

ICE-ARC project Cruise report

R/V Porsild August 21st – 23rd 2016

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GEOLOGICAL SURVEY OF DENMARK AND GREENLAND
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GEUS

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Summary

A sediment coring program was undertaken from the research vessel R/V Porsild August 21st – 23rd 2016. The research vessel belongs to the University of Copenhagen and was chartered for the ICE-ARC cruise. 12 sediment cores were collected during the cruise in the Rodebay area of the Disko Bay region using a Rhumor Lot corer. Neither seismic profiles nor detailed depth soundings existed for the areas to be investigated. Therefore echo sounding profiles were run prior to coring operations to locate sea bottom depressions suitable for the coring.

The cores will be analyzed using a suite of different methods and techniques. Based on these data a record of past changes including past climate changes, changes in sea ice cover and productivity will be outlined with specific focus on the Whaling Period 16th – 18th century.

ICE-ARC Work Package 3 holds in addition to the objective of investigating past climate changes also an important component of past and present socio economic conditions in Greenland and the impact of western civilization on the Inuit communities in Greenland. In order to focus on this subject the old whaling area called Rodebay just north of Ilulissat was chosen as the focal point for the coring activities. This area was a stronghold for the European whalers in the 16th – 18th century.



Fig 1. The small settlement 'Rodebay' is located next to the small embayment where Dutch whalers slaughtered the whales.

Introduction

The EU funded *ICE-ARC project - Ice, Climate and Economics in the Arctic* was launched in January 2014 to investigate ongoing climate changes in the high Arctic and study the impact of the changes on present day Arctic socio economy. A third dimension of the ICE-ARC project is the investigations of past climate changes and their possible impact on the various Inuit cultures that have existed in the high Arctic through time – and the impact of western civilization on the Inuit culture.

The purpose of the Porsild cruise in 2016 was to collect sediment cores from the Rodebay area in the Disko Bay region to enable studies of past climate and environmental changes in an area further to the south of the Inglefield Bredning area where marine sediment cores were collected in 2014 (Fig. 2).

