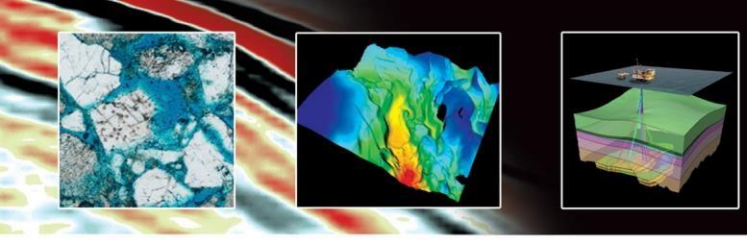

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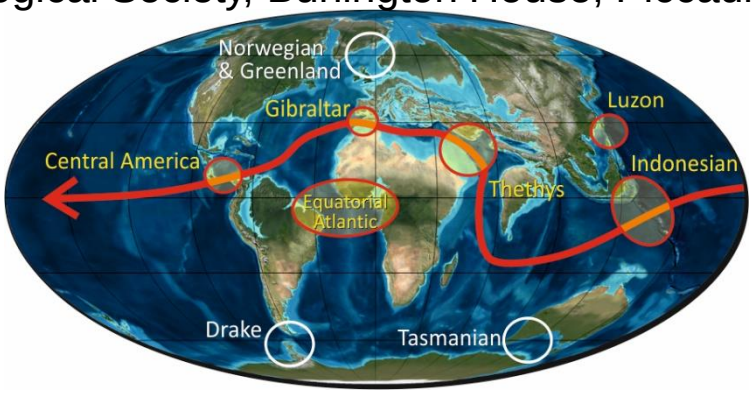
Oceanic gateways: modern and ancient analogues and their conceptual and economic implications

23-25 November 2022

The Geological Society, Burlington House, Piccadilly London



The International hybrid conference "Oceanic gateways: modern and ancient analogues and their conceptual and economic implications" will be at The Geological Society (Burlington House, Piccadilly, London) and Virtual via Zoom.

Sessions:

- Tectonic Controls on Gateways
- Oceanographic, Paleoceanographic and Sedimentary processes and deposits
- Gateways in polar regions
- Implications of gateways and contourite deposits on energy geosciences
- Data integration &multidisciplinary analysis

Keynotes:

- **Oceanic gateways during the last 750 million years** by *Christopher R. Scotese* (Northwestern Univ., USA)
- **Paleoceanography and gateways** by *André Bahr* (Heidelberg Univ., Heidelberg, Germany)
- **Water masses circulation and oceanographic processes on gateways: the study case of the Strait of Gibraltar** by *Ricardo F. Sánchez-Leal* (Spanish Institute of Oceanography, Spain)
- **Sedimentary processes and deposits associated to gateways: a perspective from the ancient sedimentary record** by *Heiko Hüneke* (Univ. Greifswald, Greifswald, Germany)
- **Ichnological record on gateways and other high-energy deepwater environments** by *Francisco J. Rodríguez-Tovar* (Univ. Granada, Spain)
- **Fingerprints of geological-scale change in the Antarctic Circumpolar Current: insights from the present day** by **Alberto Naveira Garabato** (Univ. Southampton, NOC, Southampton, UK)
- **Southern ocean gateways and the development of the Antarctic Circumpolar Current** by *Carlota Escutia* (IACT, CSIC-UGR, Spain)
- **Implications of gateways and contourite deposits on energy geosciences** by *Neil Hodgson and Karyna Rodriguez* (Searcher, UK)

Round table:

Oceanic gateways & energy geosciences. Chaired by *Adriano R. Viana* (Petrobras) & *Cindy Yeilding* (Ex-BP)

Programme and registrations:

Details at https://www.geolsoc.org.uk/11-EG-Oceanic-Gateways-22

For further information please contact:

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14.40 Virtual	**New data on sedimentary processes in the Charlie-Gibbs Fracture Zone area during the Late Pleistocene to Holocene** Evgenia Dorokhova *(Shirshov Institute of Oceanology, Russian Acad. of Sciences, Russia)*
14.55	**Sedimentary processes in the Discovery Gap (Azores—Gibraltar Fracture Zone, NE Atlantic)** Tatiana Glazkova *(Royal Holloway University of London, UK)*
15.10	***Break & Posters***
15.30 Virtual	*Keynote:* **SEDIMENTARY PROCESSES AND DEPOSITS ASSOCIATED WITH GATEWAYS: A PERSPECTIVE FROM THE ANCIENT SEDIMENTARY RECORD** **Heiko Hüneke** *(Universität Greifswald, Greifswald, Germany)*
16.10	**Mixed carbonate-siliciclastic contourite drift deposits associated with the entrance of an Atlantic-Mediterranean corridor (late Miocene, southwest Spain)** Jesús Reolid *(Departamento de Estratigrafía y Paleontología, Universidad de Granada)*
16.25	**Mixed carbonate–siliciclastic tidal sedimentation in the Mediterranean-Atlantic connection through the Zagra Strait (Betic Cordillera)** Ángel Puga-Bernabéu *(Departamento de Estratigrafía y Paleontología, Univ. de Granada)*
16.40 Virtual	**Closing of the Betic-Rif corridors: considerations from the Late Miocene evolution of the Gulf of Cadiz** Zhi Lin, Ng *(Royal Holloway University of London, UK)*
16.55 Virtual	**Investigating Miocene Mediterranean-Atlantic Gateway Exchange (IMMAGE): an amphibious drilling project** Rachel Flecker *(University of Bristol, UK)*
17.10	***General discussion (Session One)*** Chaired by Eleanor Stirling (BP); and Giancarlo Davoli (Eni SpA)
17:30	**End of day one**
17:30-18:30	**Drinks reception**

Day Two	
08.30	***Registration***
08.50	**Welcome**
	Session Two: **Oceanographic, Palaeoceanographic and Sedimentary processes and deposits**
09.00	*Keynote:* **PALAEOCEANOGRAPHY AND GATEWAYS** **André Bahr** *(Heidelberg University, Heidelberg, Germany)*
09.40	**Seismic stratigraphy of the Guinea plateau: a 150-Myr history of structural deformation, sediment routing and magmatism** Benedict Aduomahor *(Heriot-Watt University, Edinburgh)*
09.55 Virtual	**Impact of the Pyrenean Gateway on deep-water circulation in the NE Atlantic during the Middle and Late Cretaceous** Shan Liu *(School of Marine Science, Sun Yat-sen University, China)*
10.10	**Late Cretaceous palaeotemperature records from the Australian southern margin: a link between temperature and the opening of the Australo-Antarctic Gulf?** Lauren K. O'Connor *(University of Manchester, UK)*
10.25 Virtual	**Bottom currents deposits in NW Australia: evidences of the onset and evolution of the Australia - Indian Ocean Gateway** Oswaldo Mantilla *(Ecopetrol S.A, Colombia)*
10.40 Virtual	**Contourite depositional systems within the Orange Basin, South Africa** Anthony Fielies *(Petroleum Agency SA)*
10.55	***Break***
11.15 Virtual	**The impact of Atlantic palaeogateways on the growth of ancient mixed depositional systems: palaeoceanographic, sedimentary and economic implications** Sara Rodrigues *(Royal Holloway University of London, UK)*
11.30	**Eocene to middle Miocene contourite deposits in Cyprus: a record of Indian Gateway evolution** F. Javier Hernandez-Molina *(Royal Holloway University of London, UK)*
11.45 Virtual	**The late Miocene Panamanian Isthmian strait was shallow** Elena Stiles *(Universidad del Norte, Colombia)*

reflections in the seismic profiles reflect the interaction between storm waves and contourites.

New data on sedimentary processes in the Charlie-Gibbs Fracture Zone area during the Late Pleistocene to Holocene

Dorokhova E.V.[1], Sokolov S.Yu.[2], Ponomarenko E.P.[1], Bashirova L.D.[1], Pugacheva T.L.[1,3], Urazmuratova Z.F.[1,3]

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The Charlie-Gibbs Fracture Zone in the North Atlantic is a mega-transform system in the Mid-Atlantic Ridges which represents the deep oceanic gateway that connects the Iceland and West European Basins with the Irminger Basin. At present, the Charlie-Gibbs serves as a deep-water corridor for the Iceland-Scotland Overflow Water (ISOW) which is part of the lower limb of the ocean conveyor belt that affects the global climate. The ISOW-related contour current, which is channelized in fracture valleys, influences the sedimentary processes that produce contouritic drifts, whose sediments may serve for high-resolution paleo-reconstructions. The aim of this study is to determine the sedimentary processes in the area of a tectonically active deep-water gateway and to reconstruct the climatic and bottom current variability as reflected in the sediments.

New geological and geophysical data in the area of the Charlie-Gibbs Fracture Zone were obtained during the cruises of R/V Akademik Nikolaj Strakhov (2020) and R/V Akademik

Sergey Vavilov (2021). The surveys included: bathymetric studies using the RESON Seabat-7150 deepwater multibeam sonar system, profiling of the topmost part of the sedimentary cover with an EdgeTech 3300 profiler (2-6 kHz), retrieval of two sediment cores using a gravity corer.

