

Walrus Island – A pivotal place for High Arctic Palaeo-Eskimo societies in Northeast Greenland

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Résumé de l'article

Dans cet article, nous présentons et analysons les vestiges paléoesquimaux du site Walrus Island. En 2008, l'étude du site a révélé plus de 2 000 structures en pierre, dont 445 habitations attribuées à des occupations paléoesquimaudes. Les vestiges sont décrits comme étant des «aménagements axiaux», des «cercles de tentes», des «aires dégagées» ou encore des «pavages». Les vestiges lithiques témoignent de la présence sur ce site de toutes les cultures paléoesquimaudes identifiées au nord-est du Groenland: Indépendance I, Saqqaq et Dorsétien groenlandais. En nous basant sur la localisation des structures en bordure de pentes et sur l'absence de pierres dans leur périphérie, nous formulons l'hypothèse que les Dorsétiens groenlandais utilisaient des iglous sur le site. Walrus Island est le deuxième plus grand site paléoesquimau au nord-est du Groenland, le premier étant celui du cap Saint-Jacques sur l'Île-de-France, qui a 548 structures. Ces deux sites, ainsi que quatre autres potentiellement très vastes, ont ceci en commun qu'ils sont situés près de polynies le long du rivage du nord-est du Groenland. Ces grands sites étaient d'une importance capitale pour les Paléoesquimaux du nord-est du Groenland et peuvent nous aider à comprendre leur mode de vie dans l'extrême Haut Arctique.

Walrus Island – A pivotal place for High Arctic Palaeo-Eskimo societies in Northeast Greenland

Mikkel Sørensen*

Résumé: Walrus Island – Un lieu phare pour les sociétés paléoesquimaudes du Haut Arctique au nord-est du Groenland

Dans cet article, nous présentons et analysons les vestiges paléoesquimaux du site Walrus Island. En 2008, l'étude du site a révélé plus de 2 000 structures en pierre, dont 445 habitations attribuées à des occupations paléoesquimaudes. Les vestiges sont décrits comme étant des «aménagements axiaux», des «cercles de tentes», des «aires dégagées» ou encore des «pavages». Les vestiges lithiques témoignent de la présence sur ce site de toutes les cultures paléoesquimaudes identifiées au nord-est du Groenland: Indépendance I, Saqqaq et Dorsétien groenlandais. En nous basant sur la localisation des structures en bordure de pentes et sur l'absence de pierres dans leur périphérie, nous formulons l'hypothèse que les Dorsétiens groenlandais utilisaient des iglous sur le site. Walrus Island est le deuxième plus grand site paléoesquimau au nord-est du Groenland, le premier étant celui du cap Saint-Jacques sur l'Île-de-France, qui a 548 structures. Ces deux sites, ainsi que quatre autres potentiellement très vastes, ont ceci en commun qu'ils sont situés près de polynies le long du rivage du nord-est du Groenland. Ces grands sites étaient d'une importance capitale pour les Paléoesquimaux du nord-est du Groenland et peuvent nous aider à comprendre leur mode de vie dans l'extrême Haut Arctique.

Abstract: Walrus Island – A pivotal place for High Arctic Palaeo-Eskimo societies in Northeast Greenland

In this article, the Palaeo-Eskimo ruin features of the Walrus Island site are presented and analysed. The Walrus Island site was investigated in 2008 and more than 2,000 stone features were recorded, of which 445 were the remains of dwellings attributed to Palaeo-Eskimo occupations. These ruins are described as “mid-passages,” “tent rings,” “clearings,” and “pavements.” They are associated with lithic artefacts that attest to the presence of all the previously identified Palaeo-Eskimo cultures of Northeast Greenland, i.e., Independence I, Saqqaq, and Greenlandic Dorset. Based on the ruins' location near sloping terrain and lack of peripheral stones, it is argued that the Greenlandic Dorset people built snow houses on the site. Walrus Island has the second largest known Palaeo-Eskimo site in Northeast Greenland, the largest one being the Kap Skt. Jacques site on the island Île-de-France, which has 548 features. Both sites, and four other large or potentially very large sites, have in common a shore location

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on the Northeast Greenland coast near polynyas. These large sites were of pivotal importance for the Palaeo-Eskimos of Northeast Greenland and may help us understand their way of life in the extreme High Arctic.

Introduction

Walrus Island is in the Greenland Sea, 2 km off Sabine Island (74° 30 N, 18° 46 E) (Figure 1). This purely basaltic island presents a bleak, uninviting, and windswept landscape of boulder beaches, raised boulder-beach ridges, and raised gravel terraces. It is 1.2 km long and 0.8 km wide. Its west coast is low, and the terrain rises gradually towards a steep cliff face at the northeastern end, at 85 m a.s.l.¹ (Figures 1 and 2). Its Palaeo-Eskimo ruins are primarily concentrated near the northwest and southwest beaches, at elevations from 6 to 10 m a.s.l., but some clusters of ruins appear on beach terraces up to 35 m a.s.l. and over 400 m inland (Figure 2). Erosion is visible on the northwest beach, where some prehistoric ruins are eroding into the sea, although the erosion is modest and, presumably, only a few ruins have been affected. The other ruins have been sheltered from erosive processes, bioturbation, and modern human activity. In general, the ruin features seem well preserved but are often difficult to interpret and describe due to the nature of the local geology.

This prehistoric settlement was initially discovered and briefly surveyed in 1926 by Johnson and Wordie (1933), who did not identify it as being Palaeo-Eskimo. No sites would be reported as such for the region until 1948. In 2005, archaeologists and geographers of the GeoArk project² arrived to begin a survey (Jensen et al. 2008). The number of prehistoric features they discovered was so overwhelming that a complete inventory had to wait until a team of eight GeoArk project researchers (four archaeologists, one zoologist, and three geographers) systematically carried out a nine-day survey in August 2008 (Sørensen et al. 2009). The team found 2,094 features and attributed them mainly to the Thule culture (Grønnow et al. 2011). Based on morphology and *in situ* lithic artefacts, a significant number were identified as Palaeo-Eskimo (Sørensen et al. 2009).

This article is the first to present the Palaeo-Eskimo archaeology of Walrus Island. Data on 445 recorded ruins are described and analysed, and the following questions discussed: Which Palaeo-Eskimo peoples settled there? Which dwelling types and locations did they use on the island? Based on the new evidence from Walrus Island, how did they use the High Arctic landscape of Northeast Greenland?

¹ The abbreviation a.s.l. means “above sea level.”

² The GeoArk project was an interdisciplinary research initiative by archaeologists, geographers, and zoologists from the following institutions: SILA-Arctic Centre at the Ethnographic Collections of the National Museum of Denmark; the Department of Geography at the University of Copenhagen; and the Natural History Museum of Denmark.

