Contribution to the prehistory at Røst, Lofoten, North Norway, a multiproxy palaeoecological approach.

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ABSTRACT

Archaeological, osteological and palynological data are presented and give evidence for use of the marginal and exposed archipelago Røst from the Neolithic onwards. Small sea level changes have affected the settled areas and have been the most critical elements. Partly ^{14}C dated house pits, farm mounds, and stray finds are presented together with two pollen profiles. Most of the present-day settlements are of medieval and post medieval age and located on the flat island, Røstlandet. Evidence of woodland and cultivation of cereals is lacking. Fish has been the most important source for living. Available written documents from 1432 on daily life, correspond with the osteological as well as the palynological data.

KEYNOTES **:** Remote community, Neolithic – Bronze - medieval Age, fish, birds

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INTRODUCTION

Røst, an archipelago and municipality in Nordland County, at the south westernmost tip of Lofoten archipelago and a part of geological "strandflat" formation (Fig. 1 and 2), is during historical time known for cod-fisheries, bird cliffs (e.g. island Hernyken) and in recent years for ornithological studies (e.g. Baines & Anker-Nilssen 1991, Anker-Nilssen 2003; Anker-Nilssen & Aarvak 2003).). In addition also archaeological (several excavations), botanical (pollen analysis), geological (sea level modelling), and zoological (osteological studies) data exist. The main aim has been to evaluate and combine data from the different fields to create a better understanding of human adaption to changing sea level and use of dry land. The results are correlated with available pollen data from the nearby island Værøy and the mainland, Salten, east of the fjord, Vestfjorden.

GEOGRAPHY

The Røst municipality consists of hundreds of islands, most of them rather low, among them the "mainland", Røstlandet, only 11 m a.s.l.)(Figs. 1 and 2). Few islands like Stavøy, Vedøy, Trenyken, Storfjellet (259 m a.s.l.) are tall. The glacial history indicates that the tallest rose mountains above the Weichselian glaciation (Helland 1897, 1908; Vogt 1913; Grønlie 1940; Gjessing 1967; Sollid & Torp 1984, Andersen & Karlsen 1986; Holtedal 1998). Unconsolidated sediments exist on the top of at least the tall island, Vedøy, and north facing moraines exist on Trenyken and Vedøy (Moe 1970a). Caves are known, and marine terraces are recorded 8 m to 12 m a.s.l (Helland 1897, 1908; Møller 1985). Marine molluscs are found at about 20 m a.s.l. and ^{14}C dated to c. 33,000 yr BP (Bjerck 1995).

A sea level curve is presented (Fig. 3) (Møller 1998). A transgression started c.9600 BC and reached a maximum of about 4 m above the present day level at c.4700 BC and persisted more or less to 1800 BC. A large part of the today submerged archipelago was dry land before c.4700 BC (e.g. Vorren & Moe 1986; Sørensen et al. 1987; Moe et al. 1996). After 1800 BC, a start of slow sea level lowering took place.

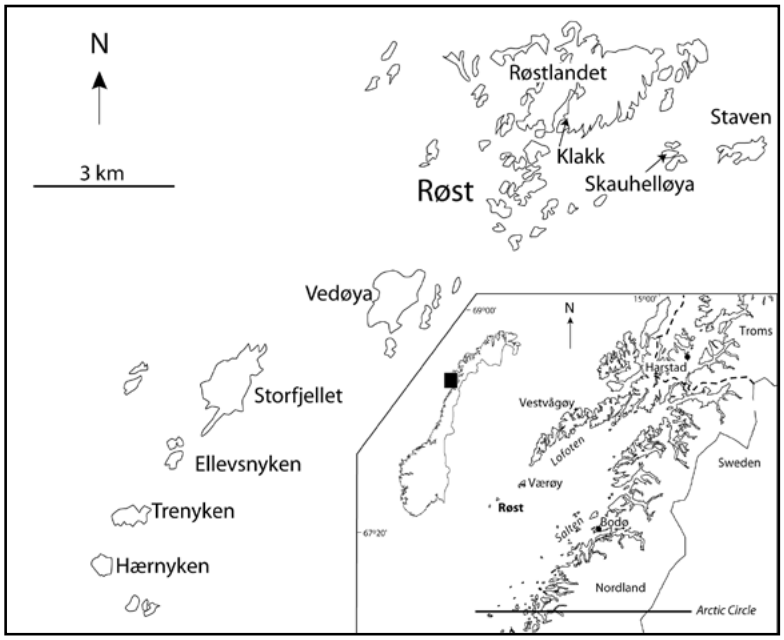

Figure 1
Survey map of the main part of the Nordland County with the different place names used. (Staven=Stavøy), Skauhelløy= Skau-Helløy)
(see Fig. 2).