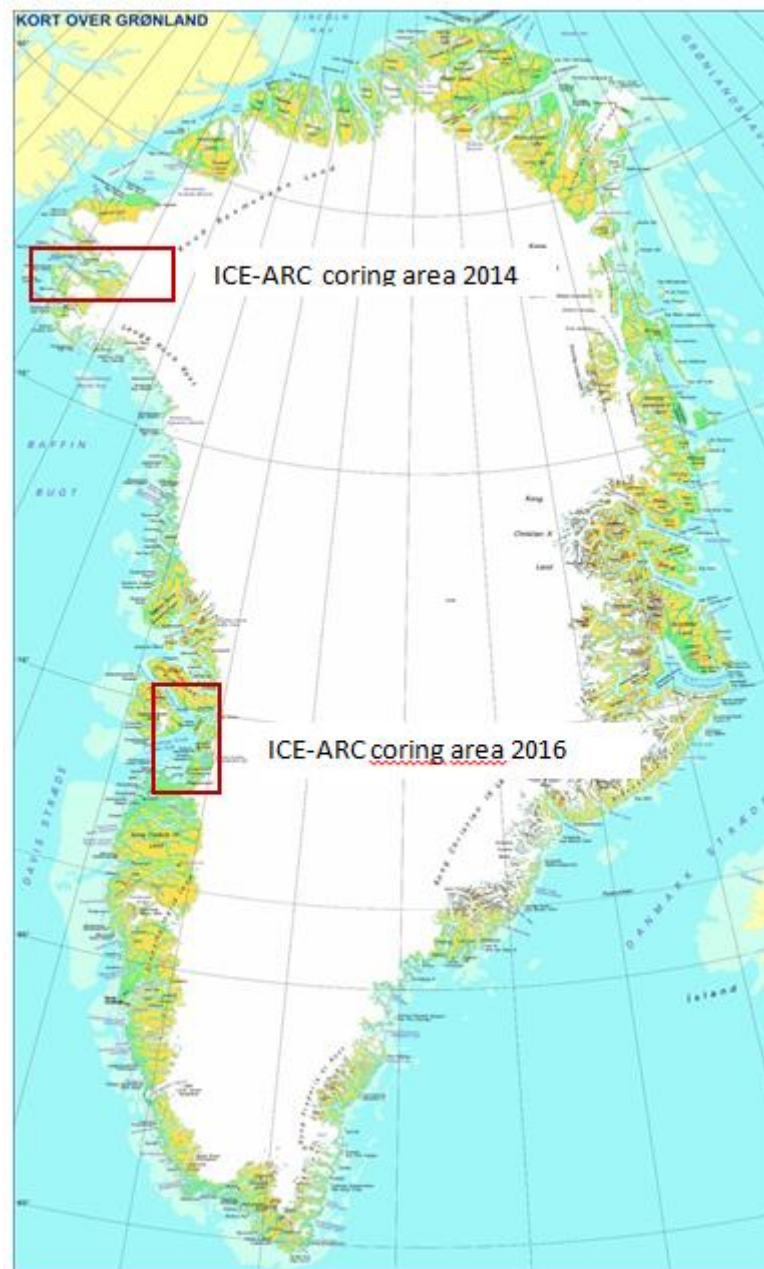


Fig. 2 Marine sediment cores have been retrieved from two areas off West and NorthWest NW Greenland. During the Cruise with the navy Ship N/V Knud Rasmussen in 2014 21 sediment cores were collected in the Inglefield Bredning and in 2016 12 cores were retrieved from the Rodebay area by the R7V Porsild.

Greenland and northern NW Greenland has only been inhabited for 4500 years. During this short time span several highly developed and independent cultures has succeed each other. Archeological investigations have shown that Greenland several times was uninhabited for longer periods during these 4500 years. The question is therefore what caused this periodic depopulation of the country. The sediment cores may add some answer to this question as each of the successive cultures has developed their own hunting and living strategies to survive in these for man rather extreme environments during a specific climate regime. However with climate and environmental changes these very sophisticated skills were threatened and the culture perished until a new culture entered Greenland with the capability to cope with the new climate regimes.

Western civilization has through time and to various degrees influenced the local population in Greenland. The Norse living in Greenland from about 1000 to 1450 AD presumably had only minor impact on Inuit culture whereas Europeans arriving some few hundred years later had major impact on the Inuit societies along the west coast of Greenland. The European Whaling Period from about 1600 to 1800 thus had profound impact on the livelihood of the Greenlandic population an impact that was sustained by the colonization by the Danes.

Cruise participants

Naja Mikkelsen, GEUS

John Boserup, GEUS



The Research vessel

The sediment coring program was undertaken from the University of Copenhagen Research Vessel 'Porsild'. The vessel has a length of 15 m, a breadth of almost 5 m and a max draft of 1,9 m. There are two winches for investigation purposes. A big winch is situated on the deck with a capacity of 400 m wire ($\varnothing = 10$ mm) and lifting capacity of about 2 tons was used for the coring operations. A smaller winch was used for hydrographic monitoring instruments.



Fig 3. The research vessel R/V 'Porsild' was ideally suited for retrieval of marine sediment cores in the sheltered waters.

Daily Log

August 19th 2016 Departure from Copenhagen via Kangerlussuaq to Ilulissat. Arrival 19 hours.

Accommodation at Hotel Avannaq in Ilulissat.

August 20th 2014. Coring Equipment collected at 'Blue Water' and unpacked.

August 21st 2014. Transfer to the harbor and embarkation on R/V Porsild. Coring Equipment assembled on deck prior to departure from the harbor. Coring operations in Ata Dyb and the two embayments of Rohde Bay. Anchoring for night in Rhodebay.

August 22th 2014. Coring operations continued in Kangasluarssuk AtaSund, Pakitsoq Fjord and Brede Bugt. Night off Ilulissat.