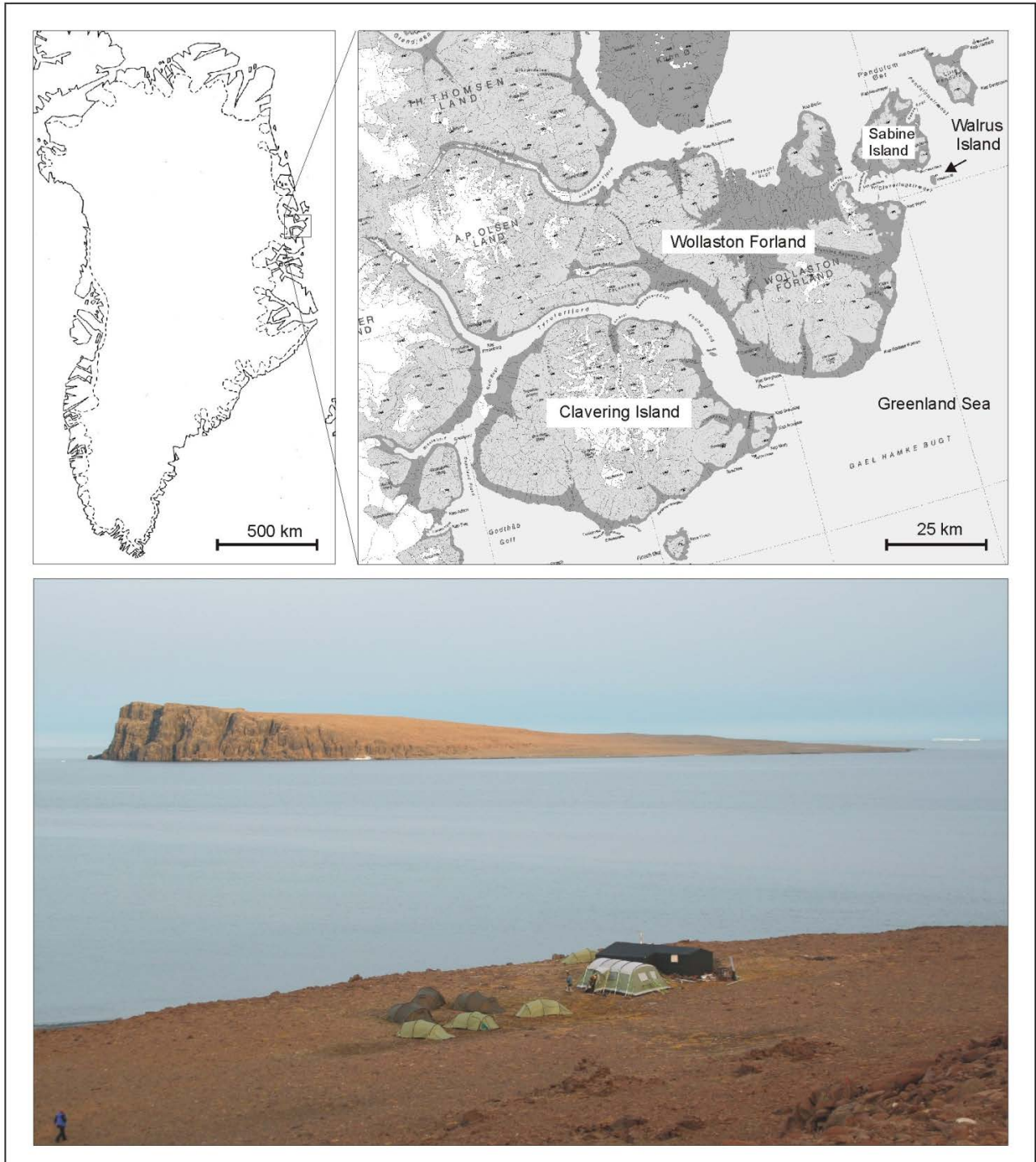


Figure 1. Location of Walrus Island in Northeast Greenland. Legends on right-hand side of map: dark grey: land; light grey: mountains; white: glaciers; lightest grey: sea. Photo (below) shows Walrus Island in the Greenland Sea as seen from Sabine Island where the GeoArk team camped next to the trapper station Germania Havn. Photo by Mikkel Sørensen.

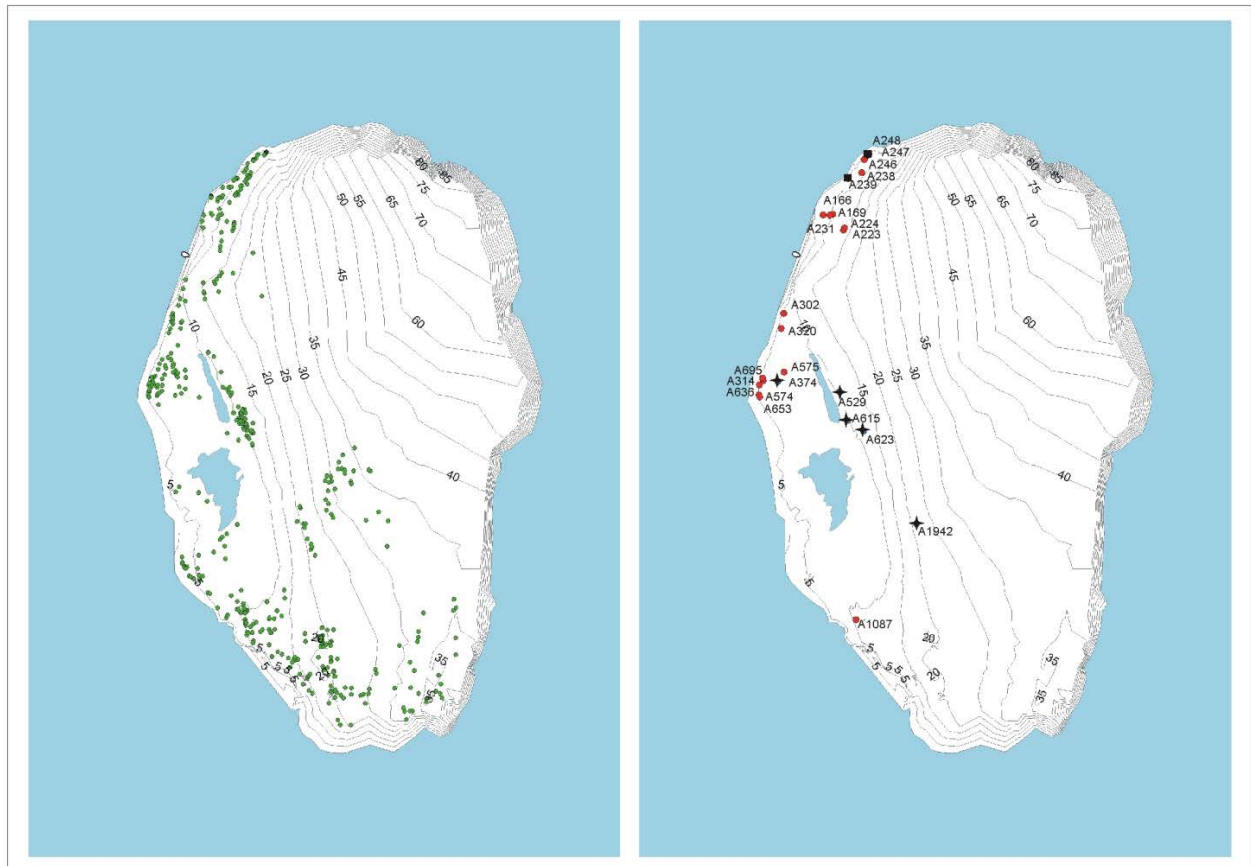


Figure 2. Map of Walrus Island with ruin features attributed to Palaeo-Eskimo cultures. Left: all recorded Palaeo-Eskimo ruin features. Right: numbered ruin features that could be attributed to a specific Palaeo-Eskimo culture from lithic artefacts. Dots: Independence I; squares: Saqqaq; stars: Greenlandic Dorset. Maps by J.B.T. Pedersen.

Methodology

Fieldwork was non-destructive and focused primarily on identifying, cataloguing, and photographing each ruin feature. The aim was to estimate the total number of ruins, to record their precise locations with GPS equipment, and to write up an overview of the site, i.e., an initial description that could highlight the most relevant research questions for future investigations and excavations. When surface scatters of lithic artefacts were discovered during the inventory, they were documented in the field, i.e., associated with a feature, and placed back *in situ* for future investigation. Thus, the 2005 and 2008 fieldwork involved no excavation or thorough spatial surface recording of single structures. The recorded data (GPS location, feature description, artefacts, faunal remains, and photo documentation) were stored as information about topography, artefacts, and ruin type, thereby forming a database that the present analysis has drawn upon.

Because conditions were poor for preservation of organic artefacts, none were found in Palaeo-Eskimo contexts, and this absence made absolute dating and faunal analysis impossible. Optically stimulated luminescence (OSL) dating was performed on

samples taken from beneath the foundations of the Palaeo-Eskimo ruins. Unfortunately, due to the young geology of the area and the lack of quartz sediments on Walrus Island, this method still needs further development to produce reliable absolute dates from this site (Pedersen et al. 2010b).

To identify cultural traditions and to estimate relative dating, we used information from lithic artefacts and ruin types that had already been extensively described in the archaeological literature on Northeast Greenland (Grønnow and Jensen 2003; Knuth 1984). We analysed the lithic artefacts using a dynamic technological approach that integrates the choices that had originally been made to produce them—from the selection of raw material to the discarding or modification of the tools, and including all debris (i.e. the *chaîne opératoire*, e.g., Inizan et al. 1999; Pelegrin et al. 1988). A study of lithic technology had previously shown that each Palaeo-Eskimo culture in Greenland had specific concepts and methods of lithic production (Sørensen 2006, 2012). By assessing raw material quality, preform morphology, flake types, and microblade cores for example, this approach makes it easier to assign lithic artefacts to each of Greenland's Palaeo-Eskimo cultures than was possible with earlier typological studies (Sørensen 2012).

