



OGS: ongoing activities in the Arctic and partnerships with member countries of the Arctic Council (July 2014)

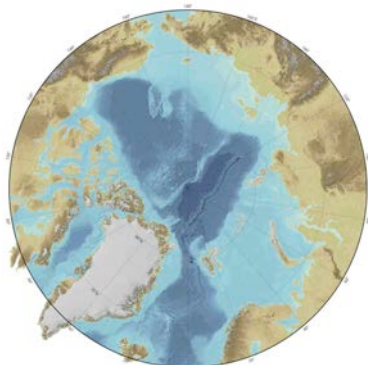
OGS intervenes, in agreement and coordination with other research institutions, in the scientific activities of Earth Sciences, Polar Sciences and other fields where its skills can help to produce knowledge and to solve scientific, economic and social problems (Art. 2 of the Statute). As such, OGS conducts research in the Arctic and Antarctica mainly, but not exclusively, in the sea with the ship OGS-Explora.

Activities currently underway in the Arctic:

- 1) **CORIBAR**, international project (Italy, Germany, Spain, Norway, Denmark) for the study of paleoclimate in the Barents Sea through perforations MeBo on R / V Maria S. Merian based on data acquired with the Italian vessel OGS Explora for project IPY-EGLACOM (sites.google.com/site/ipynicestreams/coribar). The innovative technology of drilling with an underwater drilling derrick placed on the seafloor and remotely controlled from the ship has been used in the Arctic for the first time. OGS Contact: Michele Rebesco.
AC Partners: University of Tromsø.



2)



IBCAO map Version 3
(Jakobsson et al., 2012)

- 2) **IBCAO (International Bathymetric Chart of the Arctic Ocean)** to develop a digital bathymetric database north of 64° for use by mapmakers, researchers, institutions and others whose work requires a detailed and accurate knowledge of the depth and shape of Arctic seabed (www.ngdc.noaa.gov/mgg/bathymetry/arctic/). OGS is the editorial board and provides multibeam data (Jakobsson et al., 2012). OGS Contact: Michele Rebesco.
Leading AC partner: University of Stockholm.

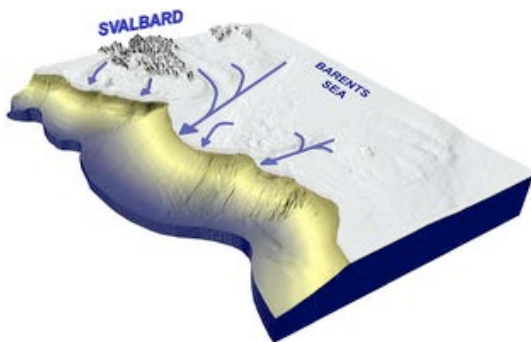


- 3) **EUROFLEETS2**: European project (2013-2017) for research infrastructure (including OGS Explora) for the creation of an alliance of centers of marine research in Europe to work together and share resources to improve the quality of European marine research. This project (www.eurofleets.eu), includes a pioneering Polar Working Package to determine the resources and the demand in polar research and to facilitate the integration of the polar research fleet. OGS Contact: Michele Rebesco.
AC partners: Institute for Marine Research (IMR), Technical University of Denmark (DTU-AQUA), Swedish Polar Research Secretariat (SPRS).



Research vessel OGS Explora

4)



Reconstruction of ice cover extent in the Barents Sea during the last glacial maximum (about 18,000 years ago).

ARCA excellence Project (Arctic: Current Climate change and extreme events of the past) for Arctic research in collaboration between CNR, INGV and OGS. The project aims to gain insight into the complex mechanisms that govern the dynamics of the ice sheets and the flow of fresh water and sediments in the ocean, and to reconstruct the history of extreme events of sub-glacial melting over the past 20,000 years along the edge continental shelf south of Svalbard.

OGS contacts: Michele Rebesco and Renata Lucchi.

AC partner: Universities of Tromsø and Bergen.

- 5) **PAST Gateways** (Palaeo-Arctic Spatial and Temporal Gateways), a research network accredited by the IASC to understanding Arctic environmental change (www.geol.lu.se/pastgateways/). The focus of the six-year program is the nature and meaning of the transitions between major late Cenozoic climatic events (such as the interglacial and glacial maximum) and the more recent Holocene fluctuations. The second international conference of this project was organized in Trieste from 19 to 23 May 2014. OGS Contact: Renata Lucchi.
Canadian Partners: Université du Québec à Montréal.



Pasterze Glacier (3798 m Grossglockner, Austria) where the field-trip on glacial geology and geomorphology was held.



