

# Things and Patterns – from Pyramiden to Patagonia

Festschrift in honor of Professor  
Hein Bjartmann Bjerck

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Birgitte Skar, Heidi Breivik og Martin Callanan (red.)



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# Innhold

## **Innledning**

Introduksjon til festschrift til professor Hein Bjartmann Bjerck

*Martin Callanan, Birgitte Skar, Heidi Mjelva Breivik* ..... 9

## **Tema 1 Tidlig forhistorisk tid; stein, bilder og landskap**

### **Re-visiting Middagskarheia 1**

Fragments of Middle Mesolithic Life on Vega, Central Norway

*Birgitte Skar, Helena Knutsson, Kjel Knutsson* ..... 18

### **Tilbake til Reinsvatnet**

*Heidi M. Breivik, Martin Callanan* ..... 40

### **What's the Point of all the Points?**

Thoughts on the use of Bow and Arrow in Early Mesolithic Coastal Norway

*Leif Inge Åstveit* ..... 62

### **Mesolithic Portable Animal Figurines in Coastal Western Norway**

*Knut Andreas Bergsvik, David Simpson, Hanne Årskog* ..... 74

### **Hellig landskap ved Julsundet i yngre steinalder**

- om erkjennelse og lokalisering av steder for rituell praksis

*Silje E. Fretheim* ..... 86

### **Et essay om fremstillingen av menneskefigurer og dyr**

*Trond Klungseth Lødøen* ..... 114

## **Tema 2 Komparative og globale perspektiver på menneskers relasjon til havet**

### **Late Pleistocene Archaeology**

*Daryl Fedje, Christopher F.G. Hebda, Duncan McLaren* ..... 134

### **Marine Mammals in Rock Art and Fossils in Flint**

Regional Expressions of Being-Sea-Stone Relations on the West Coast of Norway in the Mesolithic

*Astrid J. Nyland* ..... 152

### **Marine Ventures Project**

A Comparative Perspective for the Human Colonization of Archipelago Landscapes in Norway and Patagonia

*Atilio Francisco Zangrando, Heidi M. Breivik, Silje E. Fretheim, Angélica M. Tivoli* ..... 180

<b>Towards a “Flutter” Landscape Archaeology</b> On Relations between Digital Elevation Models and an Ethnolinguistic Dictionary from Tierra del Fuego <i>Jo Sindre P. Eidshaug</i> .....	196
<b>Tema 3 Samtidsarkeologi og arkeologi i hverdagen, arkeologiens hverdag</b>	
<b>Hvorfor arkeologi?</b> <i>Bjørnar Julius Olsen</i> .....	218
<b>Anekdoter som arkeologisk metod</b> <i>Mats Burström</i> .....	228
<b>Going Himmelblå</b> Sideways-Thinking Archaeology Within the Multiple <i>Terje Brattli and Ragnar Vennatrø</i> .....	234
<b>Salt House</b> For an Act of Unrelinquished Obligation <i>Christopher Witmore</i> .....	250
<b>Tema 4 Vitenskap, ord og bilder – visual essays</b>	
<b>En digital bergkunstreise gjennom tekst, bilder og lyd</b> <i>Heidrun Steberggløkken</i> .....	266
<b>Walking Down Memory Lane to the Sound of Bombs and Shells</b> <i>Axel Christophersen</i> .....	276
<b>Ytterst i verden – en utstilling mellom to permer</b> <i>Redigert av Heidi M. Breivik og Elin S. Sandbakk</i> .....	288
<b>Bifangst</b> <i>Elin Andreassen, Ann-Cathrin Hertling</i> .....	310
<b>Supplementary Tables and Figures</b>	
<i>Skar, Knutsson and Knutsson</i> .....	314
<i>Breivik og Callanan</i> .....	321



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# Marine Ventures Project

A Comparative Perspective for the Human Colonization  
of Archipelago Landscapes in Norway and Patagonia

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*Atilio Francisco Zangrando, Heidi M. Breivik, Silje E. Fretheim, Angélica M. Tivoli*

