

Long-term perspectives on ocean and climate dynamics – Three decades of ICP



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Over the past 30 years, the International Conference on Paleoceanography (ICP) events have established a strong tradition in pushing paleoceanographic research forward, as well as witnessing and stimulating the great progress and achievements that this multi-disciplinary field has made. The ICP11 took place in Sitges, a small Mediterranean coastal hamlet south of Barcelona, and was attended by 576 participants (including 196 students) from 41 different nationalities.

The conference was organized along five themes, addressed through five plenary sessions. The mornings were dedicated to oral presentations (30 in all) and three poster sessions were held in the afternoons, featuring a total of 527 posters. The Scientific Committee designed the session themes to guarantee a multidisciplinary approach to past climates at various timescales, from the most recent past back to the Paleozoic using both empirical and modeling approaches (the full program is available at: www.icp2013.cat). ICP11 also committed to providing early-career scientists the opportunity to present their research to an international audience, and therefore they accounted for more than half of the selected speakers. For the first time in ICP events, three “perspective lectures” were included: two highlighting work in disciplines closely related to paleoceanography - modern ocean geochemistry from the GEOTRACES program’s perspective, and ice core paleoclimate studies and the third presenting the ideas for a follow-up project to the International Marine Global Change Study. As in previous ICPs, the Scientific Committee awarded 12 students poster prizes (www.icp2013.cat/index.php/best-student-awards.html).

A number of challenging and important findings were presented during the ICP. For example, we learned of advances and refinements in geochemical proxies and their application on issues such as sea ice cover (IP25), ice sheet stability (Nd isotopes, Sr-Nd-Pb isotopes) or glacial CO₂ sequestration (radiocarbon, B isotopes, foraminifera-bound N isotopes, C isotopes).

Participants also learnt of remarkable efforts to combine major “data mining” and modeling to examine global and regional oceanographic patterns and causes of past climate changes.

These efforts focused on several climatic and oceanic variables including global and regional temperature changes since the Last Glacial Maximum, the Meridional Overturning Circulation over the last 40 ka, ocean oxygenation across the last deglaciation and a sea surface temperature compilation for the past two millennia, conducted by the PAGES Ocean2k project.

New geochemical records and modeling experiments provided insight on the coupling between past climates and ocean biogeochemistry, in general, and the carbon cycle in particular. Evidence of the breakdown of North Pacific stratification during the last deglaciation prompted a lively discussion on the possibility of North Pacific deep-water formation at that time. At millennial time scales, modeling simulations also showed the relevance of circulation

changes, both in the Atlantic and in the Pacific, in controlling atmospheric CO₂. At longer time-scales, an unusual attempt to shed light on the C isotopic vital effects in coccoliths provided a new avenue to detect a global atmospheric CO₂ decrease about 7-5 Ma ago that was coupled to ocean temperature decrease. For these ancient times, a wealth of new results from deep-time paleoceanography and paleo-modeling demonstrated the substantial recent progress in quantitatively tackling several key parameters, such as deep-ocean oxygenation during extreme climates and exotic events of the Cenozoic and beyond.

Efforts to improve the resolution and accuracy of marine proxy records were also presented, and the associated value for gaining further knowledge about ocean-land-atmosphere interactions was demonstrated. Excellent examples came from coral records, which allow us to more accurately decipher past inter-annual climate variability such as the El Niño-Southern Oscillation, but also from sediment and pollen records from the Mediterranean, the Atlantic and Antarctica’s margins.

Another memorable event of the conference was the traditional ICP paleomusicology concert where conference attendees put on a diverse range of outstanding musical performances for their colleagues. The next tri-annual meeting, ICP12, will be held in Utrecht in The Netherlands in summer 2016.

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Figure 1: “Castells”, Human Towers, a Catalan tradition that accelerates your heartbeat. This picture shows a performance of the “Castells of Poble Sec” during the ICP11 ice breaker with the participants’ help to support the tower. This is an excellent example of team effort and the importance of every single member to the success of the project, in this case, the human tower. “Team spirit, strength, balance, courage and common sense”, the “castells” motto also defines the essence of the ICP conferences and the paleoceanographic community.