- 6) **PANORAMA**, five-year project for the exploration of marine energy resources. Aimed at the acquisition of new data on subsurface structures to reconstruct the depositional history from the beginning of the opening of the Arctic Ocean (50 million years ago) and contribute to a robust assessment of the potential for hydrocarbons in the Arctic regions and in particular in European sector of the Arctic. The first cruise took place, as far as latitude 83° north, on board OGS Explora from 8/15 to 15/09/2013 ([PANORAMA OGS-Explora](#)).
OGS Contact: Angelo Camerlenghi.
Partners: Federal Institute for Geosciences and Natural Resources (BGR, Germany).



Data acquisition in the Arctic with OGS Explora in the summer of 2013

- 7) FP7/I3 **ARICE** Initiative "Arctic Research Icebreaker Consortium for Europe: A strategy for meeting the needs for marine research in the Arctic coordinated dall'Alfred Wegner Institute for the use of the icebreaker Polarstern and Oden in Arctic areas recovering the project work FP7/ERICON Aurora Borealis. The project also aims to increase coordination of heavy icebreaker currently available and ice-strengthened research vessels (such as OGS Explora) throughout Europe.

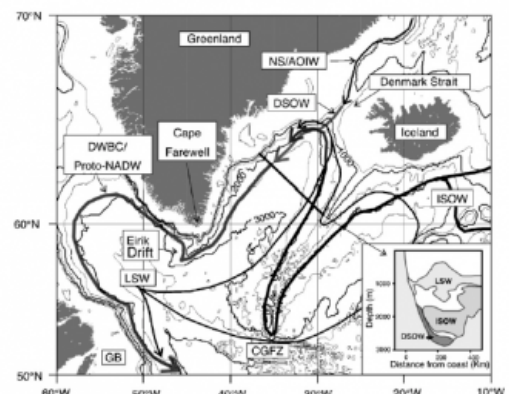


Swedish icebreaker Oden

OGS Contact: Angelo Camerlenghi.
Key partners: Alfred Wegener Institute (AWI, Germany) and the Swedish Polar Research Secretariat.

- 8) **EDIPO** (Eirik Drift PaleoOceanographic investigation). The project, funded by the National Program for Research in Antarctica, aims at the acquisition of marine sediment, seismic and morphobathymetric data with research vessel OGS Explora on the southern edge of Greenland, in particular on the Eirik Drift. The objective of the study is the thermohaline circulation and paleoceanographic reconstruction of environmental changes and sedimentary mechanisms of the last glacial and interglacial cycles.

OGS Contact: Andrea Caburlotto.
AC partners: GEUS (Denmark).



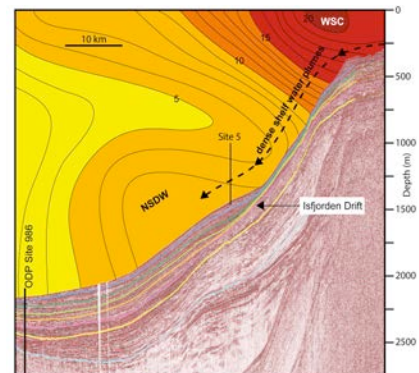
Map of the study area with the locations of the intermediate and deep ocean currents.



- 9) **EUROFLEETS PREPARED** Project aboard the Norwegian research vessel GO Sars in the summer of 2014. Objective of this project is to investigate and define the oceanographic structure in the area of two sedimentary accumulations (contourites) on the eastern side of Fram Strait. For this purpose we investigate a full range of time scales, from oceanographic instantaneous (CTD) and seasonal (moorings) measurements, analysis of recent (box corer) and deep (Calypso corer) sediments for the geological past.

OGS Contact: Renata Lucchi.

AC partners: Universities of Tromsø; University of Bergen; The University Centre in Svalbard (UNIS); University of Gothenburg.



Relationship between the West Spitsbergen Current and contourites west of Svalbard

PNRA **IMPERVIA** project (PEA 2010) to study with integrated geophysical methods the characteristics and changes in Arctic permafrost in the natural laboratory in the area of Adventdalen (Svalbard). The acquisition activities with different types of seismic sources and geophones was conducted in April 2014, and data processing is in progress.

OGS Contact: Giuliana Rossi.

AC Partner: Norwegian Centre for Integrated Petroleum Research (CIPR); University of Bergen; The University Centre in Svalbard (UNIS).