Palaeo-Eskimo ruin features on Walrus Island

Palaeo-Eskimo ruins were described according to their typical appearance on Walrus Island. The following observations were made for each type of ruin feature:

Tent rings. These rings were made of boulders or slabs. Typically, they were on fine-gravel terraces where large peripheral stones formed an oval or circular structure, measuring 2 x 2.5 to 3 x 4 m in size. In some cases, internal, centrally-placed flagstones might be remnants of mid-passages or box hearths. Tent rings were also seen in boulder fields where large stones formed a periphery around a cleared area (Figure 3A).

Oval clearings. These human-made clearings were on beach terraces, often with a few central flagstones within the structure, e.g., a remnant of a former box hearth, mid-passage, or lamp support. A clearing typically measured 2 x 3 m. A special form of clearing in boulder fields had two rooms, i.e., two clearings divided by boulders but without a well-built mid-passage. These boulder-field clearings were the same size as other clearings (Figure 3B).

Paved areas. These features were typically made of tabular basalt slabs. Such pavements could be sporadic or more systematic. In some cases, several large slabs were found on the periphery of a pavement, but obvious tent-ring structures were typically absent. The paved area was usually 1.5 to 2.0 m in diameter (Figure 3C).

Mid-passages. These well-built mid-passages divided oval features, i.e., tent rings or clearings, into two “rooms.” They typically measured ca. 1 x 2 m (Figure 3D).

Triangular paved areas. This particular type of pavement made from slabs was triangular in shape and measured ca. 1 x 1 x 1 m. It was not associated with peripheral stones (Figure 3E).

Compressed circular areas. These areas, specific to Walrus Island, were defined as “compressions.” Compressions were light-coloured areas of egg-sized basalt rocks pressed into underlying fine gravel. They were associated with many of the above-mentioned types of features, and especially with paved areas on fine-gravel terraces. Sometimes, compressed areas had no peripheral stones, e.g., only a few flagstones centrally placed in the compression (Figure 3F). Unfortunately, the compressions cannot be assigned to a cultural tradition since no artefacts were found in them. However, because they were located in an area away from the shore near dwelling features attributed to the Greenlandic Dorset, they might be of Palaeo-Eskimo origin.

This initial description is summarised in Table 1. Many caches were found but none could be clearly linked to the Palaeo-Eskimos because later prehistoric Inuit had also used caches on the raised beach terraces (Grønnow et al. 2011) and because Palaeo-Eskimo attributes were lacking. It should be borne in mind that the recorded ruin features reflect not only subjective choices made during prehistory, but also the local geology. Boulder fields forced people to clear areas for dwelling places, often described as “clearings.” Gravel terraces were more conducive to tent rings and pavements. Thus, differences between features, e.g., between tent rings and clearings, may not only be architectural but also reflect the specific location chosen by Palaeo-Eskimos. Our observations should therefore be considered preliminary. More elaborate fieldwork, with more time being spent investigating each ruin, should be conducted in the future.

Table 1. Palaeo-Eskimo ruin features on Walrus Island.

	Tent rings	Clearings	Paved areas	Compressed circular areas	Other
No. of ruin features	164	198	47	3	33
Feature elements					
Mid-passage	22	66	3	0	5
Triangular pavement	0	0	5	0	0
Box hearth	16	7	2	0	0
Lithic artefact	19	33	4	0	2

Identifying different Palaeo-Eskimo cultures on Walrus Island

Although architecture varies among the Palaeo-Eskimo groups of Northeast Greenland, the differences are generally too vague for use in identifying specific cultural traditions. Palaeo-Eskimo cultures on Walrus Island were identified by *in situ* analyses of lithic artefacts on the basis of typology and the dynamic technological approach mentioned earlier (Figure 4). The Independence I culture was identified by its distinct lithic technology, i.e., burins, burin spalls, arrowheads, bifaces, choice of raw material, and serially produced large microcrystalline quartz (mcq)³ flakes that result from reduction of large tabular blanks. The Saqqaq culture was identified by its diagnostic production of large bifacial flakes with abraded butts made from fine-grained basalt, a material available on Basalt Ø (Basalt Island) in nearby Young Sund (Sørensen and Andreasen 2006; Sørensen 2012: source no. 48). The Greenlandic Dorset culture was identified by its distinct endscraper design, i.e., flaring edges, use of stemmed notched endblades and a preference for small irregular mcq core blanks as preforms.

By identifying the presence of Independence I, Saqqaq, and Greenlandic Dorset groups on Walrus Island, we have confirmed previous archaeological research in Northeast Greenland, which recognised these three Palaeo-Eskimo groups as the exclusive human colonisers until Inuit societies arrived ca. 1400 AD (Bennike et al. 2008; Grønnow and Jensen 2003). Radiocarbon dating indicates that Independence I people settled the region ca. 2500-1900 BC and the Greenlandic Dorset ca. 800-0 BC (Grønnow and Jensen 2003; Sandell and Sandell 1999). Walrus Island has provided the northernmost evidence of Saqqaq groups in Northeast Greenland. No material has yet been recovered in the region for absolute dating of this group's presence. There is only typological and technological evidence previously retrieved from the Young Sund area, 50 km to the south (Bennike et al. 2008; Sørensen and Andreasen 2006) and in the Scoresby Sund region (Sandell and Sandell 1999). Because Saqqaq ruins and artefacts are so sparse within the area of Young Sund and Walrus Island, it seems that these people visited the northern parts of Northeast Greenland only sporadically, unlike the Independence I and Greenlandic Dorset groups. All of the above Palaeo-Eskimo groups have also been identified in the High Arctic Thule region, demonstrating that they were well adapted to extreme environments (Schledermann 1990).

Following the *in situ* recording of the lithic material, an attempt was made to ascribe specific ruins and their characteristics to each Palaeo-Eskimo group of Northeast Greenland. Overall, 26 ruin features could be assigned in this manner: 19 to Independence I; two to Saqqaq; and five to Greenlandic Dorset (Table 2). In line with previous archaeological research, it seems that both Independence I and Greenlandic Dorset groups created the mid-passage structures on Walrus Island and that all groups produced boulder-area clearings for dwelling places. In contrast, pavements without tent rings or any other peripheral structures are attributed solely to the Greenlandic

³ To produce lithic tools, Independence I groups used microcrystalline quartz, like chalcedony and agates, typically found in basaltic rock formations.

Dorset. This observation is confirmed by an endscraper with flaring edges of Greenlandic Dorset type that had previously been found on a triangular pavement on southeastern Wollaston Forland (Andreasen 2005: 123; Sørensen and Andreasen 2006: 33).