Figure 2
The Røst municipality seen from NE towards SW. The settled Røstlandet (max altitude 11 m a.s.l.); background to the left the islands first Vedøy, Storfjellet (259 m a.s.l.),(see Fig. 1). The oldest open site, Skau, is marked (Photo: Fjellanger-Widerøe ©, VF13428)

The present climatic situation is windy and dominated by mild, oceanic and humid conditions: mean January and July temperature (period 1961-90) of respectively +1.4^{0}C and 11.5^{0}C (Aune 1993); mean early precipitation (period 1881-1969) was 709 mm (Førland 1993).

Except single individuals of rowan (*Sorbus aucuparia*), the whole municipality of Røst is treeless and the dominated by grass and some shrub meadows due to sheep pasturing. Bog bilberry (*Vaccinium uliginosum*), blueberry (*V. myrtillus*) and crowberry (*Empetrum nigrum*), are frequent, while heather (C*alluna vulgaris*) is rare (Moe 1970a; Reiersen & Skifte 1988). Tall herb vegetation exists close to seashores, on steep slopes, on smaller islands, and close to open air dry-fish installations (Norman 1894-1901; du Rietz 1925; Nordhagen 1925; Grønlie 1948; Bjerke 2005). In the neighbouring islands to the NE, Værøy and Moskenes, rowan tree (*Sorbus aucuparia*) and birch (*Betula pubescens*) occurred (Griffin 1976).

Different pollen analytical studies of the central and western part of the Lofoten archipelago reflect different vegetation changes including human disturbances during the last 9000 years (Griffin 1976; Vorren 1979, 1986, 2012; Moe 1983; Nilssen 1988). (See later).

Prehistoric sites like pit-houses, open sites, cave deposits and paintings are known from different Røst islands (Fig. 1) (Myrvoll & Myrvoll 2008). To the NE the archaeological data from the nearby island Værøy is limited, while osteological records are known from the cave Storbåthallaren at island Flakstad, further northeast (Utne 1973).

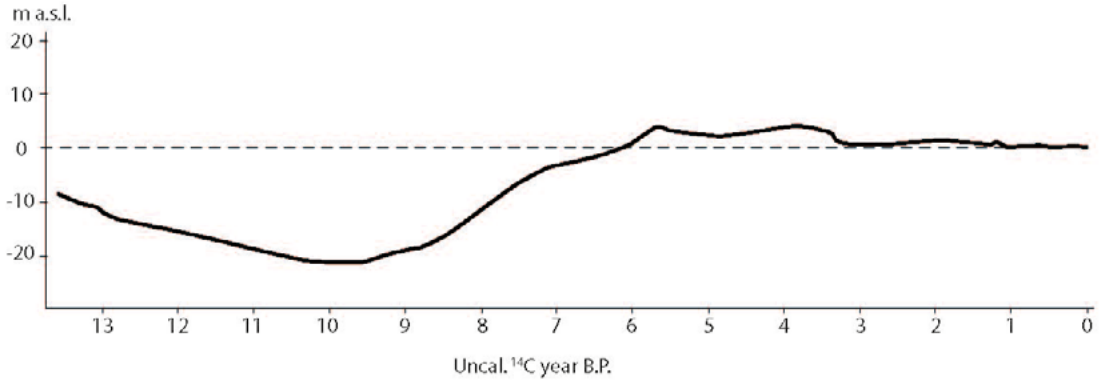

Figure 3
Suggested sea level changes for the Røst area during the last 15,000 years BP, based on available database program (Møller 1998).