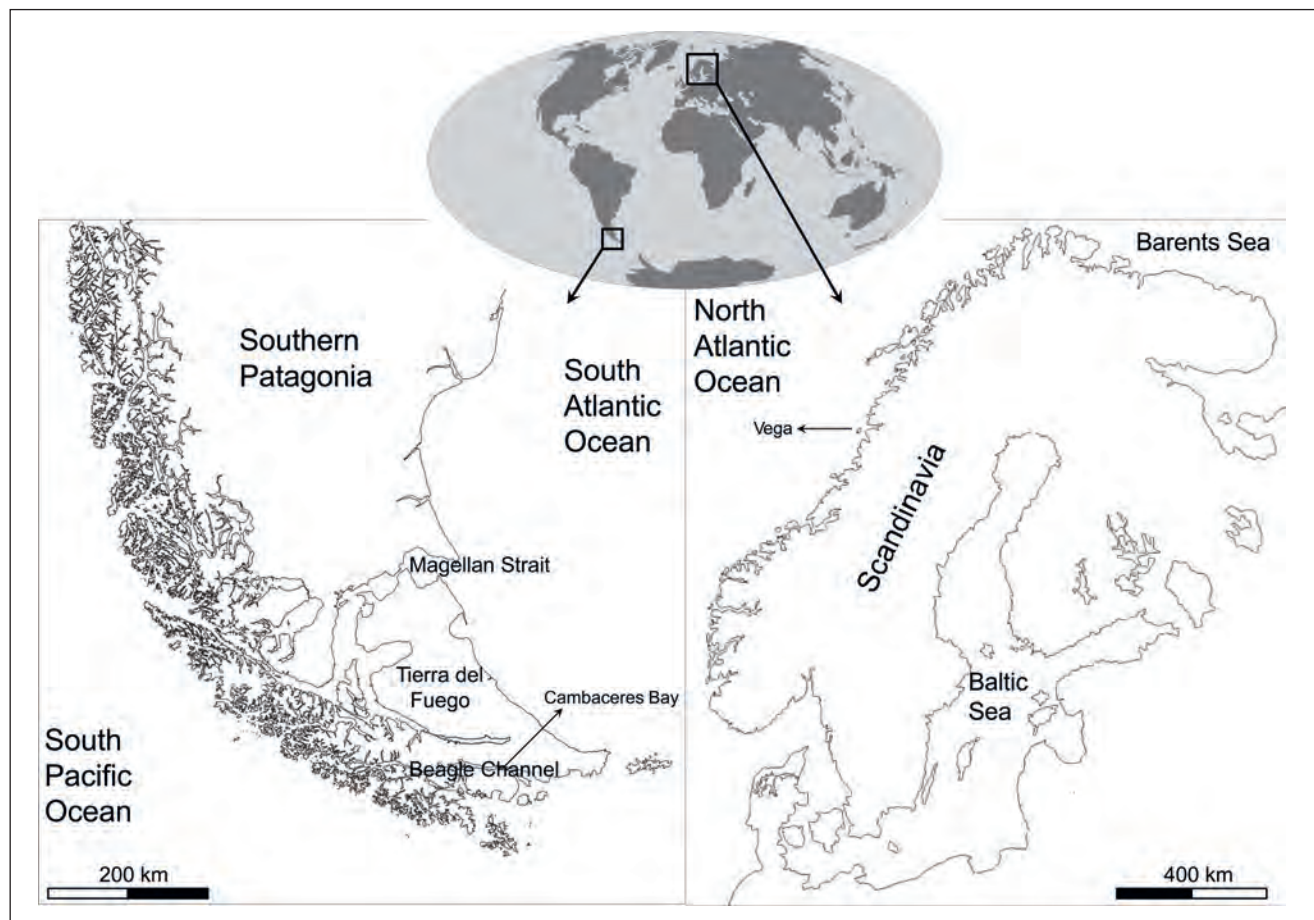
## ABSTRACT

The Marine Ventures project addresses three interconnected topics: (1) the colonization of seascapes and the dynamics of marine foraging development; (2) the interactions between logistics (e.g., boats) and settlements; and (3) dwelling types and settlement structures. These themes guide the project's exploration of how hunter-gatherer societies interacted with their environmental, material, and social surroundings in two distinct yet comparable settings: the archipelagos of Scandinavia and Patagonia. Both regions were significantly shaped by Pleistocene glaciations, resulting in similar natural histories and seascapes. Human occupation of these areas, coinciding with the glacial retreat during the late Pleistocene, represents one of the last major colonization processes in human history. Consequently, the coastal archaeological sequences of both regions show parallel developments. This paper aims to address these parallels through a comparative analysis of two early coastal sites excavated as part of the Marine Ventures project: Mohalsen II on the island of Vega (Norway) and Binushmuka I in the Beagle Channel (Argentina). The evidence discussed considers how the locations and assemblage structures of these sites may reflect patterns of mobility and settlement during the colonization process.

## Introduction

What can the locations and settlement structures of coastal archaeological sites tell us about conditions of mobility and the extensive use of boats in the human colonization of high latitude archipelagos? The motivation for posing this question stems from a significant discussion emphasized in Hein Bjerck's work, both in Norway and Patagonia. Bjerck (1990, 2009, 2016) argues that the way prehistoric people arranged themselves in coastal settings extends beyond just the economy and resources, and the use of boats is a key technological factor in determining the locations of sites and the nature of the cultural imprints that are preserved in the coastal archaeological record. Identifying archaeologically relevant units in time and space is a significant methodological challenge in the study of coastal settlement patterns (Bjerck 1990). In his analysis of dynamics in marine ecosystems, Bjerck (2009) distinguishes between two types of relationships. A littoral relationship is strictly land-based, does not involve boats, and implies minimal activities on the open seas. However, it may include various interactions with sea ice, such as ice fishing and hunting seals at

breathing holes (Bjerck 2021). In contrast, a maritime relationship encompasses a wide range of interactions with the open sea, including fishing, hunting, and traveling. Maritime relationships, therefore, rely on sophisticated boats capable of supporting and ensuring this diverse range of activities. According to Bjerck's perspective, boats consist of various integrated parts and functions, constructed to meet human demands and intertwined with seascapes, mobility and settlements: a bonded relationship conceptualized as the "human-boat machine." The combined affordances and constraints of this "human-boat machine" have significantly influenced the size and composition of basic residential groups, their range of activities, the duration and frequency of occupations at settlements, and, consequently, how these settlements appear in the archaeological record (Bjerck 2016). In this manner, extensive use of boats may be a pivotal factor in explaining the observed location of sites and recursive patterns of occupation, inasmuch as the boats themselves are elusive in the archaeological record (Bjerck 2009, 2016).



**Figure 1.** The study areas and locations of Vega (Norway) and Cambaceres Bay (Beagle Channel, Tierra del Fuego).

In line with the above, the main goal of the Marine Ventures project (see acknowledgements) is to increase our understanding of the early relations between humans and the sea by addressing three interrelated topics (Bjerck and Zangrando 2013): 1) colonizing seascapes and the dynamics of the development of marine foraging; 2) interactions between logistics (boats) and settlements; and 3) dwelling types and settlement structures. The project's methodological approach combined excavations and surveys at two specific locations in archipelagos in Scandinavia and Patagonia. This broad comparative framework provides the opportunity to understand how hunter-gatherer societies related to their environmental, material, and social surroundings in two independent, yet similar, settings. The similarities lie both in the geological and human past. The archipelagos of Scandinavia and Patagonia were strongly influenced by Pleistocene glaciations that resulted in similar natural histories and seascapes. As a process that was concurrent with glacial retreat during the late Pleistocene, the human occupation of these areas is one of the last important colonization processes in human history.