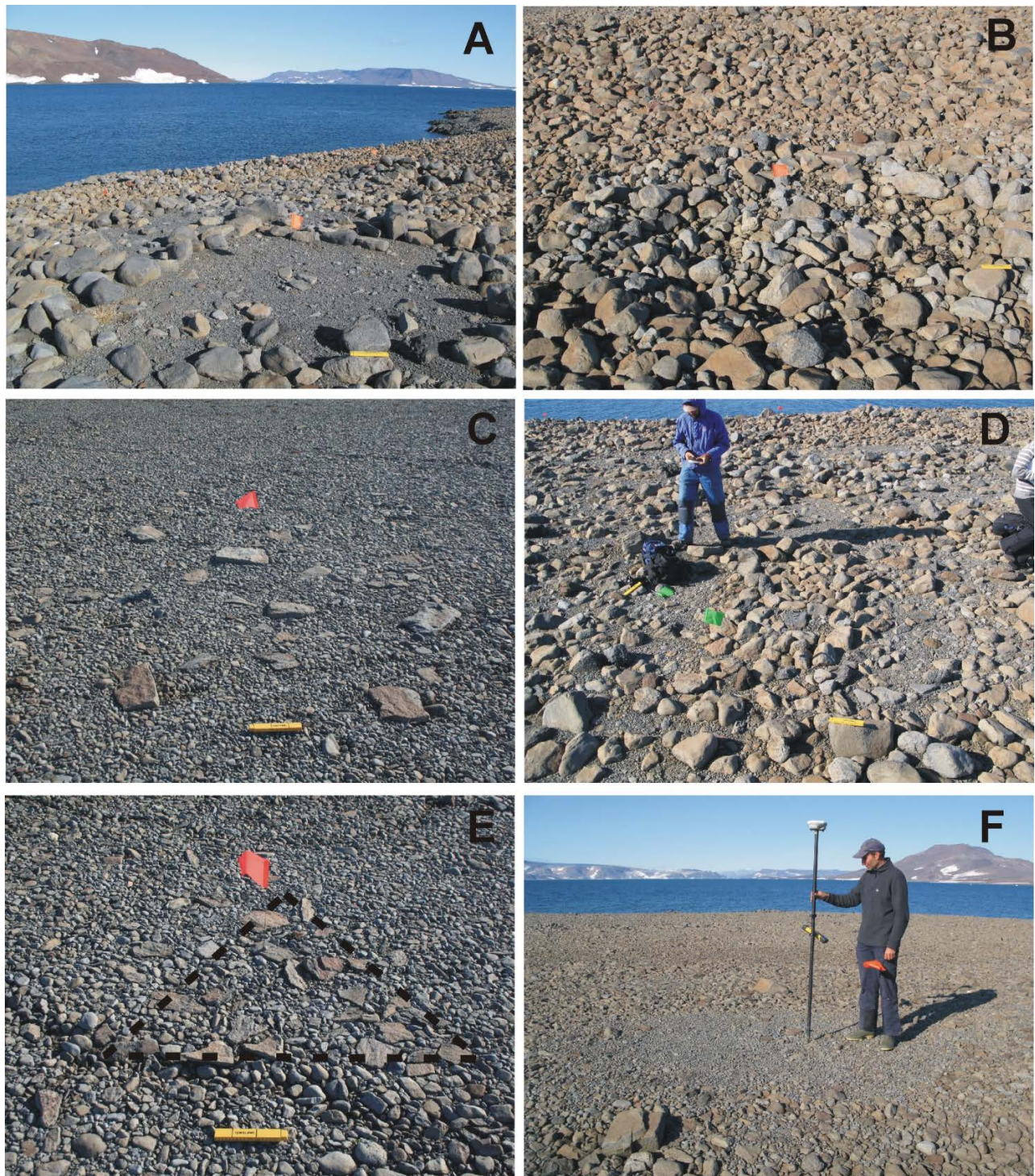


Figure 3. Feature types attributed to ruins of Palaeo-Eskimo dwellings on Walrus Island: A) tent ring in clearing (no. A138); B) oval clearing in boulder field (no. A164); C) Area with pavement/flagstones (no. A623); D) mid-passage in clearing (no. A231); E) triangular pavement (no. A600); F) compressed circular area (no. A548). Photos of no. A138, A164, A231, A548 by Bjarne Grønnow, no. A623 and A600 by Mikkel Sørensen.

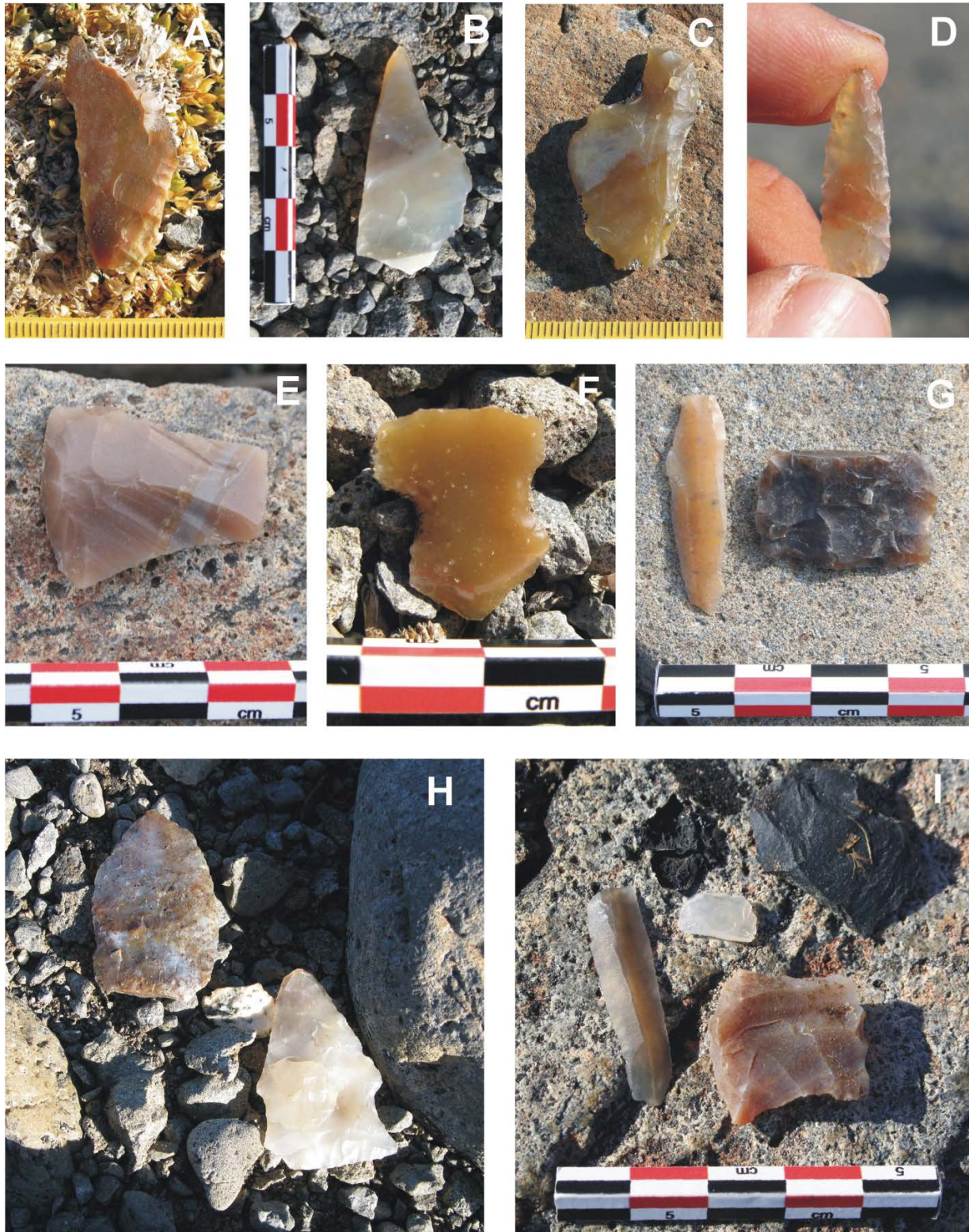


Figure 4. Typical lithic artefacts from Palaeo-Eskimo ruin contexts on Walrus Island: A) spalled burin of Independence I type (tent ring no. 426); B) spalled burin of Independence I type (tent ring with mid-passage no. 320); C) spalled burin of Independence I type (tent ring no. 231, see Figure 3A); D) arrowhead of Independence I type (clearing no. A314); E) endscraper with flaring lateral edges of Greenlandic Dorset type (pavement area no. A529); F) endscraper with flaring lateral edges of Greenlandic Dorset type (clearing with mid-passage no. A374); G) microblade and endblade preform of Independence I type (mid-passage no. A302); H) endblade preform and endblade of Greenlandic Dorset type (near cache no. 611); I) microblade, endscraper with flaring edges of Greenlandic Dorset type and debris (mid-passage no. A1942). Photos by Mikkel Sørensen.

Table 2. Cultural attribution of Palaeo-Eskimo ruin features on Walrus Island.

Feature no.	m a.s.l.	Palaeo-Eskimo culture	Lithic artefacts	Ruin characteristics
166	10	Indep. I	Flakes	Tent ring
169	9	Indep. I	Flakes	Tent ring
223	13.1	Indep. I	Flakes	Tent ring
224	12.9	Indep. I	Flakes	Tent ring
230	9	Indep. I	Burin spall	Tent ring
231	7.2	Indep. I	Burin	Clearing with mid-passage
238	8.5	Indep. I	Endscraper + flakes	Clearing in beach terrace
246	5.3	Indep. I	Burin	Clearing in beach terrace
247	5.4	Indep. I	Burin	Clearing in beach terrace
302	6.7	Indep. I	Biface	Tent ring with mid-passage
314	5.1	Indep. I	Arrowhead	Clearing in beach terrace
320	6.1	Indep. I	Burin	Tent ring with mid-passage
561	5.2	Indep. I	Sidescraper	Tent ring
574	5.1	Indep. I	Flakes	Tent ring with mid-passage
575	8	Indep. I	Burin spall	Tent ring with mid-passage
636	5.2	Indep. I	Flakes	Clearing with mid-passage
653	5.1	Indep. I	Flakes	Tent ring and clearing
695	5.9	Indep. I	Flakes	Tent ring and clearing
1087	10.4	Indep. I	Biface	Clearing in beach terrace
239	6.7	Saqqaq	Flakes	Clearing in beach terrace
248	5.4	Saqqaq	Flakes	Clearing in beach terrace
374	7.6	Gr. Dorset	Endscraper	Clearing with mid-passage
529	10.5	Gr. Dorset	Endscraper	Paved area
615	9.8	Gr. Dorset	Flakes + cores	Paved area
623	10.6	Gr. Dorset	Biface	Paved area
1942	21.3	Gr. Dorset	Endscraper	Clearing with mid-passage