Written documents about living conditions and economy are known from 1432 onwards. Forty-seven Venetian crewmen abandoned their ship in two lifeboats, and one landed on the 6 January on "*Isola di Santi*", in the Røst archipelago (Pietro Querini, Christoforo Fioravante, and Nicolò di Michiel in Wold 1991, 2004). Data are given about: small round huts made of stone and turf, known in the 16 and 17century in Scotland (Murray 1973; Smout 1975); daily life including use of the dried cod, 'stockfish' (*Gadhus morhua*), and fisheries. Different fish species are mentioned. The stockfish was essential, and used as local 'currency' for the imported flour, beans, salt, wool clothes, leatherwear, iron tools, etc.(Nedkvitne 1988). Peat and driftwood were used as fuel in addition to wood bought from the Salten area (Fig. 1) (Lindbekk 1978). Other local resources were eggs, feather and duck-down (*edderdun*), seal and bird (hunting, especially on 'Lunde', puffin (*Fratercula arctica*) (Wold 2004). Beer and rye bread were used. Today, about 600 people are living on Røst, and the economy is still based on cod fisheries.

RADIOCARBON DATING.

Nine radiocarbon dates are available from Røst (Table 1) and three used in a pollen diagram from the nearby island Værøy (Griffin 1976). Calibrated ^{14}C ages (BC/AD) are used as a standard throughout the paper.

Table 1. 14C dates from Røst used in the studied. Calibrated ages BC/AD are used with one standard deviation, and based on Stuiver & Reimer (1993) and Reimer et al (2004). (Abbr. T = Trondheim, Norway; TUa = Trondheim/Uppsala; Beta= Beta Analytic Inc., Miami, USA).

Site, depth in cm	Age BP (1950)	Lab.No	Call.age AD/BC	Type of material	Reference
Pollen dates:					
Klakk, Røst 57-60	860 ± 70	T-757	AD 1050-1082	telmatic peat	This paper
Skau-Helløy, Røst, 65-66	2590 ± 55	Tua-3325	823-751 BC	peat	This paper
Rømdalen, Værøy, 76-82	1890 ± 100	T-3901	150 BC-AD 400	peat	Griffin 1976
Rømdalen, Værøy, 123-129	3080 ± 80	T-1669	1520-1110 BC	peat	Griffin 1976
Rømdalen, Værøy, 204-208	5480 ± 149	T-1670	4650-3950 BC	peat	Griffin 1976
Archaeological dates:					
Stavøy, 40-45	4660 ± 165	T-10096	3669-3322 BC	black soil	Bjerck & Hansen 1991
Vedøy, house 16	4210 ± 110	Beta-96653	2886-2871 BC	soil	Bjerck & Hansen 1991
Trenyken, ´Helvete´,	3210 ± 100	Beta-67372	1615-1395 BC	seal bones	Bjerck 1992
Vedøy, house 19	3170 ± 120	Beta-	1690-1120 BC	soil	Myrvoll & Myrvoll 2008
Vedøy, house 1	2290 ± 60	Beta-78041	415-190 BC	soil	Myrvoll & Myrvoll 2008
Vedøy, house 2	1300 ± 50	Beta-78042	AD 650-865	soil	Myrvoll & Myrvoll 2008
Stavøy, upper level	965 ± 80	T-10095	c. AD 895	soil	Bjerck & Hansen 1991

OSTEOLOGICAL STUDIES.

Bone material has been collected from the open archaeological sites: Skau farm at Røstlandet (Table 2, 3), and Husum at Storfjellet (Table 4) (Fig. 1), but none are ^{14}C-dated. The two datasets differ in composition of type of bones. The samples from the Skau farm mound are assumed to have a maximum age of 1000 years, and reflect use of different fish species, birds and domestic mammals. The Husum samples of assumed Neolithic ages (Table 3 and 4) (Simonsen 1957) is dominated by sea mammals, with different seal species and the much larger killer whale (*Orcinus orca*). (See discussion)

Group of animal	Scientific name	Trival name (E)	Trivial name (N)	Number
Mammals	*Halichoerus grypus*	Grey seal	Havert	17
”	*Phoca vitulina*	Common seal	Steinkobbe/Fjordsel	2
”	*Orcinus orca*	Killer whale	Spekkhogger	15
”	Whale (sp.)	Unidentified	Hval	2
”	Fragment	Unidentified		7
Bird	*Phalacrocorax carbo*	Great cormorant	Storskarv	1
”	Fragment	Unidentified	Bird	4
Fish	Fragment	Unidentified	Fisk	1
Sum				**42**

Table 2. Skau (Nes) at Røstlandet. Osteological study from open archaeological site, assumed Neolithic Age. (Anal. Håkon Olsen, University of Bergen, Natural history collection, (Osteology) reg. no. J.S. 309).