In this paper, we draw on the results and experiences from the Marine Ventures project to reassess how locations, settlements and assemblage structures relate to human mobility and colonization of high latitude archipelagos, linking this with the concept of the “human-boat machine” (Bjerck 2016). We address this issue based on a comparative analysis of two early coastal sites excavated within the Marine Ventures project: Mohalsen-II on the island of Vega (Norway), and Binushmuka I in the Beagle Channel (Argentina) (Fig. 1).

### Contextual background

In southwest Patagonia and Norway, the proximity to mountain ranges and strong influence of Pleistocene glaciations produced a very characteristic coastal landscape with abundant shallows, skerries, islands, channels, and fiords (Fig. 2). This channel/fjord seascape consists of highly productive marine habitats and sheltered seas that were available for human colonization from the Pleistocene–Holocene transition. There are parallel foundations for the coastal archaeological sequences of both regions. Late Pleistocene hunt-



**Figure 2.** View of Beagle Channel, Tierra del Fuego. Photo: A. F. J. Zangrando

er-gatherers are documented in the adjacent plains, but the archaeological data also suggest a marked time lag of several thousand years until the emergence of the initial human occupation of those seascapes during the Early Holocene (e.g., Orquera et al. 2011, Fuglestedt 2012).

The earliest archaeological records from both regions share several common characteristics, with a predominance of coastal *site distribution*. In Norway, two main trends have been observed (Breivik 2014). First, sites are unevenly distributed topographically: 96% of Early Mesolithic (Early Holocene) sites are located in coastal zones, while only 4% are situated in mountainous areas. Second, the geographic distribution is also uneven. There is a particularly high concentration of sites in Central Norway, with smaller concentrations along the southwest coast, southeast, and northernmost parts of the country, while some areas show no traces of Early Mesolithic settlements. With respect to coastal sites, Early Mesolithic contexts are primarily located in exposed coastal areas, often on raised beaches overlooking vast stretches of sheltered seawater. The elevation above current sea level varies

significantly depending on the region. For instance, in Central Norway there are notable differences in the rebound effect, with the oldest Early Mesolithic sites currently found at elevations ranging from 20 m asl in the southwestern archipelago to around 160 m asl in the inner fjord areas. In Norway, as radiocarbon dates from the Preboreal are rare, shore displacement curves provide a good age control as long the elevations of the sites are known (Breivik 2014). In most recorded cases, the original elevation at the time of occupation is estimated to have been around 2 m asl (Bang-Andersen 2003). Additionally, most of these sites would likely have been inaccessible or unusable without the use of boats.

Early Holocene occupations along the southwest coast of Patagonia are extremely scarce, making it challenging to conduct a comprehensive distribution analysis at this time (Zangrando 2018). In the Fuegian archipelago, these archaeological contexts are confined to the northern coast of the Beagle Channel and located between 5 and 18 m asl, though sea levels would have been higher during the time of their occupation (Zangrando et al. 2022). The northern coast of

the Beagle Channel could be reached from the inland regions of Tierra del Fuego by passing through the Fuegian Andes. However, no sites have been recorded for this period in the valleys of this mountain range.

The *organic preservation* at Early Holocene occupations is generally poor in both regions. In Norway, charcoal is uncommon at Early Mesolithic sites and osteological and other kinds of organic material are almost entirely absent. On the northern coast of the Beagle Channel, preservation is very poor, but remains of charcoal, and calcined and very fragmented bones associated with hearth structures, have been recovered (Piana et al. 2012, Zangrando et al. 2018).

*Site size* varies greatly. In Norway, most assemblages are small, often covering less than 50 m<sup>2</sup>. However, excavated sites have revealed that these are often clusters of smaller lithic scatters, likely associated with basic residential groups and an unknown number of re-occupations. For example, at the fully excavated Ormen Lange Sites 48 and 72, 20 distinct lithic scatter units, ranging in size from 10 to 25 m<sup>2</sup>, were identified as part of the same settlement area. Artifact counts varied widely, from 1,000 to 11,000 items, with notable concentrations of microflakes in specific areas (Bjerck et al. 2008, Bjerck 2016). Excavated settlements have

produced occasional fireplaces, and stone alignments that seem to represent expedient dwellings. Early contexts in the Beagle Channel also exhibit variability in the size of assemblages, with sites ranging from just a few square meters to as large as 150 m<sup>2</sup> (Zangrando et al. 2022). The frequency of lithic debris is similarly variable, with flakes and other stone-working debris often found in well-defined concentrations. For instance, at the Imiwaia I site, the assemblage consists of 103 shaped artifacts and around 11,000 lithic debris, predominantly distributed across four concentrations (Piana et al. 2012). The archaeological material is associated with a single combustion feature, comprising charcoal, microflakes, and calcined bones, measuring approximately 60 cm in diameter and 3 cm thick. Additionally, a depressed area, 35 cm in diameter and 4 cm deep, was found to contain abundant charcoal, with thermally altered pebbles framing part of the depression (Caruso Fermé et al. 2017).

### Case studies

In order to address the abovementioned topics within the framework of the Marine Ventures project, two excavations of early archaeological contexts were con-



**Figure 3.** Mohalsen 2012-II after removing the top 5 cm layer. Photo: Å. Hojem, NTNU University Museum

ducted on the island of Vega (Norway) and in the Cambaceres Bay (on the northern coast of the Beagle Channel) between 2012 and 2013.