Differences in Palaeo-Eskimo settlement location and architecture on Walrus Island

Sea-level changes were charted over time for the region since the arrival of Independence I groups ca. 4500 BP to 2300 BP. The sea level fell modestly by around 2 m and then rose by about 0.5 m to the present time (Pedersen et al. 2011). Palaeo-Eskimo ruins in the region appear to have been unaffected by marine transgression, though affected by erosion in some cases. Many Thule ruins, however, have undergone marine transgression, the sea level falling by about 2 m from the Independence I

occupation to the Greenlandic Dorset occupation. Thus, it can be expected that ruin features are ca. 2 m lower for the Greenlandic Dorset than for Independence I groups. However, as seen on the Walrus Island site, factors other than proximity to the shore were in mind when the Palaeo-Eskimos chose their camping grounds. Indeed, Palaeo-Eskimo ruin features on Walrus Island range in elevation from a low of around 3-4 m a.s.l. to a high of 36 m a.s.l. It seems, then, that proximity to the shore did not influence some of the culturally defined choices and demands.

The 21 identified Independence I and Saqqaq ruins are near the coastal zone (average elevation of 7.5 m), often in areas made up of substantial beach boulders and also in proximity to the main dwelling places of the Thule (Grønnow et al. 2011). In contrast, the five ruins attributed to the Greenlandic Dorset are on higher terrain (12 m on average and up to 21 m), not so close to the shore, and often on stable flat-beach terraces consisting of fine gravel (Figure 2, right). On the same terrace behind a small lake are the three pavements without peripheries that are attributed to Greenlandic Dorset groups (no. 529, 615, 623). This particular plateau has around 30 ruins of similar structure and thus seems to have been favoured by the Greenlandic Dorset. It was therefore named the “Dorset terrace” during the 2008 fieldwork. High elevations were occasionally preferred for habitation by the Greenlandic Dorset at the Kap Skt. Jacques site in Northeast Greenland, as shall be discussed later.

Snow houses on Walrus Island?

On Walrus Island, the general lack of peripheral stones, e.g., on the Dorset terrace, implies use of something other than a skin tent, which had to be anchored to the ground by stones. One hypothesis is that the walls could have been made of snow, leaving behind only inner-structure stones, compressions in the gravel, and some lithic artefacts. This possibility is strengthened by the specific location of these ruins on a wide terrace with a pronounced slope to the northeast (Figure 2). Strong winds blow over the open landscapes of Walrus Island during winter, thus causing snowdrifts to redeposit on leeward slopes. Because the southwestern part of the island has a large open plateau with small lakes that ends in a slope near the Dorset terrace, masses of snow are redeposited there. This location is perfect for snow-house building (e.g., Flaherty 1922; Savelle 1987: 31-32), while the flat plateaus of the island are more or less windswept and clear of snow. Within a dwelling, human activity would have compressed the gravel, and during spring the melting snow would not have drained from the compressed area, thus forming puddles. As a result of these puddles, the red-brown patina otherwise seen on most basalt rocks on Walrus Island would have washed away, leaving the compressed area lighter in colour.

In Palaeo-Eskimo contexts of the Eastern Arctic, snow houses are indicated by the presence of snow knives. The earliest snow knife from Greenland is a fragment made from a walrus tusk and found at Malmquist, a Greenlandic Dorset site near Kangerlussuaq in West Greenland (Gynther and Meldgaard 1984: 54). Probably the oldest snow knife from the Eastern Arctic comes from the Kapuivik site, on Jens Munk

Island in the Igloolik area. This specimen (no. M 2403), a fragment likewise made from walrus tusk, was found by Jørgen Meldgaard in House 3 on the 24 m terrace, equivalent to a late Pre-Dorset context. A complete snow knife was recovered from an Early Dorset context on the 22 m terrace at the same site (Meldgaard 1962: pl. 3). Because artefacts interpreted as snow knives are present in late Pre-Dorset, Early Dorset, and Greenlandic Dorset contexts, it seems that the Greenlandic Dorset people of Northeast Greenland knew how to build snow houses. Such knowledge may go further back to early Palaeo-Eskimo cultures, as indicated by Pre-Dorset features without peripheral stones in Back Bay, in the Central Eastern Arctic, which Ramsden and Murray (1995) have convincingly interpreted as being snow-walled structures.

This line of argument would suggest that pavements and circular compressions without peripheral stones in the gravel indicate that snow houses were built on Walrus Island, especially by the Greenlandic Dorset. Another possibility is later scavenging of tent stones and slabs. On Walrus Island, given the local boulder-rich geology, such scavenging seems mostly to have occurred in areas where the Inuit had their main settlement, on the southwestern shore (Grønnow et al. 2011). The Palaeo-Eskimo ruin features on the island differ in their characteristics perhaps because of chronological differences in site use and architecture or perhaps because of seasonal differences. As suggested by contextual faunal remains from the Bettison Point site on Back Bay (Ramsden and Murray 1995), Palaeo-Eskimo ruins with snow walls were likely winter dwellings, while those with tent rings were warm-season dwellings. Yet we still are unsure why mid-passages and pavements are seen only in some ruins on Walrus Island. Future studies may determine whether seasonality or different cultural practices explain the great variation in Palaeo-Eskimo architecture of Northeast Greenland.

The Kap Skt. Jacques site on Île-de-France

The Walrus Island site is not the only very large Palaeo-Eskimo site in this region. From 1987 to 1989, Count Eigil Knuth and his assistants recorded 584 ruin features at the Kap Skt. Jacques site on the southwestern corner of the Island of Île-de-France, ca. 160 km north of Walrus Island, which were attributed to the Palaeo-Eskimos (Grønnow and Jensen 2003: 278) (Figure 5). The ruin features are located in clusters on raised beach terraces between 2 and 20 m a.s.l. In a tentative typological description, Knuth defined 274 as ruins with a mid-passage, but only 49 of them also had a tent ring. Thus, 225 of these mid-passage ruins survived without an apparent peripheral structure, while 307 other ruin features without mid-passages were attributed to the Palaeo-Eskimos. The ruin features were built with boulders and flagstones and some had pavements; others had centrally-placed box hearths. Some features were defined as stone-built caches. A recent study of Knuth's inventory suggests that at least some of the tent rings should be attributed to the Thule (Grønnow and Jensen 2003: 294).

