



Figure 1: Fossil coral reefs, here from Barbados, are an important archive for reconstructing paleo sea level. Using fossil corals at different localities to reconstruct the deglacial sea-level rise during Termination I are key for determining melt water pulse events and the fingerprinting of sources of the ice-sheet melting (e.g., Antarctica vs. Northern Hemisphere).

(5) Sea levels and ice sheets during the Holocene (6) panel discussions focused on deliverables and future funding strategies.

Among the variety of topics discussed was sea level and ice-sheet evolution following Termination I, including comparisons of records of the last deglacial sea-level rise (e.g., from Sunda shelf and Tahiti corals) and meltwater pulse events

(MWP). Specific attention was given to the character of the MWP 1b event, which was suggested to have been very small (if it existed at all) to be consistent with near field data. Ideally, a combination of existing and new observable data on MWPs, with well-defined error estimates, coupled with glacio-isostatic adjustment (GIA) modeling would help to quantify MWPs more accurately, which is key to the understanding of ice-sheet extent and dynamics. For example, for MWP 1a, there is a discrepancy between glaciological data and glacio-eustatic modeling on where the melt water was sourced (Antarctica, Northern Hemisphere or both). In order to address this problem, improved cross-disciplinary communication between data and model specialists is essential. Another important topic addressed was the stability of ice sheets during warm periods and in particular over the last 2000 years. Despite considerable attention, there remain many unanswered questions, particularly concerning sea level and ice-volume stability in relation to insolation forcing during warm periods. Research on ice-sheet stability during present and past warm climates will benefit our general understanding of ice-sheet dynamics of both the Antarctic and Greenland ice sheets. Improved sea level estimates for the Pliocene Warm Period (when ice sheets were

- 1) We continue to work towards a global, open source and quality monitored database of RSL and ice-sheet extent
- 2) We support efforts to generate new RSL and ice-sheet extent records and improve techniques.
- 3) We support efforts in glacio-isostatic adjustment (GIA) and ice-sheet model intercomparison and aspire to the creation of community GIA models in line with other modeling communities.
- 4) We emphasize the critical importance of close working relationships between climate modelers, ice sheet modelers, GIA modelers and field scientists who study RSL and ice-sheet extent on a variety of timescales.

Table 1: 3rd PALSEA Workshop statements. These statements form the core framework for the continuing effort of the PALSEA workgroup.

greatly reduced), provides another way to address this issue and will be the focus of further research within the PLIOMAX project (Raymo et al., 2009).

Because the main focus points of the PALSEA Working Group is to tightly integrate the different communities working on research themes related to reconstruct past and predict future sea-level fluctuations, a set of key workshop statements was formulated (Table 1).

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Learning from other communities: Towards more robust varve chronologies



2nd workshop of the PAGES Varves Working Group, Corpus Christi, USA, 17-19 March 2011

MARK BESONEN¹, P. FRANCUS², A.E.K. OJALA³, R. BEHL⁴ AND B. ZOLITSCHKA⁵

¹Texas A&M University-Corpus Christi, USA; mark.besonen@tamucc.edu

²National Institute of Scientific Research, Québec, Canada; ³Geological Survey of Finland, Espoo; ⁴California State University, Long Beach, USA;

⁵University of Bremen, Germany

Varved sediment records, i.e., sediment records that accumulate in discrete annual to sub-annual increments, archive an extremely rich variety of paleo information either via their simple physical sedimentology, or from the chemical, isotopic or biological proxies they may contain. Despite this richness, these records are only sparsely used in regional and global climate reconstructions, which tend to favor other annually resolved records such as tree rings. Against this backdrop, and a decade long gap without any large meeting of the varve community, the PAGES Varves Working Group (VWG) was established in 2010. The VWG held a productive first

workshop in Tallinn, Estonia in April 2010 that focused on reviewing methodological advances in varved sediment studies over the last decade (Francus et al., 2010; Ojala and Kosonen, 2010). In order to expand the reach of the VWG, recognition by INQUA was recently petitioned, and the VWG was granted project status as "INQUA Project Number 1102—VWG Project".

A second workshop was held in March 2011 on the campus of Texas A&M University-Corpus Christi, USA. A scientific program and abstract volume is posted on the project's website www.pages-igbp.org/workinggroups/varves-wg/. This second workshop focused on the develop-

ment of more robust varve chronologies based on what could be learned from the communities that work with other non-sedimentary annually resolved climate archives. It was attended by 31 scientists from institutions in 10 different countries. Early career scientists, such as graduate students, post-docs and new faculty, accounted for nearly half of the participants (14 of the 31); thus, the workshop provided a great opportunity for knowledge transfer from more experienced varve researchers to young academics.