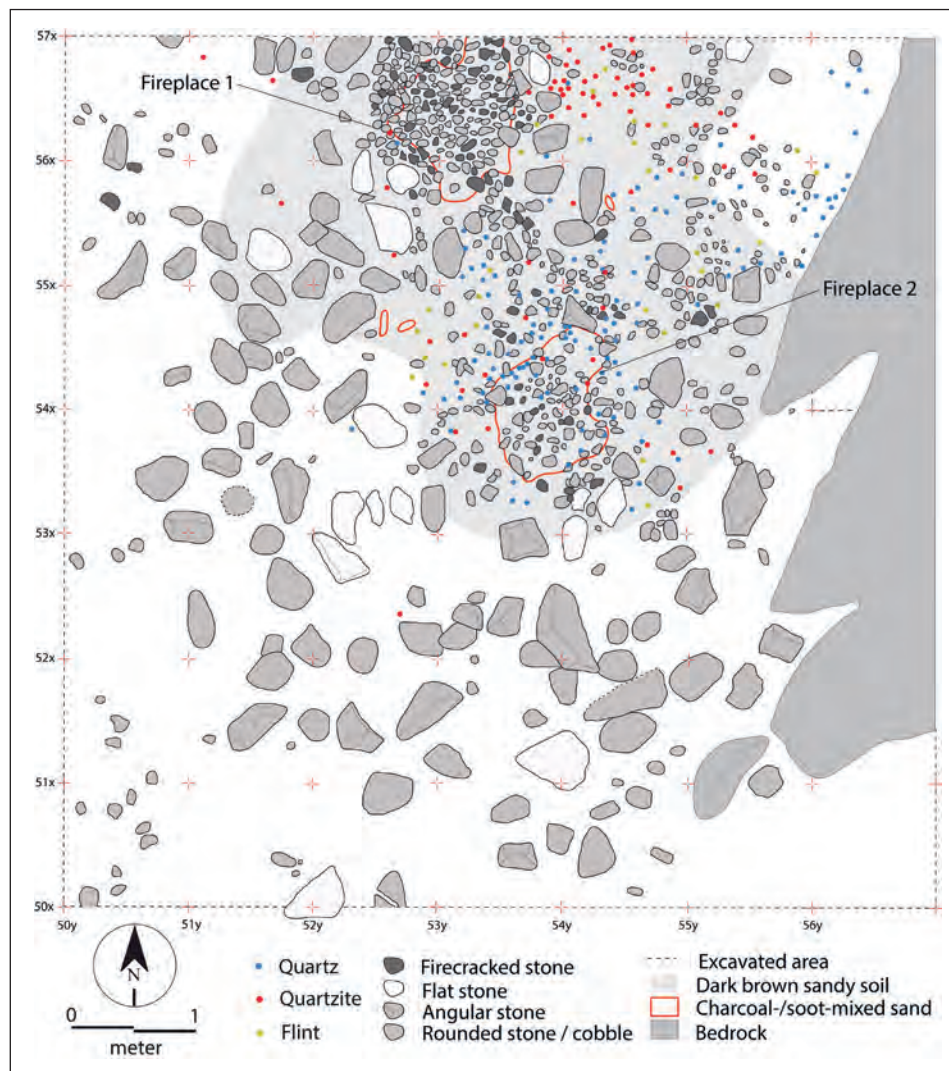
### Vega: Mohalsen-II site

Mohalsen is a low bedrock ridge located at the southeastern base of Gullsvåg fjellet on Vega, Northern Norway, just below the marine limit at 96 meters above sea level. The area features a mix of wave-eroded bedrock ridges and beach sediments. During the Early Mesolithic period, a large, sheltered bay existed on the southwest side of the Mohalsen formation. The Mohalsen 2012-II site is situated on an exposed beach formation at 75 m asl. Surface lithic finds and positive test pits first revealed the site in 1982. A circular structure of aligned cobbles stood out against the otherwise well-sorted beach sediments of sand and pebbles. Heather and moss vegetation covered the interior of the circle and the area facing the bedrock outcrop, while the sediments surrounding the other

sides of the structure were significantly more exposed. The primary aim of the 2012 excavation was to determine the nature of this structure, with secondary goals including the establishment of the site's chronology and analysis of the composition and distribution of its lithic assemblage (Fretheim et al. 2017). The shoreline displacement data is particularly relevant to our study (Bjerck 1989:45–50), which suggests that the site dates to the very end of the Early Mesolithic period.

As a first step, the area was cleared of vegetation, and the top 5 cm of the beach sediments were excavated in 50 x 50 cm units (Fig. 3). This approach was taken in order to better reveal the shape and positioning of the rocks, expose potential human-made features not visible on the surface, and gain an understanding of the horizontal distribution of lithic materials. The excavation yielded a total of 341 artifacts of quartz, quartzite and flint. The complete and detailed results of this excavation are presented in Bjerck et al. (2016a).

The exposed dwelling remains consisted of a circular



**Figure 4.** Plan of Mohalsen 2012-II including lithic distribution. Drawing: S. E. Fretheim, NTNU University Museum

alignment of approximately 98 cobbles, counting only those larger than 20 cm (Fig. 4). The outer diameter of the circle measured about 5 m. In the south and west, the cobbles appeared to form two parallel lines roughly 50 cm apart, while in the north and east, the alignment was more irregular and formed a single line. The inner diameter of the alignment was somewhere between 3.5 and 4 m, indicating a floor area of 10–13 m<sup>2</sup>. A circular fireplace, 1.5 m in diameter, with larger stones marking the circumference of a single layer of pebbles or small cobbles, was uncovered adjacent to the northern part of the dwelling, nearly within the walled area (Fireplace 1). Another, less structured or more disturbed, pebble fireplace occupied the northeastern part of the floor area, measuring approximately 2 x 1.5 m (Fireplace 2). Both fireplaces contained sooty sand or gravel beneath and between the pebbles. Some pebbles were clearly fire-cracked, while others appeared only moderately heated. The sooty sand layers were more confined than the pebble layers, and the proportion of visibly fire-cracked stones increased towards the sooty areas. This suggests that the actual fires were concentrated in the central parts of the structures, reinforcing the observation that the surrounding pebbles were not simply discarded fire-cracked rocks or stones heated in the fire and then spread out (Fretheim et al. 2017).

