

Geo-Temas, 11

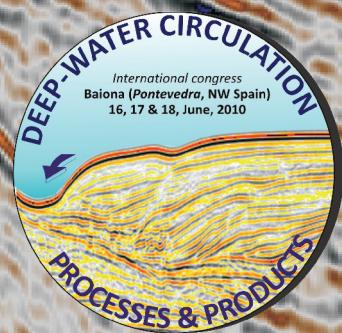


DEEP-WATER CIRCULATION: PROCESSES & PRODUCTS

INTERNATIONAL CONGRESS

Baiona, Pontevedra, Spain

16, 17 & 18 June 2010





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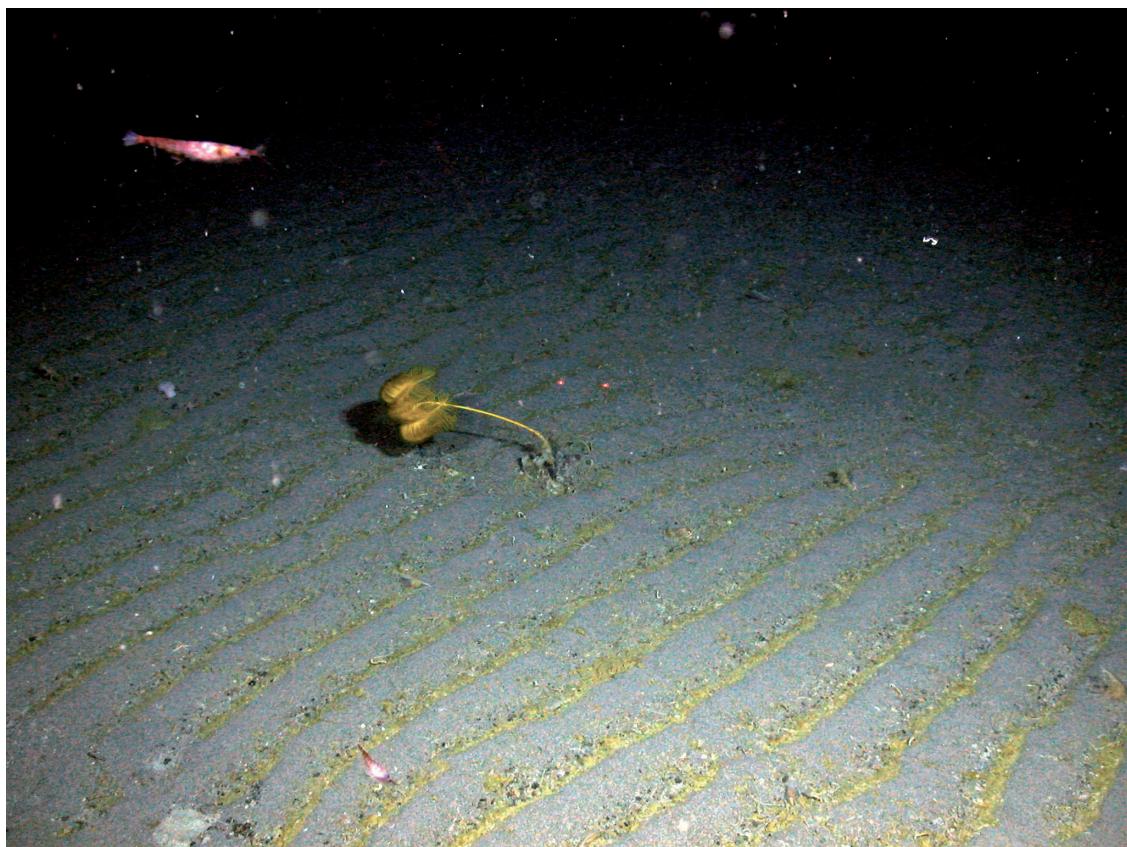
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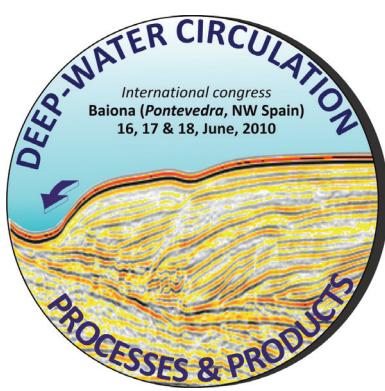
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Deep-Water Circulation: Processes & Products

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Isis ROV photograph from the Antarctic Peninsula Pacific margin. The photo was taken in the axis of the channel north of the proximal part of Drift 5, at about 3000m depth [courtesy of J.A. Dowdeswell (Scott Polar Research Institute, Cambridge, UK); P.A. Tyler and Gwyn Griffiths (National Oceanographic Center, Southampton, UK); and Robert D. Larter (British Antarctic Survey, UK)].



