

## Joint PAGES-LOICZ Initiative on Late Holocene Sea-Level and Climate Change

### The Research Context

Regional sea level changes over the last few thousand years have been principally determined by small eustatic contributions from fluctuations in global ice volume, steric contributions due to thermal and/or saline expansion of seawater, fluctuations in ocean circulation and continuing post-glacial geodynamic adjustments to the ocean basins. Interpretation of these sea level changes at coastal sites is often complicated by vertical movements of the land through tectonic and sedimentary processes.

Several international projects have developed programs to study the rates and causes of modern sea level changes, including the Int. Oceanographic Commission (IOC) Group of Experts on the Global Sea level Observing System (GLOSS) and Global Ocean Observing System (GOOS), the Permanent Service for Mean Sea level (PSMSL) and the World Climate Research Program Climate Variability and Predictability Program (WCRP-CLIVAR). However, there has been little focus on the effect of century to millennial scale climatic fluctuations on late Holocene sea level, ocean circulation and regional patterns in ocean salinity and density. This topic has to a large extent been overshadowed by research on the geodynamic influence on relative sea level history since the mid Holocene. Great effort has gone into numerically modelling predictions of future sea level rise (Warrick *et al.*, 1995) but little has been focused on hindcasting the last millennial sea level

history. Recent research by van de Plasche *et al.* (1998) and Nunn (1998) have demonstrated that regional sea level in the north eastern USA and parts of the south western Pacific Ocean have experienced fluctuations on the order of a few decimeters over a few hundred years, which are synchronous with observed sea surface temperature (SST) and proxy temperature oscillations. These sea level fluctuations are on the order of the observed globally averaged 0.15 to 0.25 cm rise in sea level for this century.

Evidence for climatic fluctuations during the last few thousand years is increasing for each of the PAGES PEP transects. This evidence includes proxy SST from deep sea sediments, coral time series, fluctuations in sea ice cover and biogenic and terrestrial sedimentation in polar shelf sediments as well as proxy atmospheric surface temperature and rainfall records from mangrove, coastal swamp and lake sediments, fluvial sedimentation patterns, coral reef growth rates, ice core stratigraphy and tree rings.

### A Joint Initiative

Recently, both the PAGES and LOICZ SSC's have approved the establishment of an initiative to focus on the contribution of climate change to late Holocene (last 1000–3000 years) global sea level fluctuations using proxy climate and ocean data and relative sea level records. The first task of the initiative will be to determine the influence of late

Holocene climate and oceanic circulation changes on sea level in the Oceania region of the Pacific and the tropical Indian Ocean as well as the centennial to millennial rates of regional sea level change. The small islands and atolls which are scattered throughout these regions are some of the most vulnerable to modern and predicted sea level rise. Modern sea level monitoring programs on low atolls and islands in the south Pacific and in the Maldives, in the Indian Ocean would also benefit considerably from a greater coverage of detailed relative sea level curves determined for the last 1000–3000 years.

### Scientist Involvement

The project will require the involvement of climatologists and oceanographers with both modern and paleo specializations, coastal geologists and geomorphologists, and ocean and geodynamic modelers. Participation is sought from research scientists working in the Oceania and tropical Indian Ocean regions together with global experts. Collaboration with scientists associated with PAGES ARTS and PEP II, LOICZ, WOCE/CLIVAR, START Oceania, and IGCP 367 (Late Quaternary Coastal Records of Rapid Change) and its succeeding project, will also be sought. As the initiative develops it is planned that collaboration with scientists working on glacio-eustatic contributions to Late Holocene sea level will be encouraged.

It is planned to convene a PAGES/LOICZ sponsored workshop on "Late Holocene climate and rates of sea level change in Oceania and the tropical Indian Ocean" in early to mid 1999. Scientists interested in participating in and/or in the development of the initiative should contact Ian Goodwin (coordinates below), Nick Harvey, Vice Chair LOICZ SSC, The University of Adelaide, Adelaide 5005, Australia, [nharvey@arts.adelaide.edu.au](mailto:nharvey@arts.adelaide.edu.au), or Keith Alverson at the PAGES IPO.

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## Spain: Paleoclimatology of the Last 18,000 Years

A new three-year project funded by the Spanish government is investigating paleoclimatology of the last 18,000 years. It is mainly based on pollen analysis of continental and sub-littoral deposits from Mediterranean Spain, but other proxies such as geomorphology, paleobotany, paleontology and dendroclimatology are being considered. The project involves the following Spanish universities: Murcia, Autónoma de Barcelona, Valencia, Alcalá, Sevilla, León, Autónoma de Madrid and Politécnica de Madrid. The project embraces two sub-projects led respectively by José S.

Carrión (Murcia) and Joan M. Roure (Barcelona) and both coordinated by the former. Among the main goals of this project are not only to increase the scanty paleoecological database but also to improve collaborative research, increase international links, and acquire financial support for more ambitious actions in the future.

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(references listed on bottom of next page)