The fireplaces at Mohalsen 2012-II bear similarities to structures documented in Early Mesolithic contexts elsewhere in Norway, such as at Localities 48 and 72 from the Ormen Lange project in Møre og Romsdal (Fretheim et al. 2017). At these sites, the packings consisting of “potato-sized” pebbles were interpreted as being heat retainers and possibly foundations for low-energy, blubber-fueled fires (Bjerck 2016). Heat-retaining fireplaces of this kind would have minimal impact on an open site without a superstructure. In the context of Mohalsen 2012-II, this led us to hypothesize that Fireplace 1 represents a secondary occupation, rather than an outdoor feature contemporary with Fireplace 2 and the dwelling.

The positioning and undisturbed nature of Fireplace 1 suggested that it was constructed after Fireplace 2 and the dwelling, but likely not by a significant number of years. However, AMS radiocarbon dating of charcoal samples gave an age of 10,256–10,164 cal. BP (2σ) (9,050 ± 40 BP) for Fireplace 1, and an age of 11,085–10,695 cal. BP (2σ) (9,540 ± 40 BP) for Fireplace 2: an age difference of approximately 600–700 years. While the date for Fireplace 1 aligned closely with expectations, the date for Fireplace 2 was several centuries older than anticipated (Fretheim et

al. 2017). Due to the rapid shoreline displacement, the radiocarbon dates from other sites in the area, and the close contextual relationship between the two fireplaces, that difference has been questioned (Fretheim et al. 2017:212–214). Even though the presence of two hearth structures might suggest reoccupation of the site, this likely occurred within a significantly shorter period than 600–700 years.

### Beagle Channel: Binushmuka I site

Binushmuka is situated in a semi-enclosed area of Cambaceres Bay in the Beagle Channel, offering excellent shelter and protection particularly from westerlies. The Binushmuka I site lies on the western coast of the bay at approximately 5.5 m a.s.l., just behind a littoral gravel ridge (Fig. 5). Coastal landforms in the Cambaceres Bay perimeter indicate that the sea level reached 5 m asl during the Middle Holocene. Around 7,000 cal. BP, the paleo-bay Cambaceres had an open configuration that would have allowed greater influence of waves and currents, and better oxygenation of the waters than today (Zangrando et al. 2016).

Binushmuka I was detected and excavated as part of a comprehensive and systematic survey aimed at recording the locations of archaeological sites within the bay (Bjerck et al. 2016, Zangrando et al. 2018). Following a phase of test pitting, excavations were conducted in two large areas. The main excavation (Area A) covered 24 m<sup>2</sup> and yielded 1,497 artifacts. The second excavation area (Area B), located 15 meters to the southwest, covered 16 m<sup>2</sup> and produced 8,794 artifacts. Additionally, 314 artifacts were documented from 33 test pits, each measuring 50 x 50 cm (8.25 m<sup>2</sup> in total). A preliminary report on the archaeological assemblages recovered from these excavations was presented by Zangrando et al. (2018).

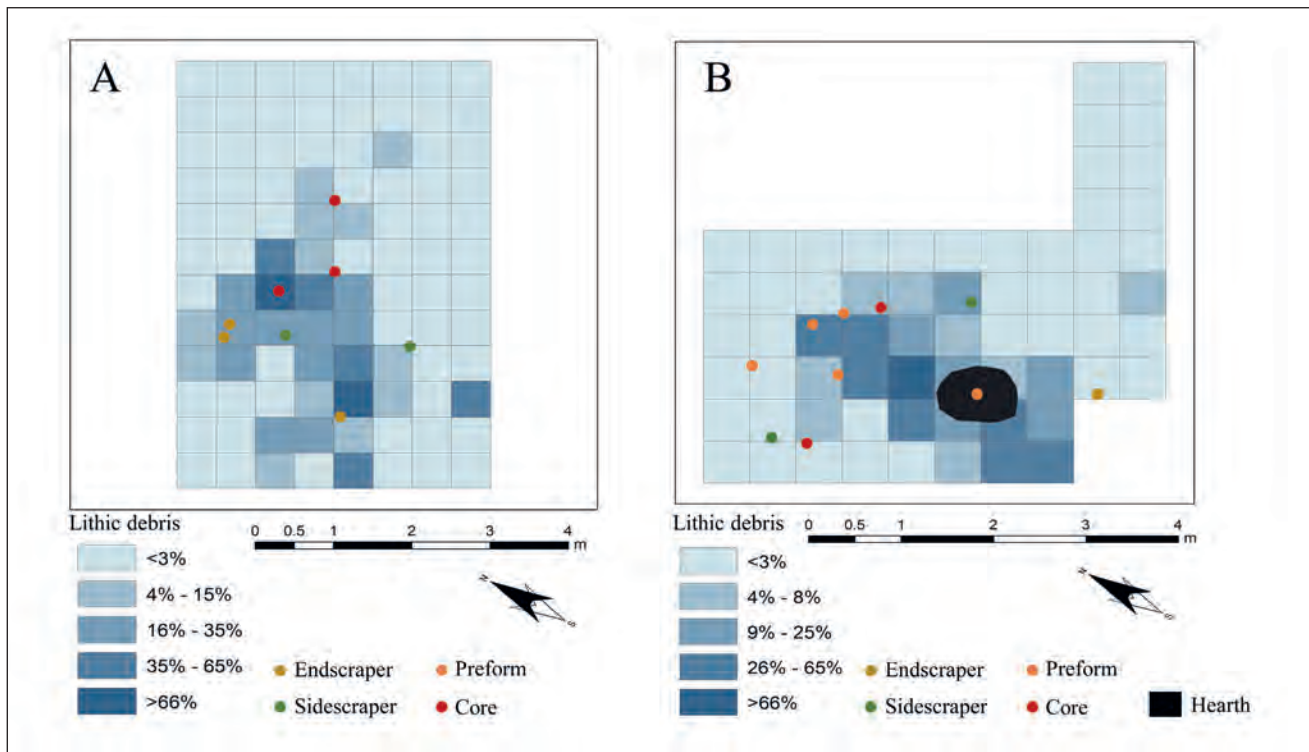
Binushmuka I consists of four stratigraphic units, each characterized by different sediment matrices and anthropogenic inclusions, indicating varying periods of occupation and differing frequencies of artifacts. The lithic assemblages at Binushmuka are shallowly buried, with occupation layers found between 12 and 38 cm below the modern ground surface. To understand the depositional environment of the site, it is important to note that layers A and B are part of a soil formation process. Layer C, a gravel-dominated deposit, consists of unconsolidated material underlying these organic horizons and is associated with the formation of the coastal landform. The composition of this layer is linked to the sediment of a paleo-beach formed during the Holocene maximum transgression.