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PREFACE

The international congress on «**Deep-water Circulation: Processes & Products**» took place in Baiona (Pontevedra, Spain) from 16-18 June, 2010 (Fig. 1). It was organised with wide European and global support and convened many of the principal specialists in the field.



FIGURE 1. Deep-water Circulation: Processes & Products» (Pontevedra, Spain, 16-18 June, 2010).

Deep-water circulation is a critical part of the global conveyor belt that regulates Earth's climate (Fig. 2). The bottom (contour) current component of this circulation is hugely significant in shaping the deep seafloor, through erosion, transport and deposition (Fig. 3). As a result a great variety of depositional and erosive features are developed, including a range of different drifts, sediment waves, moats, furrows, and abraded surfaces. Yet the nature of these deep-water processes and contourites thereby deposited are still poorly understood in detail. Their ultimate decoding will undoubtedly yield results of fundamental importance to earth and ocean science. The Baiona Congress, therefore, focused specifically on processes and deposits related to bottom-water circulation.

Nearly one hundred abstracts from 255 contributors were presented at the meeting, providing a truly multidisciplinary perspective of interest to both academic and industrial participants. The papers and discussions at this congress have contributed greatly to the advance of knowledge of deep-water bottom circulation and related processes and contourite sediments. The different and multidisciplinary contributions, including geomorphology, stratigraphy, sedimentology, paleoceanography, physical oceanography, deep-water ecology) have demonstrated that the advances in paleoceanographic reconstructions and understanding of the ocean's role in the global climate system depend largely on the feedbacks among disciplines. New insights into the link between the biota and deep-water ecosystem with bottom currents confirm the need for this area to be investigated and mapped. Likewise, it is confirmed that deepwater contourites must be viewed not only to as a scientific target but also as potential resources.

The observations of different datasets presented in the contributions have allowed us to identify five major goals and a number of related topics for future research:

- ▶ Characterization of the depositional and erosional elements associated with individual contourite drifts, hiatuses, and with more complex Contourite Depositional Systems (CDSs).
- ▶ Detailed understanding of deep-water-mass circulation, including the flow of bottom currents around submarine obstacles, their behaviour and variability in response to tides and benthic storms, and their role in the construction of drifts and bedforms.
- ▶ Comparisons between bottom current and gravity flow processes and products, including their distinction from hemipelagic/pelagic sedimentation.
- ▶ Careful review of existing facies models, both for outcropping ancient deposits (Fig. 4) and present

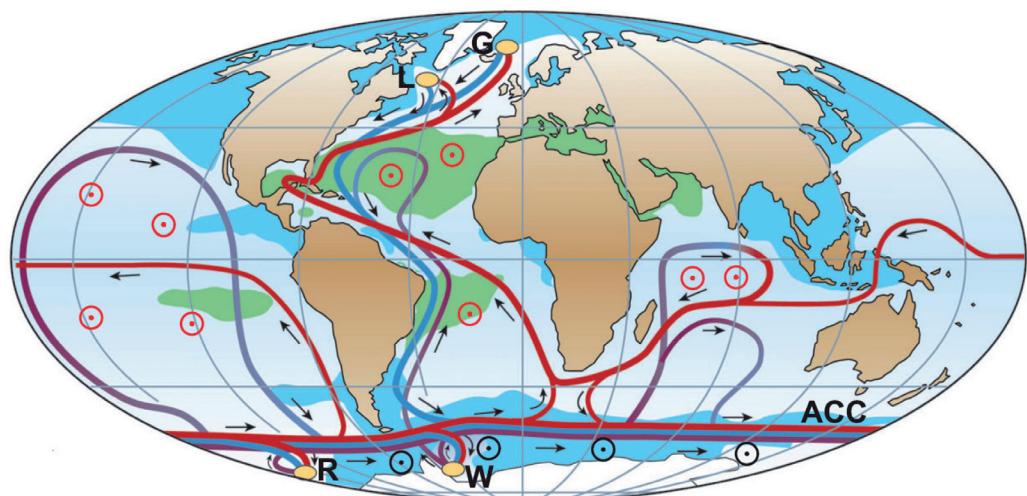


FIGURE 2. Schematic representation of the global thermohaline circulation. Surface currents are shown in red, deep waters in light blue and bottom waters in dark blue. The main deep water formation sites are shown in orange (Rahmstorf, 2006).