Seismic acquisition in Innehytta Pingo in Adventdalen

- 10) International Geoscience Programme (IGCP) 619 "**Contourites: processes & products**" (<http://contourites.org/igcp/>). This international project studies the sediments deposited by bottom currents in all continental margins, including the Arctic.
OGS Contact: Michele Rebesco
AC Partner: Norwegian University of Tromsø. University of Gothenburg.
- 11) Informal Italian Group **SAON** (Sustaining Arctic Observing Networks) for the coordination of activities in support of SAON (www.arcticobserving.org/).
OGS Contact: Renata Lucchi.
- 12) **ECORD**. Participation at the European Consortium for Ocean Research Drilling (www.ecord.org).
OGS contacts: Angelo Camerlenghi, Michele Rebesco, Laura de Santis, Nigel Wardell
AC Partner: Natural Sciences and Engineering Research Council of Canada; Research Council of Norway; The Danish Agency for Science, Technology and Innovation; Suomen Akatemia (Academy of Finland); The Icelandic Centre for Research; Swedish Research Council.



Recently completed projects:

- 13) **PERGAMON**, COST EU: European network for study and long-term monitoring of permafrost, gas hydrates and methane release in the Arctic and impact on climate change (www.cost-pergamon.eu/). In this context, OGS has organized the Training School "Permafrost and gas hydrate related methane release in the Arctic and impact on climate change" at the Research Station Sodankylä in Finland (26/9-5/10/2013) and published a study on the stability of gas hydrates in the Arctic (Giustiniani et al., 2013).
OGS Contacts: Umberta Tinivella, Angel Camerlenghi
AC Partners: Natural Resources Canada; USA; Russia; Denmark; Norway; Sweden.
- 14) **ERICON AB**, EU/FP7 project (www.eri-aurora-borealis.eu/) for preparatory phase of the icebreaker Aurora Borealis (following EU roadmap). The project was completed in 2012. Has produced a document for the scientific strategy in the Arctic and Antarctica from 2015 to 2030 and a series of documents that suggest the pan-European business model of the infrastructure, from the legal, political and scientific point of view. The construction of the ship is now on standby awaiting a political decision to fund shared by several countries
OGS Contact: Laura De Santis
AC Partners: Geological Survey of Denmark and Greenland; University of Bergen; Arctic and Antarctic Research Institute; Aker Arctic Technology Incorporated; Finnish Meteorological Institute; Finnish Environment Institute
- 15) **GLAMAR**, progetto appartenente all'Anno Polare Internazionale internazionale, finanziato dal Programma Nazionale di Ricerche in Antartide per lo studio della storia glaciale del Mar Celtico, vicino al limite sud-ovest raggiunto dall'ultima calotta glaciale e dove la sua estensione massima rimane incerta. I dati (multibeam morfobatimetria, sismica a riflessione) sono stati acquisiti nel 2009 nella crociera omonima *OGS-Explora* sul margine irlandese, allo scopo di comprendere i processi deposizionali avvenuti nelle passate fasi di espansione e ritiro glaciale.
Referente OGS: Daniel Praeg.
Partner Canadesi: Geological Survey of Canada (GSC).
- 16) **MELTSTORM**, PNRA project (PEA 2010), for the study of paleoclimate in the Barents Sea with geological and geophysical data of the EGLACOM OGS Explora International Polar Year cruise (<http://www.sites.google.com/site/ipynicestreams/meltstorm>).
OGS Contact: Michele Rebesco.
AC Partner: University of Tromsø; University of Bergen; The University Centre in Svalbard (UNIS).
- 17) **Paleokarst** Project for tomographic processing of seismic data for the integrated geophysical study of karst structures of the formation Wordiekammen (Svalbard Islands), as analog for the oil and gas fields in the Barents Sea;
OGS Contact: Giuliana Rossi.
AC Partners: Norwegian Research Council in collaboration with Statoil and DetNorske.



Collaborations with the member countries of the Arctic Council for ongoing activities in the Arctic:

Norway: Uni. Tromsø, Uni. Bergen, Centre for Integrated Petroleum Research, Univ. Centre Svalbard, Norwegian Geotechnical Institute, Norwegian Hydrographic Service, Statoil, Det Norske (PERGAMON, MELTSTORM, DEGLABAR, CORIBAR, ERICON AB, Paleokarst, IMPERVIA, MELTS-O);

Denmark: GEUS, Uni. Copenhagen (MELTSTORM, CORIBAR, ERICON AB, EDIPO, PERGAMON);

Canada: Geological Survey of Canada, Natural Resources Canada, Université du Québec à Montréal, Natural Sciences and Engineering Research Council of Canada (GLAMAR, PERGAMON, PAST Gateways, ECORD);

Sweden: University of Stockholm (IBCAO, PERGAMON)

USA: Columbia University, Naval Research Laboratory, U.S.G.S. (IBCAO, PERGAMON)

Finland: Finnish Meteorological Institute, University of Eastern Finland, Finnish Environment Institute SYKE, Aker Arctic Technology Inc., (ERICON AB, PERGAMON);

Russia: Arctic and Antarctic Research Institute, Russian Academy of Science, VNIIOkeangeologia, Petroleum Institute of Geology and Geophysics SBRAS, Institute for Biological Problems of the Cryolithozone, Lomonosov Moscow State University (ERICON AB, IBCAO, PERGAMON).