**Figure 5.** Landscape and location of Binushmuka I showing the excavation areas: “A” on the right and “B” on the left.  
 Photo: E. L. Piana

This maximum transgression is dated to approximately 7,000 cal. BP in the Beagle Channel region (Gordillo et al. 1992, Rabassa et al. 1986, Isla and Bujalesky 2008, Coronato et al. 2022).

Layer S, the basal unit situated on top of the till formations (drumlins), is characterized by a dominance of silt, likely of aeolian origin. This layer contains the highest frequency of artifacts, primarily concentrated



**Figure 6.** Plan of Binushmuka I (Layer S) including lithic distributions and frequencies. Drawing: A. F. J. Zangrando

in Area B (N=7,400). Test pits indicated no continuity in artifact assemblages between the two excavated areas (Zangrando et al. 2022). Although a hearth feature was discovered in Area B, there is still no compelling evidence of wall remnants, prepared floors, post molds, or other distinct architectural features in the excavations. No bone material was found.

A sample from a charcoal concentration associated with a lithic assemblage in Area A yielded a date of 8,386–8,155 cal. BP ( $2\sigma$ ) ( $7,486 \pm 64$ ). The hearth feature in Area B was radiocarbon dated to 8,170–7,980 cal. BP ( $2\sigma$ ) ( $7,310 \pm 40$ ) (Zangrando et al. 2018). The calibrated median ages suggest a probable 170-year difference between the occupations. This temporal discontinuity is also reflected spatially, as no artifacts were found in the sediment corresponding to Layer S in the test pits between the two excavation areas, with the artifact assemblages appearing as discrete scatters in both sectors. Tools, cores, and lithic debris were recovered from both excavation units, but Sector B exhibited a notable difference, with a higher frequency of preforms, whole and fragmented microblades, and fragments of microflakes (Fig. 6). Therefore, the site shows discrete scatterings in two distinct sectors of the site, each representing spatially and temporally separate occupational moments (Zangrando et al. 2022).

## Discussion

### Colonization processes and maritime mobility

Some issues surrounding the human colonization process of the archipelagos of Scandinavia and Patagonia remain unresolved. In Norway, several studies highlight that most of the sites have been found in the raised coastal zones, frequently on islands, and they were positioned close to good natural harbours (Bjerck 1990, Bergsvik 1995, Bang-Andersen 1996, 2003, Breivik 2014). As is evident from the location of sites close to the shore and favourable landing places for boats, and most frequently on larger islands, marine resources (seal, fish, seabirds and, possibly, shellfish) must have been of great importance. Various papers by Hein Bjerck (1990, 2009, 2016) focusing on the marine/maritime aspects of the colonization are highly relevant to this discussion. One of Hein Bjerck's main assertions is the role played by seaworthy boats, a prerequisite for expansion along the rugged and demanding Norwegian coast (Bjerck 1990). Sites from the same period have also been recovered with less frequency in mountain contexts (Tørhaug and Åstveit 2000, Bang-Andersen 2003, 2012, 2013, Callanan

2008). The large numbers of projectile points indicate regular hunting of land mammals was an important part of the subsistence pattern. The colonizers therefore approached and exploited two very different landscapes and resource situations. Breivik and Callanan (2016) proposed that the combination and timing of hunting activities both high in the mountains and low along the coasts gave Early Mesolithic groups access to resources that complemented each other in a 'colonizer package' that was apparently quite successful.

In Tierra del Fuego, following the inland occupations at the Tres Arroyos I rock shelter during the Late Pleistocene, there is a 3,500-year gap in the archaeological record of the island, covering almost the entirety of the Early Holocene (Morello et al. 2012). Archaeological evidence reappears around 8,600 cal. BP, marking a shift in spatial occupation, with the emergence of open-air sites along the northern coast of the Beagle Channel, such as Binuhsmuka I. Only a few occupation sites have been documented for this initial period, but in the Middle Holocene (after 7,200 cal. BP), there is a notable increase in the number of sites and in the appearance of shell midden formations (Orquera and Piana 2009). Unlike in Scandinavia, there is no evidence of Early Holocene occupations in the cordillera, and no record of activity in the interior mountain ranges until the Late Holocene (De Angelis 2020). Nevertheless, the early coastal settlements along the northern Beagle Channel have been ascribed to visits by hunter-gatherers from further inland (Orquera and Piana 2009). According to Orquera and Piana, the colonization of the archipelago likely occurred later with the arrival of populations with seaworthy technology around 7,200 cal. BP, at which point the exploitation of marine resources and the use of harpoon technologies become evident in the archaeological record. This perspective is currently being re-examined in light of various factors affecting the formation and preservation of the archaeological record (Zangrando 2018, 2022, Zangrando et al. 2018, 2022). In all cases where early coastal occupations are documented, reoccupations are also recorded during the Middle Holocene. The overlap between assemblages from the two periods in the archaeological sequences at the same coastal sites makes it difficult to assume that the repeated use of specific locations was fortuitous. In other words, it is reasonable to consider the possibility that groups with similar mobility patterns and foraging strategies are reflected in those archaeological sequences (Zangrando et al. 2018). At early coastal open-air Norwegian sites, such as Mohalsen 2012-II, there is no preserved evi-