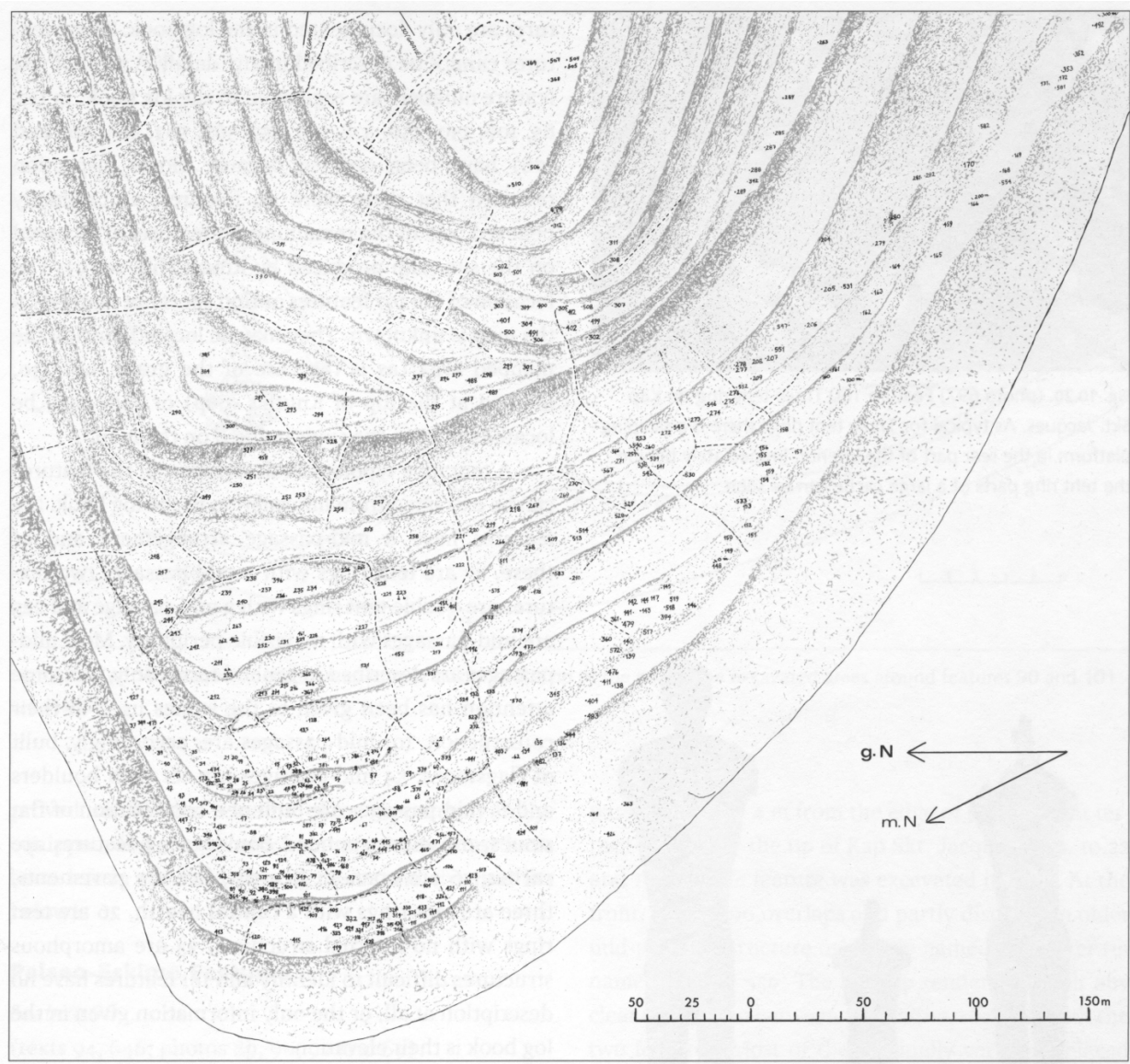


Figure 5. Kap Skt. Jacques site on the island of Île-de-France. More than 500 ruin structures were recorded and assigned by Eigil Knuth to the Greenlandic Dorset. After Grønnow and Jensen (2003).

Eleven ruins from the site were thoroughly investigated through excavation and documentation, while artefacts were systematically collected at another 14 ruins. Based on the lithic tool morphology and the architecture, all excavated artefacts and investigated ruins were attributed to the Greenlandic Dorset (formerly defined by Knuth as Independence II). One absolute date was produced from a terrestrial mammal bone found in a Palaeo-Eskimo context in excavated ruin no. 426 (muskoxy bone, Lab no: Ua-1686, 2340 \pm 70 bp). The date suggests that this feature was in use ca. 200-400 cal BC, when the Greenlandic Dorset is generally dated in Northeast Greenland (e.g., Grønnow and Jensen 2003). Based on Knuth's data, the ruin features at Kap Skt. Jacques ought to be attributed mainly to the Greenlandic Dorset, while only a few belong to the Thule. To date, the site has not yielded artefacts that are typical of Independence I and Saqqaq groups.

The Walrus Island and Kap Skt. Jacques sites share many similarities. Geographically, both are located on the southwestern shores of islands on the outer coast in the High Arctic Greenland Sea. At both sites, several hundred Palaeo-Eskimo features cluster on beach terraces 2-40 m a.s.l. Further, they are largely similar in size and types; i.e., they are oval, between 2 and 4 m long, and described as clearings, tent rings, pavements, and mid-passages. These similarities suggest similar functions and meanings for the Palaeo-Eskimos of Northeast Greenland during certain periods. A big difference, however, is an absence at the Kap Skt. Jacques site of artefacts and ruins that could be attributed to the Independence I group.

Polynyas and Palaeo-Eskimo settlements along the coast of Northeast Greenland

Why do very large Palaeo-Eskimo sites exist at Walrus Island and Kap Skt. Jacques? And why at these two particular places in the High Arctic? These questions will be discussed in this section through a look at sea-ice formation off Northeast Greenland.

When annual sea-ice formation off Walrus Island is examined through satellite imagery and historical records, we find that a large and persistent polynya called the “Sirius Water” forms during winter and spring from Shannon Island down to Young Sund (Pedersen et al. 2010a: figure 8) (Figure 6). This polynya is driven primarily by northern gales that break up the ice south of the southern tip of Shannon Island, occasionally as far south as Kap Breusing on Clavering Island (*ibid.*: figure 3). Open water predominates here even during the coldest part of spring, when fast ice generally dominates the seascape elsewhere in the region (Figure 6). Moreover, to get to the Sirius Water during episodes of severe cold and calm winds, one of the only access routes would start at Walrus Island, which could be reached without a boat over the solid fast ice between its location and Sabine Island (*ibid.*: figures 3, 7).

Around Walrus Island, the sea is generally less than 80 m deep and thus in winter and spring attracts marine mammal species that prefer open sea and relatively shallow depths (e.g., walrus, bearded seal, and whales). Hence the name “Walrus Island.” During some periods of the year, Walrus Island was possibly *the* place from which local Arctic hunters could hunt large marine mammals from the sea ice, while maintaining stable camping grounds and having access to dry land for the processing of game meat. Thus, the ruins on Walrus Island, and also on the eastern capes of Wollaston Forland and Clavering Island, are concentrated where the sea ice is least stable during winter and where, therefore, marine mammals are likely to live and gather (Figure 7). A similar situation has been documented in the High Arctic Thule-Ellesmere Island region, where Palaeo-Eskimo settlements are closely associated with recurring polynyas (Schledermann 1980; Sørensen 2010).