Analysis of the acoustic profiling data revealed four Quaternary seismic complexes. We assume that the formation of these complexes is related to glacial cycles, which control the supply of terrigenous material from the nearby continental areas by ice/iceberg rafting. Sedimentary bodies in the form of seismic facies draping structural features were recognized in the abyssal zone adjacent to the study area from the northeast and along fault troughs. These seem to be formed mainly by contour currents which construct mounded, elongated and channel-related contourite drifts. There are numerous sedimentary bodies with a chaotic internal structure and a higher degree of acoustic turbidity in the fracture zone area. They accumulated as a result of sediment gravity flow processes which are widespread seismically active regions. The registered deviation of acoustic stratification from the sub-horizontal bedding is proposed to be due to a combination of two factors: the enveloping of basement heterogeneities with sedimentary material and also tectonic deformations. Areas with amplified reflections in the sediment between folded and piercement structures indicate an admixture of volcanoclastic material. The sediment-filled fault troughs show signs of neo-tectonic dislocations in the sediments in both the active and passive parts of the fracture zone.

The sediment cores ASV-5308-C1 (52°37.080’ N 33°34.726’ W, 4.65 mbsf, 3850 mbsl) and ASV-5309-C2 (53°03.301 N 33°32.719 W, 5.20 mbsf, 3140 mbsl) were retrieved from the southern slope plateau in the northern valley of the active part of the fault and from the confined basin in the southern part of the Reykjanes Ridge, respectively. The cores were studied with a variety of analyses including magnetic susceptibility (MS), X-ray fluorescence, ice-rafted debris (IRD) and foraminiferal counts, $CaCO_3$ and total organic carbon analyses. Smear slide examination, X-ray diffraction, and grain-size analyses are going to be performed for the sediment description and reconstruction of sedimentary regimes in the study area.

Four sedimentary facies have been defined based on the preliminary analysis of available data. The cores are characterized by two similar facies. The upper parts of ASV-5308-C1 and ASV-5309-C2 cores (0–280 cm and 0–340 cm, respectively) consist of clayey silts with increasing carbonate concentration to the top of the core (from 20 to 70%), low IRD, and planktonic foraminifera *Neogloboquadrina pachyderma* (sin.) content. These features together with small concentrations of terrigenous elements (Fe, Zr, Rb, Ti, and Sr), low MS, and numerous signs of bioturbation lead us to interpret the sediment as silty contourites of Holocene age accumulated under the influence of paleo-ISOW bottom current. The lower parts of both cores consist of sandy silts with variable (ASV-5308-C1) and low (ASV-5309-C2) $CaCO_3$ content, high IRD and *N. pachyderma* (sin.) values, and increased concentration of terrigenous elements. Bioturbation is also typical. This facies is interpreted as being hemipelagic and related to the glacial Late Pleistocene interval which was characterized by weakening of the paleo-ISOW flow and increasing terrigenous material (IRD) supply from the nearby continental areas.

The prominent feature of the recovered sediment is the specific sedimentary facies in each core. In the ASV-5308-C1 at 336–375 cm, there is a sediment layer which is characterized by a minimum in $CaCO_3$, IRD, and foraminifera content. Simultaneously, very high MS values (up to 30 times higher than background) and a jump in Ti, Fe, and Zr values were registered, pointing to the high titanomagnetite content. In the lower part of this interval, prominent bedding was recognized. The nature of the facies is still unclear unclear and further studies are needed.

In ASV-5309-C2, a diatom mat was registered at 340–370 cm. Low values of both biogenic calcareous and terrigenous components are common for this layer. The diatom mat may be

linked to strong changes in surface water productivity related to the Subarctic Front position as shown by earlier studies.

In summary, the combination of geomorphological and sediment composition studies enables us to update the existing understanding of sedimentary processes in the Charlie-Gibbs Fracture Zone. The contour currents amplified by the narrow valleys of the fracture zone played an important role in sedimentation during the Holocene. The influence of terrigenous material input during the glacial interval and the proximity of the Subarctic Front to the study area during the Pleistocene to Holocene transition were also registered.

The study was supported by the RSF, grant No.22-17-00170.

Paleoceanographic setting and depositional processes in the Discovery Gap (Azores—Gibraltar Fracture Zone, NE Atlantic)

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The low current velocities and low sediment accumulation rates often associated with abyssal plains can make identifying bottom current influence challenging. Such influence may be limited to condensation and non-deposition of sediment, but erosion may also occur if currents are particularly intense. However, the changes in current velocity through deep marine gaps connecting adjacent abyssal plains may be sufficient to increase sediment