dence of marine subsistence (such as is typically found in shell midden contexts and which often includes faunal remains and specialized marine hunting tools). However, they suggest marine connections primarily through their locations in the landscape (Bjerck 1990). The location of Binushmuka I and other early open-air sites in the Beagle Channel can be similarly interpreted, possibly serving as natural harbors and representing key components of the mechanism that connects maritime mobility, seascapes, and settlements.

### Location and reoccupation of settlements

Landscape approaches emphasize the development of local and social information (Rockman 2003). From Bjerck's perspective, boats and seafaring tend to structure the location of settlements, patterns of activity and, consequently, what was left behind in abandoned settlements (Bjerck 2016). Boats are elusive in the archaeological record, but can be inferred from other observations such as island settlements and the close relationship between settlements and natural harbors (Bjerck 1990). In other words, the location of coastal settlements may provide evidence of the presence and pivotal role of seaworthy vessels. The use of boats is not only related to specific features and areas of the topography, but also to the way in which these features and areas have been used and modified over time. This use and modification involves social practices. To understand the decisions inherent in the reuse or disuse of the topography over time requires an analysis of how resident groups adapted their practices to a given location. Although this is usually not easy to discern in the archaeological record, these factors can support an assessment of the duration, frequency and recurrence of occupations of a given coastal space (Bjerck 2016).

In previous papers, we considered the accumulation of remains, material distributions related to combustion structures and the discreteness of features to explore these factors (Breivik et al. 2016, Fretheim et al. 2017, Zangrando et al. 2018). From these variables, we assume that the accumulation of remains and alteration of structures will increase with the duration and frequency of occupations (Chatters 1987), while also considering the effects of overlapping occupations on material frequency (palimpsest) (Bailey 2007, Bailey and Galanidou 2009). The small number of artifacts recovered at Mohalsen-II might challenge the idea of long-term reuse of the site. However, a marked concentration of quartzite finds, including discoidal cores and two burins associated with Fireplace 1, was observed on the northern boundary of the excavated

area. Quartz artefacts showed a concentration in and around Fireplace 2, while the distribution of dark grey quartzite is associated with Fireplace 1 (Fretheim et al. 2017). That is, while the size of the technological assemblages is small, the discreteness of the features reflects the overlapping of short-term occupations probably produced by small groups at different times in the site's occupational history. At Binushmuka I, occupations were recorded in two different areas, where we found that one unit had a markedly higher artifact frequency ( $n=7,400$  in Area B) than the other ( $n=792$  in Area A). It must be borne in mind that in the first case more than 99% of these artifacts correspond to debris, the vast majority of which are micro-flakes (95%) scattered over an area of  $7.5 \text{ m}^2$ , so the knapping of a few nodules can explain the accumulation of this amount of material in a short time (Zangrando et al. 2018). In summary, regardless of the frequency of lithic artifacts found in the assemblages, the explanation for the discreteness differs between the two cases. While Mohalsen-II probably shows reuse of the same area involving two adjacent dwelling features, Binushmuka I shows reoccupation of two different areas of the same site 170 years apart. In addition to this, there are other significant differences in the structures of the assemblages. At Mohalsen-II, though it is not at all typical of the early coastal sites in Norway (Breivik 2014: 1480), a circular alignment of cobbles interpreted as the remains of dwellings and two circular combustion structures composed of pebbles were recorded at the same level. In contrast, none of the occupation units identified at Binushmuka I showed any traces or remains of habitation structures, and the location of a hearth in unit B was identified from a simple concentration of charcoal and lithic remains. What accounts for the difference in the archaeological record, given that its formation is interpreted as having occurred under similar conditions in terms of the duration and frequency of occupations?

One key aspect to consider when analyzing the structure of early coastal assemblages from Norway and Tierra del Fuego is their location in geographically dynamic environments, shaped by isostatic rebound. Significant differences in global elevation rates (Bailey and Flemming 2008) are evident when comparing the coastlines of Norway and southern Tierra del Fuego. Moreover, the relationship between isostatic uplift and sea level rise is complex and highly variable at different scales in both regions. For instance, Breivik (2014) discusses how these processes may have affected the preservation and visibility of archaeological sites along

the Norwegian coast, contributing to the distribution patterns mentioned earlier. On a local scale, the interaction of these processes could have led to substantial geographical changes over just a few centuries, depending on the coastal configuration and gradient of each area. Geological records recently described by Björck et al. (2021) for the southern coast of the Beagle Channel indicate a rapid sea level rise between 9,000 and 7,000 cal. BP, with water levels reaching approximately 8 to 10 meters above the present height at the eastern and western ends of Navarino Island, respectively. Similar sea levels have been recorded for the north coast of the Beagle Channel (Rabassa et al. 1986, 2009, Gordillo et al. 1992, 1993, Bujalesky 1998, 2007). Although the isostatic uplift in Tierra del Fuego did not reach the levels recorded in Norway, these processes likely influenced human reoccupation of the same coastal areas over centuries. As a result, overlapping occupations may have occurred at lower frequencies in the earlier archaeological record than in later periods (Zangrando et al. 2022).