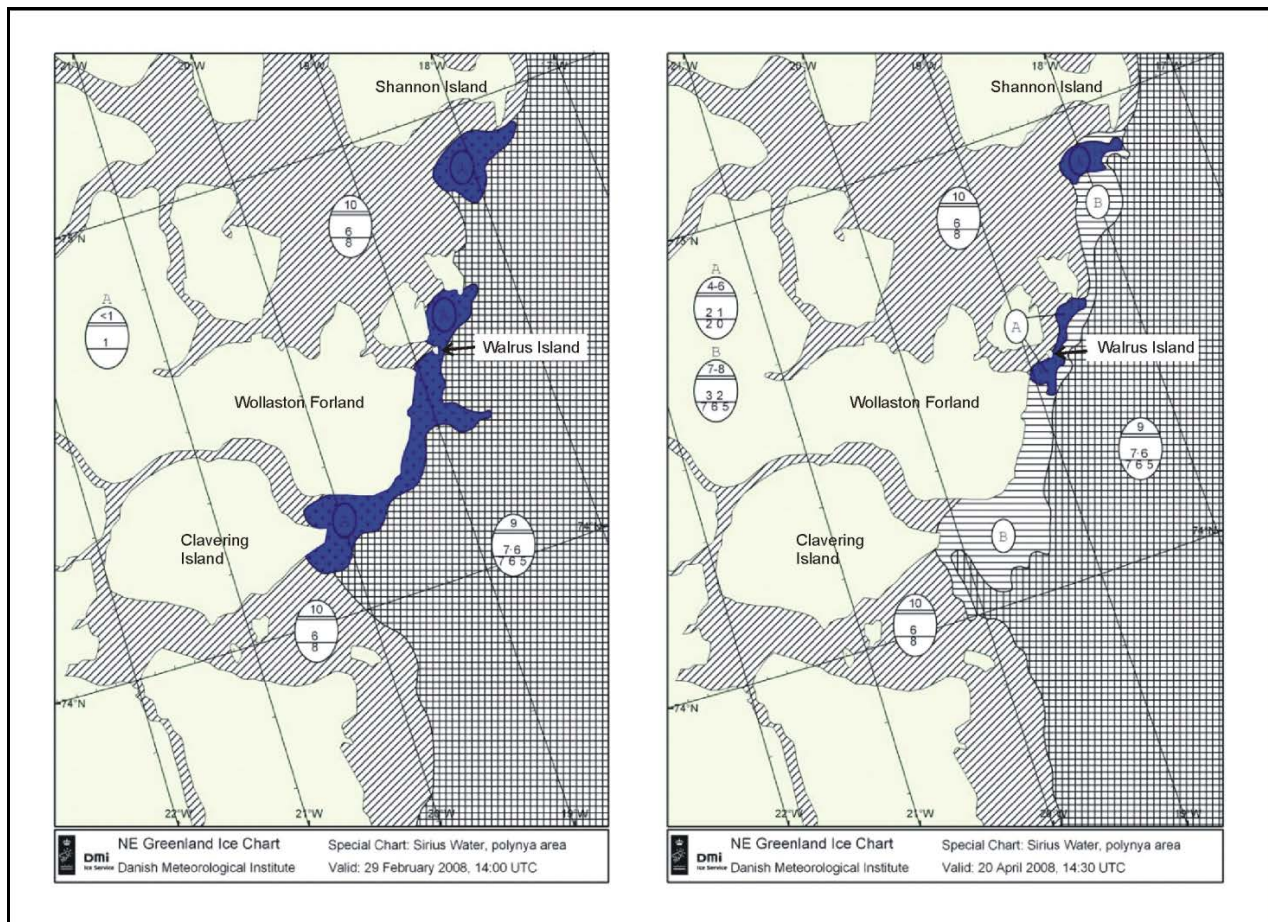


Figure 6. Distribution of the Sirius Water polynya on February 29 (left) and April 20, 2008 (right). It can be seen that the polynya opens and shrinks during winter. This variability primarily depends on changing wind direction and speed, rather than on changing temperatures. (Data from the Danish Meteorological Institute, after Pedersen et al. 2010). Legend (ovals): sea ice classification after the World Meteorological Organizations “Ice Egg Symbol.” Upper numbers represent total ice concentration on a scale of one to ten (10 is fast ice). Lower numbers are respectively stage of sea-ice development and form of the ice (see <http://www.natice.noaa.gov/products/egg>).

Annual sea-ice formation has been measured along the coast of Northeast Greenland between Nordostrundingen and Scoresby Sund. This region has at least three large and two small recurrent shore polynyas, i.e., places where the sea ice breaks up during winter, and where openings in the ice appear next to dry land all year-round (Sandell and Sandell 1999: 10) (Figure 8). These polynyas are found off Nordostrundingen (the “Northeast Water”), south of Île-de-France, south of Store Koldewey, south of Shannon Island (the Sirius Water), and in the mouth of Scoresby Sund (the “Scoresby Sund Water”). Two of these polynyas are adjacent to the two very large Palaeo-Eskimo sites previously described, an indication that the High Arctic Palaeo-Eskimos organised their lives and economy around such open water. It may be that the Kap Skt. Jacques site has only ruins of Greenlandic Dorset origin because the polynya south of Île-de-France formed differently in the 3rd to 2nd millennia BC. There might also be cultural reasons.

Concentrations of Palaeo-Eskimo and Inuit ruins have also been recorded at the other four polynyas. On Amdrup Land and Holm Land towards the Northeast Water, clusters of Palaeo-Eskimo ruins (Andreasen 1998, 2005: 118) and Inuit winter houses have been recorded (Grønnow and Jensen 2003: 266 ff). The Eigil Knuth site on Holm Land has ca. 100 recorded ruins, five convincingly attributed to Independence I groups and 33-37 to the Greenlandic Dorset (Andreasen 1998: 203). On Store Koldewey Island, a concentration of Palaeo-Eskimo ruin features is located at its southern tip, at the Kap Alf Trolle site, where 130 have been attributed to the Greenlandic Dorset and the Thule (Andreasen and Elling 1990: 39). The Cape Swainson site in the Scoresby Sund estuary, next to the Scoresby Sund Water on southern Liverpool Land, resembles the Walrus Island site. Here, clusters of numerous stone-built ruin features have been attributed to the Palaeo-Eskimos and the Thule (Sandell and Sandell 1999: 117). This site is, like the Walrus Island site, on raised boulder-beach terraces in a harsh, uninviting environment next to the Greenland Sea. More than 85 large stone features have so far been documented and primarily attributed to the Thule, e.g., large caches, meat pits, shelter walls, tent rings, and clearings. The site has also yielded 509 Palaeo-Eskimo (Independence I and Greenlandic Dorset) lithic artefacts.

Cape Tobin, ca. 10 km west of Cape Swainson, has remnants of another large Palaeo-Eskimo site (the Cape Tobin site) (Sandell and Sandell 1999: 103). The site has been disturbed by historical and modern human activity. Along its periphery, 1,284 lithic artefacts have been found in seven areas, indicating a large intensively used Palaeo-Eskimo dwelling area. The vast concentrations of lithic debris and tools have been attributed to Independence I, Saqqaq, and Greenlandic Dorset groups. The Cape Swainson and Cape Tobin sites are probably large (or very large) Palaeo-Eskimo sites, whose different locations adjacent to the polynya suggest use during various stages of sea-ice formation in the course of the year, by all of the different Palaeo-Eskimo groups over time.

By understanding the relationship between large Palaeo-Eskimo sites and the formation of polynyas, we can also understand how the Palaeo-Eskimos used and perceived these High Arctic landscapes. To them, Northeast Greenland must have consisted of a few pivotal places where the sea ice, in combination with dry land, presented extraordinary possibilities for ice-edge hunting of sea mammals—the main subsistence activity of the Palaeo-Eskimos. Moreover, the clustering of the dwellings, as seen at the Walrus Island site, suggests that Palaeo-Eskimo families came from many areas north and south of the polynyas to live and gather here at specific times of the year, depending on polynya formation. Besides their advantageous hunting possibilities, these very large sites and their large ingathering of people also probably favoured annual communal practices for ritual, social, and material purposes. To conclude, the large and very large sites of Northeast Greenland are key to understanding how prehistoric hunter-gatherers subsisted and organised their lives for centuries in one of the world's most extreme environments.