August 23rd 2014. Berthing in Ilulissat Harbour. Preparation of cores for transport.

August 24th 2014. Final packing of cores and coring equipment. Transport to Blue Water for further shipment to Denmark.

August 25th 2014. Departure at 8 am from Ilulissat with arrival in Copenhagen 9 pm.

Area of investigation

Rodebay or "Red Bay" is the Dutch name for the small Greenlandic settlement called Oqaatsut just north of Ilulissat on the west coast of Greenland. Inuit populations have been living at the site since 1700 and remains of a Norse settlement is also present in the bay area. The site has in addition been a Dutch whaling site, and the area got the status of a Danish colony / 'udsted' in 1877.

Dutch whalers called in the 1600s the area for 'Roo Baj - the Red Bay'. The whalers thus pulled whales ashore on the flat rocks north-east of the small village where they slaughtered the whales and thus colored the small embayment red with blood. Blubber was cooked both on board the large whaling ships and in onshore plants.



Fig 4. The Rodebay area of NW Greenland was investigated during the ICE-ARC cruise 2016

Sampling methods

A Rumohr Lot corer (gravity corer) equipped with a 50 kg lead weight and mounted with 2 m long plexi glass tubes were used for coring operations (Fig. 5). The winch system and crane of the ship was used to facilitate operation of the corer system.



Figs 5. A sediment filled Rumohr Lot corer is retrieved. Fig 6. The core barrel is left to settle

The cores were left to settle after retrieval and water was sipped off by drilling small holes in the core barrel before the cores liner was cut, equipped with a foam plug at the top and sealed for storage and transport.

Collected core material

Sediment coring was undertaken on 12 locations and cores were retrieved from all sites. (Fig 7; Table 1). Well defined sediment-water surfaces were obtained in all cores. Some cores displayed biological activity including worm tubes at the top of the cores (Fig.6).

It was problematic to obtain cores from the small Rodebay embayment as the sediment was very fluffy and organic rich and thus totally dispersed.



Fig. 7. Map showing the location of marine sediment cores retrieved during the ICE-ARC cruise 2016. Map kindly compiled by Karen L. Anthonsen, GEUS.

Core ID	Core Length (cm)	Water dept (m)	Lat	Long	Locality	Comments
Rode Bay # 1	158	440	69°23'34,56"N	51°01'23,16"W	Ata Dyb	
Rode Bay # 2	155	445	69°22'40,98"N	51°02'47,40"W	Ata Dyb	
Rode Bay # 3	51	94	69°20'43,69"N	50°52'48,73"W	Rode Bay East Fjord	
Rode Bay # 4	56	94	69°21'00,91"N	50°53'35,73"W	Rode Bay East Fjord	
Rode Bay # 5	85	54	69°20'30,36"N	50°58'36,52"W	Rode Bay	
Rode Bay # 6	46	53	69°20'46,02"N	50°58'01,18"W	Rode Bay	+ bulk 87cm; bottom in cap
Rode Bay # 7	131	144	69°37'42,42"N	50°32'53,70"W	Kangasluarsuk	
Rode Bay # 8	57	496	69°37'43,26"N	50°55'12,00"W	Ata Sund	
Rode Bay # 9	84	234	69°29'19,96"N	50°49'54,06"W	Pakitsoq Fjord	
Rode Bay # 10	105	386	69°27'20,91"N	51°1'25,971"W	Ata Dyb	Gas in core
Rode Bay # 11	91	92	69°16'47,22"N	50°59'24,48"W	Brede Bugt	
Rode Bay # 12	88	92	69°16'53,01"N	50°57'58,85"W	Brede Bugt	

Table 1. Marine sediment cores retrieved during the ICE-ARC cruise 2016

Acknowledgement

The success of the ICE-ARC cruise 2016 was due to the engaged and helpful crew on board the R/V Porsild. The project participants therefore direct their sincere thanks to the Captain and his crew who assisted in all aspect of the coring operations.

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