In our view, however, the difference recorded between the cases analyzed in terms of assemblage structure is not only dependent on the geographical or physical conditions of the environment (e.g., presence of a natural harbor) and their transformations over time, but also on the adoption or reuse of traces left by previous occupants of the landscape. This does not imply the transfer of information between previous and subsequent inhabitants, but invites an assessment of how the sequence of human use of a landscape may influence the process of its subsequent occupation. This analysis depends to some extent on the traces visible in the landscape. Rock shelters are a classic example of sites of repeated habitation over long periods of time, since they are visible and accessible features in the landscape that can provide shelter for many generations of people and/or different societies at different times (Bailey and Galanidou 2009). Open-air site formations, such as shell middens, can have a similar effect, as rapid conscious or unconscious accumulations of discarded materials create features in the landscape that attract reuse for various reasons (Bailey 1977, Piana and Orquera 2010). Dwelling structures may also invite reoccupation by many hunter-gatherer societies and, depending on the durability of the building materials, they could work as visible traces on the scale of centuries, as evidenced by the ethnographic and archaeological record of Tierra del Fuego (Piana and Orquera 2010), as well as the Stone Age record of coastal Norway (Fretheim et al. 2016).

From an experimental study, Morgan et al. (2018) note that the reoccupation of sites and thus the reuse of housing structures may have been promoted by the reduction of labor costs associated with the reuse of residential elements and associated camp furnishings. Applying these perspectives to the Norwegian case study, this may partly explain the observed variation in the discreteness of the dwelling features. Although circular rock alignments are clearly visible at some Early Mesolithic sites, there are few records of a recursive pattern such as is observed at Mohalsen-II (see Fretheim et al. 2017: Appendix 8 for a comparison of Early Mesolithic sites in Norway). This does not imply that the occupation of Mohalsen-II reflects greater permanence than other Early Mesolithic cases, but rather the re-use of a pre-existing and visible structure left by previous occupants, whose traces can be seen in the landscape even today.

### Dwelling structures and logistics

This leads us to consider the type of dwelling structure used, which can vary from portable technologies to permanent structures (Fretheim et al. 2017). This is relevant given that the nature of the traces they leave differs. While the distinction between these construction techniques should not necessarily be linked to more intensive use of the landscape, variations in occupation length or conditions of greater or lesser mobility, there are differences in logistical terms, especially regarding the process of colonizing an unfamiliar landscape. The use of portable structures may imply higher material costs and production time than permanent structures made of branches and cobbles, even leaving aside the logistical planning and transport costs involved in the former (Smith 2003). However, at the same time, portable structures can be considered a risk-reducing strategy when exploring new areas where the availability of materials for the construction of shelters is not known. Therefore, the use of this technology does not depend on the adoption or reuse of materials from pre-existing occupations, which influences the degree of feature discreteness in the archaeological record. This is what Binushmuka I could be illustrating, since dwelling structures were not detected during the excavation, but the distribution of lithic debris and tools in relation to the hearth position show the high integrity of the assemblage (Zangrando et al. 2018). A similar assessment was made regarding the variability in the structure of Early Mesolithic assemblages from locality 48 within the Ormen Lange Nyhamna project, where the documented hearths only appear to make sense when

interpreted as “indoor” features, likely associated with some form of heat-retaining superstructure (Bjerck et al. 2008:252–253), although no distinct circular rock alignments are visible at the site.

## Conclusion

The question posed at the beginning of this paper—*What can the locations and settlement structures of coastal archaeological sites tell us about the mobility and extensive use of boats in the human colonization of high latitude archipelagos?*—requires a detailed examination of the interface between the human use of a constantly changing landscape, the coastal geomorphological evolution, and the resulting visibility and preservation of the archaeological record (Bailey 2014). The comparative analysis presented in this paper of the locations and visible structures of two coastal sites from the early Holocene shows that the duration and recurrence of human occupations during a colonization process cannot be broadly generalized. It is interesting that the Early Holocene records from Norway and the Beagle Channel—regions on opposite sides of the globe—exhibit similarities in the coastal nature of the occupations, organic preservation, and site sizes, reflecting common patterns in the form and frequency of hunter-gatherer mobility. The topographic location of Early Holocene sites in Norway is often the sole indicator of dietary focus and transportation technology, as floral and faunal remains are not preserved, and the lithic toolkit is of a general character. Transferring these ideas into the Fuegian landscape allows us to suggest that even sites with no traces of shells or preserved osteological evidence of marine exploitation may be consistent with a highly marine lifestyle (Bjerck et al. 2016, Zangrando 2018, 2022, Zangrando et al. 2018, 2022). Another common feature of the analyzed sites is their limited size, suggesting that the groups who occupied these sites were small family units. It is tempting to relate this to the use of boats as a means of transportation, and the limited space such vessels would provide. It could also be interpreted as a societal structure where moving in small groups would be a way of successfully moving between resource patches and exploiting mobile resources such as fish and pinnipeds.

Variability is also evident in the visible traces of dwellings and their reuse, as demonstrated by the cases

analyzed, and even within Early Mesolithic sites in Norway (Fretheim et al. 2017). Exploring this variation is essential, as the use of shelters and dwellings plays a pivotal role in the mobility of hunter-gatherer societies, especially in high-latitude environments where protection from harsh weather conditions is critical. Human colonization of new environments involves a gradual acquisition of knowledge about the landscape (Rockman 2003), where different aspects of this process unfold over time rather than in a single event (Bang-Andersen 2003). This suggests that while certain areas of the landscape become familiar, other regions remain unexplored or poorly known. Under these circumstances, it is to be expected that the construction of dwelling structures will depend on the extent of knowledge about the environment and its available resources during the colonization process, and that the use of portable dwelling technology could emerge as a strategy to mitigate risks in scenarios where environmental knowledge is incomplete. Boats may not only have facilitated the transport of portable dwelling structures across both long and short distances, but also have played a crucial role in connecting the network of settlements and enabling maritime life through mobility across the seascapes (Bjerck 2016).

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