The three-day workshop began with a review of sediment varve chronologies (a task that will form the basis of one of

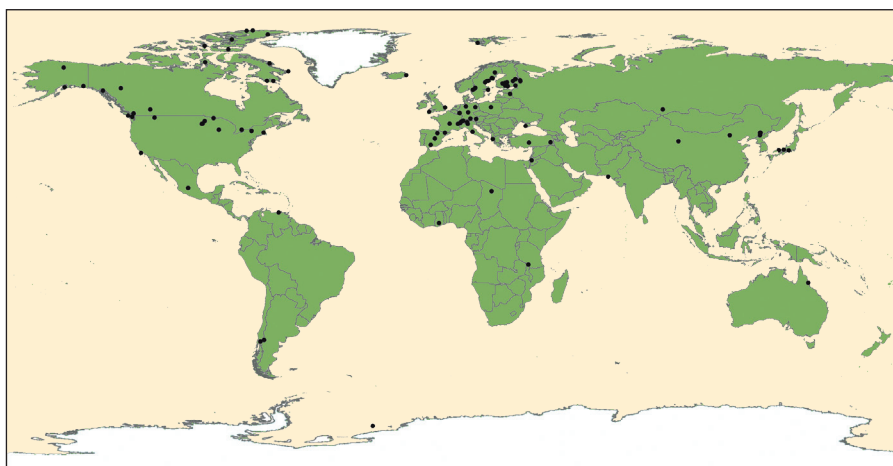


Figure 1: Distribution map of published varved sedimentary records with chronology lengths of at least 100 years. Figure from Ojala et al., in preparation.

the deliverables of the VWG), specifically, an up-to-date metadatabase and inventory of published varved records (Fig. 1). This exercise allowed the group to better identify gaps in reporting methodologies used to establish age-models for varved records, and thus, areas for improvement.

Keynote addresses were delivered by experts from the tree ring, ice core, coral and speleothem communities. By learning from other communities tools and methodologies, the goal was to address perceived or actual weaknesses in varve chronologies and dating (Jansen et al., 2007), that may, in part, be responsible for the sparse usage of varved records in climate

reconstructions. Each of the keynote addresses was followed by an active group discussion about how “best-practice” techniques in these adjacent fields could be applied and adapted to varved sediment records. Presentations by the participants were organized thematically and interspersed with the four keynote addresses.

Several plenary discussion sessions were undertaken on the last day of the workshop to address practical issues, such as how to structure the metadatabase of known varved records, and to provide recommendations for the publication of varved records including the publication of raw data, a full set of images of the en-

tire record, and error estimates. Moreover, it was decided to implement a database of papers dealing with varved sediments, and a metadatabase of varved records on the PAGES website. It was also agreed to produce two group publications, one on protocols and a review about the fidelity of sediment varve chronologies.

A third workshop of the VWG will be held in the Eifel region of Germany, 21–23 March, 2012, focusing mainly on the calibration of varved records for climate reconstructions.

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Land-cover reconstructions in the monsoon affected tropical world: Pollen modeling approach and data synthesis

IGBP PAGES PHAROS Workshop, Puducherry, India, 27–29 January 2011

ANUPAMA KRISHNAMURTHY¹ AND MARIE-JOSÉ GAILLARD²

¹Laboratory of Palynology, French Institute of Pondicherry, Puducherry, India; anupama.k@ifpindia.org

²School of Natural Sciences, Linnaeus University, Kalmar, Sweden

This workshop, supported by PAGES and organized under the umbrella of the Golden Jubilee of the Laboratory of Palynology, French Institute of Pondicherry (IFP), was attended by over fifty participants from India and abroad (Sri Lanka, Australia, Sweden, Estonia and France). There was a good mix of participants from different fields (Earth science, ecology, paleoecology, history and archeology) with adequate representation of data producers and modelers. Compiled abstracts of talks, posters and presentations are available at the IFP website (see URL's in supplementary material www.pages-igbp.org/products/newlsetters/ref2011_2.html).

The need for quantifying land cover and land use, and reconstructing climate

change in the tropics is well known. Very little has emerged so far in terms of a multidisciplinary synthesis, although much work has been done over the years in South Asia, specifically in the Indian subcontinent. To address this gap and initiate such synthesis, with India and Sri Lanka as a starting point, the workshop aimed to:

- i) Bring together paleoecologists, archeologists, historians and ecologists in order to provide a multidisciplinary background
- ii) Introduce the novel methodologies applied today to reconstruct past land cover from pollen data in Europe (the NordForsk POLLANDCAL and LANDCLIM networks, e.g., Gaillard et al., 2008, 2010) to the Indian scientific community

- iii) Achieve a synthesis of relevant historical and archeological data.

After introductory talks on PAGES Focus 4 (Past Human-Climate-Ecosystem Interactions), the LANDCLIM project in Europe and Sugita's Landscape Reconstruction Algorithm (LRA) (Sugita, 2007 a, b), lectures focused on Holocene time chronologies and vegetation history, modern forest ecosystems and the history of human settlements, providing an overview of the Peninsular India background. This was followed by a session on models and methods in pollen-based Holocene vegetation and land-cover reconstruction. Both theoretical and practical aspects were explained, emphasizing the need for pollen productivity estimates. This session concluded