrial palaeoenvironments, an understanding of long-term environmental change on the southern continents is still in its formative stages as proxy records are both spatially diffuse and temporally discontinuous. Further, an increasing awareness of major inter- and intra-hemispheric disparities in the timing of climatic signals and forcing influences between land and ocean records underscore the need for an integrated effort to explore the palaeodynamics of southern hemisphere systems.

In order to address these issues, the following aims are proposed.

1. To determine the present state of knowledge on the nature and location of land and ocean records covering a substantial part of the Quaternary and make a preliminary assessment of regional and temporal variability. Most data will probably relate to the last glacial cycle (and essentially extend the period of interest covered by INTIMATE initiatives). However, some coverage back to at least 500 ka is considered essential to examine the nature and causes of the Mid-Bruhnes event that has been identified from the Pacific and Indian Oceans and may have altered atmospheric and climate circulation patterns in the region and, in the case of the SW Pacific, led to a trend of increasing variability that had major impacts on terrestrial climate and vegetation. Coverage of the whole Quaternary would be desirable to examine causes of suggested variation in times and patterns of change within the southern hemisphere and between the two hemispheres in the Early Pleistocene and around the Early-Mid Pleistocene boundary.
2. To identify critical gaps or areas of uncertainty and encourage and facilitate development of research proposals to fill them, particularly through involvement of the IODP and the Continental Drilling Program.
3. To encourage and facilitate closer collaboration between marine and terrestrial researchers especially in examination of land and marine climate proxies within the same cores.

4. To generate and compile a potentially exciting data set amenable to modelling as a means of better understanding controls over southern hemisphere climates and the roles of the tropics and Antarctica in forcing global climate change.

Methods/approach

Now is an opportune time to start bringing information together for the southern hemisphere because there is a great deal of activity by groups working largely independently who, hopefully, will welcome greater interaction. On land, the Continental Drilling Program has recently been employed to produce long cores from previously inaccessible areas or water depths, such as Lake Titicaca in South America and the rift valley lake of Africa, that extend into the southern hemisphere, while research on long continuous records is being actively pursued and supported within Australia and, recently, in New Zealand. Collaboration on techniques of analysis and particularly on dating would be invaluable to ensure independent chronologies on terrestrial sites and avoidance of, what have been, somewhat misleading correlation with the marine stratigraphy. In the marine realm, exciting results are emerging from combined marine-terrestrial proxy studies off Southern America with preliminary research off southern Africa at last providing some clarification of climate patterns in this region. These results are beginning to relate to those from more established studies off more tropical West Africa and from terrestrial studies in the south-western Cape. Intensive study of terrestrial and marine proxies in the southern tropics of the northern-Australian Indonesian region is revealing complex relationships with forcing from the North Atlantic, Indian and Pacific Ocean regions that cry out for comparison with the other areas.

Because of distances involved between study areas within the southern hemisphere and between research participants who are resident in both hemispheres, it may be necessary to establish a number of groups that can collate and direct research from different regions. However, it would be extremely valuable to have at least two general gatherings. The first, within the next year, could be used to assess the present state of knowledge, and perhaps be formalised in the production of a multi-authored regional synthesis paper. This meeting could also provide the basis for establishment of regional and specific scientific issue study groups as well as identification of profitable areas for future study and facilitation of support for them. The second could be for presentation of new material and developments, serve as a planning meeting for a symposium at INQUA 2007, and determination of future directions.

Suggestions are sought for appropriate meeting venues. Some seed money is available and could be used to attract funding sufficient for a stand alone meeting. However, a more feasible option might be to combine the meetings with other smallish relevant gatherings to maximise their attraction.

One possible option is the final conference of the DEKLIM-EEM programme to be held at Mainz, Germany, in March, 2005, as a number of potential associates are from Germany or have been participants in the DEKLIN-EEM meetings. The focus of DEKLIM-EEM, on past interglacials and abrupt events, and their value for prediction of future climate, and the mix of marine, terrestrial and ice workers as well as modellers, is highly relevant to our project.

A second meeting could be in association with the Southern Connection conference, planned for Adelaide at the end of 2006. Southern Connection is perhaps the only relevant organisation that focuses on the southern hemisphere. It has held its triennial meetings in Australia, New Zealand, South America and South Africa and Quaternary climates have figured prominently at each meeting.

Anticipated outcomes

A much more coherent picture of southern hemisphere climate change and its drivers that will totally alter perceptions on global climates and will contribute substantially to the understanding of the development of present landscapes. Meetings and proposed publications will cement a presently disparate research community and provide a base for long term collaboration.

I welcome any suggestions, criticisms and especially expressions of interest in being involved.

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