Recent publications with Arctic topic:

Giustiniani M., Tinivella U., Jakobsson M., Rebesco M., 2013, Arctic Ocean gas hydrate stability versus changing climate. Abstract of Arctic Frontiers 2013 conference (Geopolitics & Marine Production in a Changing Arctic), 20 - 25 January 2013, University of Tromsø, Tromsø, Norway

Giustiniani M., Tinivella U., Jakobsson M., Rebesco M., in 2013, Arctic Ocean Gas Hydrate stability in a changing climate. Journal of Geological Research vol. 2013, Article ID 783969, 10 pages, 2013. doi:10.1155/2013/783969.

Jakobsson, M., Mayer, L., Coakley, B., Dowdeswell, J.A., Forbes, S., Fridman, B., Hodnesdal, H., Noormets, R., Pedersen, R., Rebesco, M., Schenke, H.W., Zarayskaya, Y., Accettella, D., Armstrong, A., Anderson, R.M., Bienhoff, P., Camerlenghi, A., Church, I., Edwards, M., Gardner, J.V., Hall, J.K., Hell, B., Hestvik, O., Kristoffersen, Y., Marcussen, C., Mohammad, R., Mosher, D., Nghiem, S.V., Pedrosa, M.T., Travaglini, P.G., Weatherall, P., 2012. The International Bathymetric Chart of the Arctic Ocean (IBCAO) Version 3.0. Geophys. Res. Lett. 39, L12609.

Lucchi, R.G., Camerlenghi, A., Rebesco, M., Urgeles, R., Sagnotti, L., Macri, P., Colmenero-Hildago, E., Sierro, F.J., Melis, R., Morigi, C., Barcena, M.A., Giorgetti, G., Villa, G., Persico, D., Flores, J.A., Pedrosa, M.T., Caburlotto, A., 2013, Postglacial sedimentary processes on the Storfjorden and Kveithola trough-mouth fans: impact of extreme glacial marine sedimentation. Global Planet. Change 111, 309-326.

Lucchi, R.G., Pedrosa, M.T., Camerlenghi, A., Urgeles, R., de Mol, B., and Rebesco, M., 2012.



- Recent submarine landslides on the continental slope of Storfjorden and Kveitehola Trough-Mouth Fans (Northwestern of Barents Sea), In: Yamada Y et al (Eds.) Submarine Mass Movements and Their Consequences, Advances in Natural and Technological Hazards Research 31, 735-745.
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- Monti, M., Minocci, M., 2013, Microzooplankton along a transect from North Norway to Svalbard Islands, July 2008. *Polar Research* 32, <http://dx.doi.org/10.3402/polar.v32i0.19306>.
- Pedrosa M, Camerlenghi A, De Mol B, Urgeles R, Rebesco M, Lucchi RG, SVAIS and EGLACOM Cruises shipboard parties (2011) Seabed Morphology and Shallow Sedimentary Structure of the Storfjorden and Kveitehola Trough-Mouth Fans (north west Barents Sea). *Mar Geol.*, 286 (2011) 65–81.
- Rebesco M., Laberg J.S., Pedrosa M.T., Camerlenghi A., Lucchi R.G., Zgur F., Wardell N. 2014, Onset and growth of Trough-Mouth Fans on the North-Western Barents Sea margin – implications for the evolution of the Barents Sea/Svalbard Ice Sheet. *Quaternary Science Review* 92, 227-234.
- Rebesco, M., Liu, Y., Camerlenghi, A., Winsborrow, M., Laberg, J.S., Caburlotto, A., Diviaco, P., Accettella, D., Sauli, C., Tomini, I., and Wardell, N. (2011). Deglaciation of the Barents Sea Ice Sheet - a swath bathymetric and sub-bottom seismic study from the Kveitehola Trough. *Marine Geology*. 279, 141-14.
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- Westbrook, G.K., Chand, S., Rossi, G., Long, C., Bünz, S., Camerlenghi, A., Carcione, J.M., (...), Zillmer, M., 2008. Estimation of gas hydrate concentration from multi-component seismic data at sites on the continental margins of NW Svalbard and the Storegga region of Norway. *Marine and Petroleum Geology* 25, 744-758.