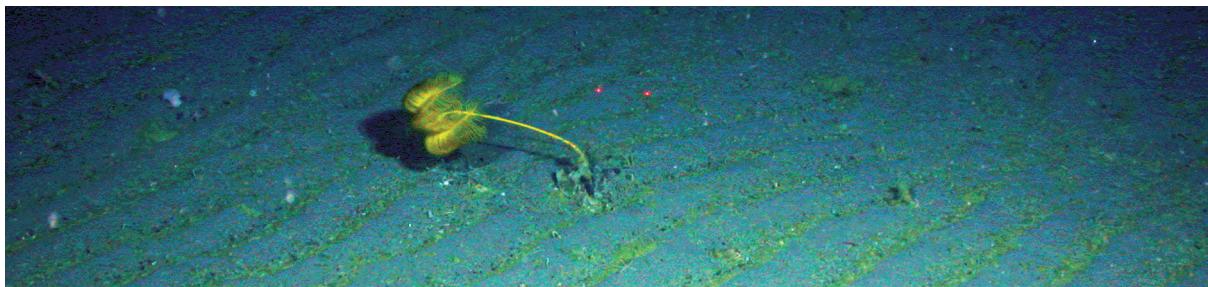


FIGURE 3. Isis ROV photograph from the Antarctic Peninsula Pacific margin. The photo was taken in the axis of the channel north of the proximal part of Drift 5, at about 3000m depth [courtesy of J.A. Dowdeswell (Scott Polar Research Institute, Cambridge, UK); P.A. Tyler and Gwyn Griffiths (National Oceanographic Center, Southampton, UK); and Robert D. Larter (British Antarctic Survey, UK)].



FIGURE 4. Outcropping ancient contourite deposits of the Lefkara Formation, Cyprus (Stow et al., 2002).

marine sediments (Fig. 5), including their association with other deep-water sediment facies, their occurrence and recognition in both modern and ancient series, and their understanding in terms of bottom current process and variability, for both local and global circulation.

- Economic relevance of contourite deposits in the future, especially for oil/gas exploration.

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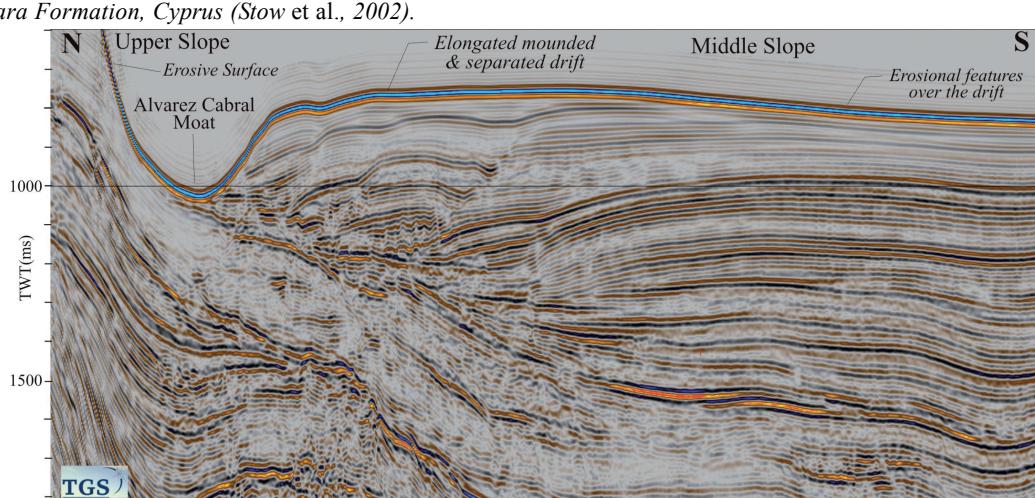


FIGURE 5. Uninterpreted multichannel seismic-reflection profile across the Faro-Albufera mounded elongated and separated drift and the Alvarez Cabral moat on the middle slope of the Gulf of Cadiz (data courtesy of TGS-NOPEC Geophysical Company ASA, for this contribution).

Deep-Water Circulation: Processes & products

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- **Dr. I. Nick McCave** (Cambridge, Univ., UK):
«Construction of contourite drifts by the deep ocean circulation».
- **Dr. Jean Claude Faugères** (Univ. Bordeaux, France):
«Contourites: from large drift to facies model».
- **Dr. Michael Sarnthein** (Univ. Kiel, Germany):
«¹⁴C-based circulation changes of glacial-to-deglacial ocean overturning circulation».
- **Dr. Adriano R. Viana** (Petrobras, Brazil):
«Economic relevance of contourites».
- **Dr. Craig S. Fulthorpe** (University of Texas, USA):
«Contourite deposition at intermediate water depths: sediment drifts of the Canterbury Basin, eastern South Island, New Zealand».

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