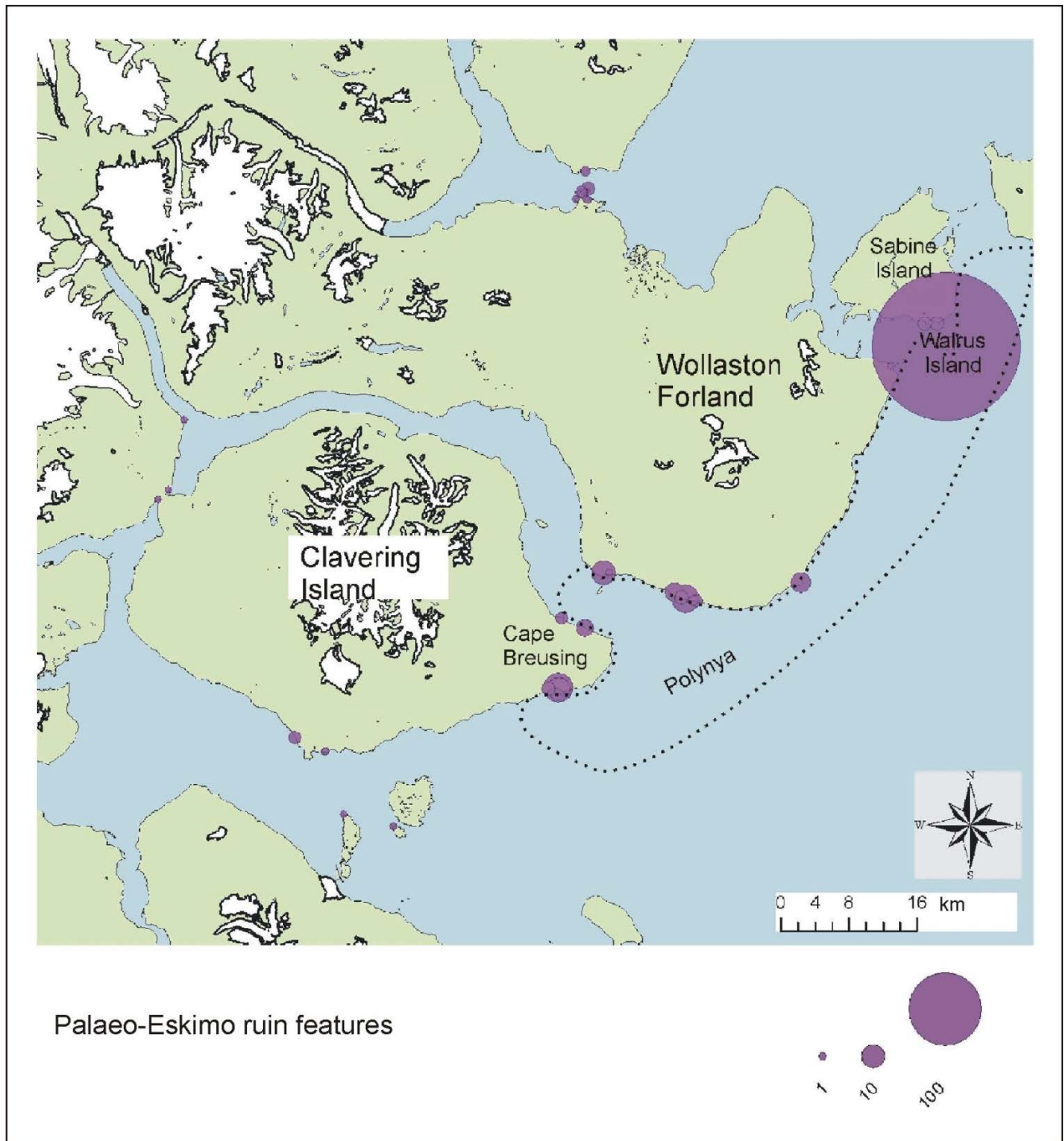


Figure 7. Distribution of recorded Palaeo-Eskimo ruin features in the Wollaston Forland-Clavering Island area. A dotted line indicates maximum extent of the Sirius Water Polynya during winter and spring (see Figure 6). After Sørensen et al. (2009).

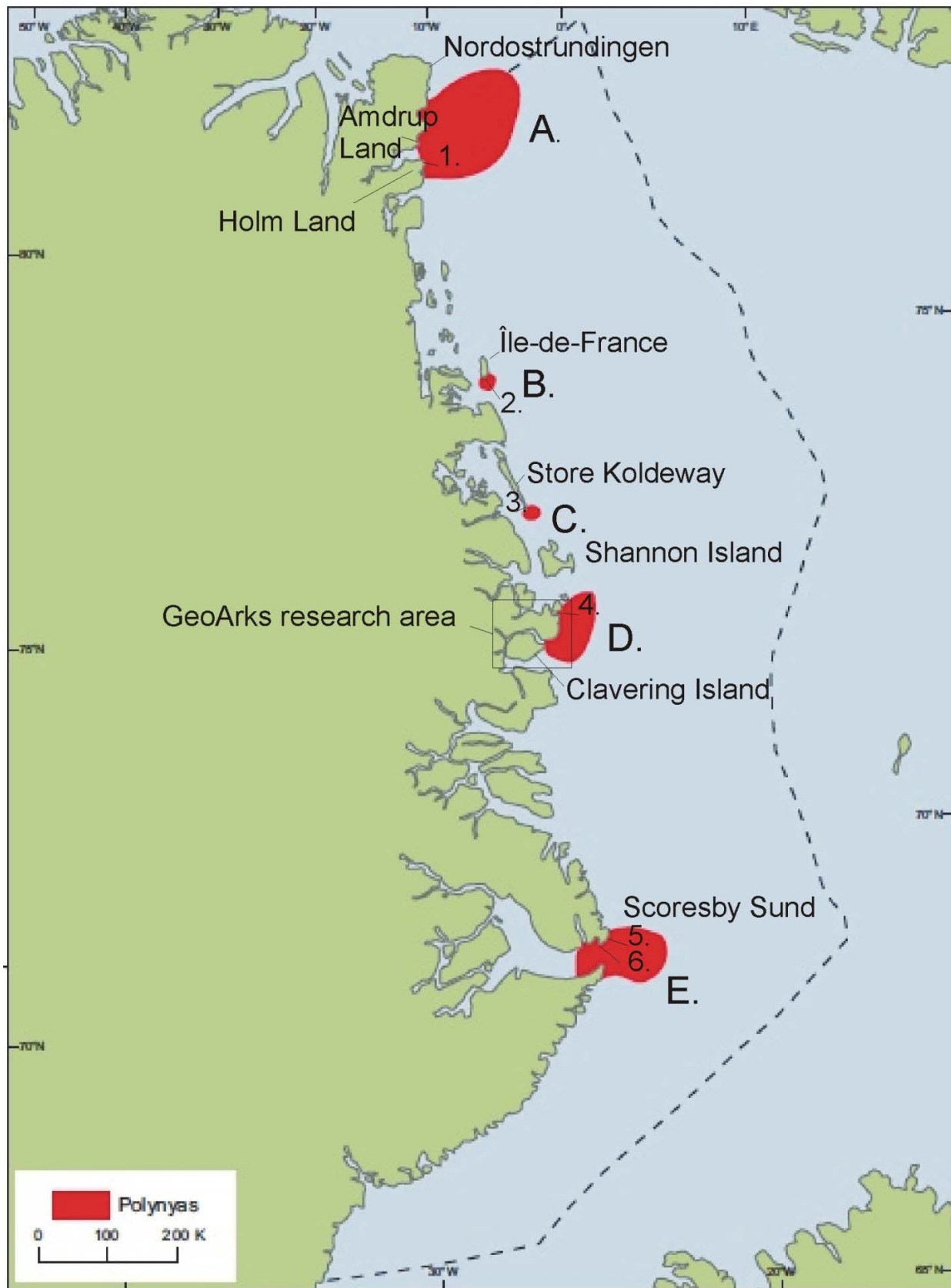


Figure 8. Locations of polynyas in Northeast Greenland: A) the Northeast Water; B) the Île-de-France Water; C) the Store Koldeway Polynya; D) the Sirius Water; E) the Scoresby Sund Polynya. Large or very large Palaeo-Eskimo sites referred to in the text are marked by numbers: 1) Eigil Knuth site; 2) Kap Skt. Jacques site; 3) Kap Alf Trolle site; 4) Walrus Island site; 5) Cape Swainson site; 6) Cape Tobin site.

Conclusion

Along with the Kap Skt. Jacques site, the Walrus Island site is one of a few sites where more than 400 Palaeo-Eskimo ruin features have been discovered and recorded in Northeast Greenland. At the Kap Skt. Jacques site, only Greenlandic Dorset and Thule ruins have been identified thus far, while Walrus Island has yielded evidence of all previously known Palaeo-Eskimo groups from Northeast Greenland, i.e., Independence I, Saqqaq, and Greenlandic Dorset. The existence of four other large or potentially very large Palaeo-Eskimo sites is supported by previous surveys of Palaeo-Eskimo ruin features in Northeast Greenland. These sites are all located on the outer coast, most often on southern spits of land, where there is or historically has been formation of polynyas primarily driven by northern gales. Because polynyas currently appear near concentrations of Palaeo-Eskimo ruins, Northeast Greenland may have had a similar icescape during the late Holocene. These stable recurrent coastal-shelf polynyas provided the Palaeo-Eskimos with much of their subsistence.

The Palaeo-Eskimo ruins on Walrus Island raise several questions about differences and similarities between Independence I and Greenlandic Dorset groups. It seems that the Greenlandic Dorset did not use the Walrus Island and Kap Skt. Jacques sites in the same way that earlier Palaeo-Eskimo groups had. Greenlandic Dorset ruins are associated with pavements, often without a peripheral structure. Sometimes, they are located higher on plateaus and further inland. The main reason could be that the Greenlandic Dorset knew how to build snow houses, as documented by the existence of snow knives from late Pre-Dorset and Dorset contexts in Canada and Greenland. They may have preferred this type of architecture during certain seasons.

There are still many unsolved questions about the Walrus Island site, e.g., its formation, the contemporaneity of its ruins, and their seasonal use. Generally, only a few Palaeo-Eskimo ruins have been carefully recorded and excavated from Northeast Greenland between Nordostrundingen and Scoresby Sund, e.g., at Kap Skt. Jacques (Grønnow and Jensen 2003) and on Holm Land (Andreasen 1998). Other Palaeo-Eskimo sites could yield much more information, e.g., seasonality, absolute dating, architecture, and cultural attribution. The priority now with the very large Palaeo-Eskimo sites is probably a conceptual one and concerns our understanding of hunter-gatherer societies in the High Arctic. These sites demonstrate that the Palaeo-Eskimos concentrated their landscape use and settlement pattern at a few key locations. To understand how Palaeo-Eskimo societies managed to organise their lives in Northeast Greenland, we must see the landscape as they saw it—as a huge territory where just a few special places played a pivotal role.

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