Table 3. Skau (Nes), Røstlandet, Røst. Osteological material from 15 layers from farm mound (Simonsen 1957). Maximum age is estimated to AD 1000 year. (Anal. Håkon Olsen. University of Bergen, Natural history collections (Osteology) reg. J.S.307)).

Group of animal	Scientific name	Species	Viking Age (1-2)	Medieval (3-9)	After 1536/37 (10-15)
Mammals	*Bos* sp.	Ox	1	1	2
”	*Ovis* sp.	Sheep/goat	1		3
”	*Sus* sp.	Pig	1	2	
”	*Phoca vitulina*	Common seal	1	1	
”		Not identified	4	5	5
Birds	*Fratercula arctica*	Puffin	1	10	1
”	*Haliaeetus* sp.	Eagle		1	
”		Not identified	1	1	1
Fish	*Gadus morhua*	Cod	6	25	27
”	*Notothenia micro*lepidota	Black cod			2
”	*Molva molva*	Ling	1	5	24
”	*Brosme brosme*	Brosme (´cod´)	1		3
”		Not identified	15	21	32
Sum			**33**	**72**	**100**

Table 4. Husum, Storfjellet, Røst. Osteological material from farm mound, assumed age medieval time. (Anal. Håkon Olsen. University of Bergen, Natural history collections (Osteology) reg. J.S.308).

Group of animal	Scientific name	Trival name (E)	Trivial name (N)	Number
Mammals	Fragment	Not identified	Pattedyr	1
Fish	*Gadus morhua*	Cod	Torsk	8
”	*Melanogrammus aeglefinus*	Haddock	Hyse	2
”	*Brosme brosme*	Brosme (cod)	Brosme	3
”	*Molva molva*	Ling	Lange	1
”	Fragment	Not identified	Fisk	2
Bird	*Fratercula arctica*	Puffin	Lunde	27
Sum				**46**

VEGETATION HISTORICAL STUDIES.

Two sites were selected for the study of vegetation history (July 1967): The Klakk site on Røstlandet, and a dry heath deposited on the small island Skau-Helløy, situated between the Røstlandet and the island Stavøy (Fig. 1). The field and laboratory work followed the guidelines in Fægri & Iversen (1964), and the pollen data presented in diagrams using the Core-program, (University of Bergen) and characterization of unconsolidated sediments (Tables 3, 4) follows Troels-Smith (1955). Chronozone zonation (Mangerud et al. 1974) and local pollen assemblage zones were made. The pollen results are presented in Fig. 5 and 6. The pollen data set from Rømdalen at the nearby island, Værøy has been redrawn and added (Fig. 7) (Griffin 1976). Accumulation rate curves are made for the Klakk and Skau-Helløy profiles (Fig 4).

Depth in cm	Lithostrategraphic description
Klakk 00-10	$Tb^{1}2$, $Th^{1}1$, $Th^{2}1$
Klakk 10-42	$Th^{2}1$, Dh2, Dg1
Klakk 42-45	Dh2, Dg1, Dg2
Klakk 45-49	Dg1, $Ld^{3}2$
Klakk 49-62	Dg2, $Ld^{3}2$, Ag+
Klakk 62-70	$Ld^{4}1$, Ga2, Ag1, Gg(min)+
Klakk 70-80	Gg(min), Gg(maj)
Skau-Heløy 00-10	Dg^{2}, $TI^{2}2$, Anthrax maj/min
Skau-Heløy 10-89	Dg2, $Ld^{2}2$, Anthrax maj/min
Skau-Heløy 89	Bedrock

Table 5. Lithostrategraphic description for the sediment in the Klakk and the Skau-Helløy profiles. Lithostratigraphical descriptions follow Troels-Smith (1955).

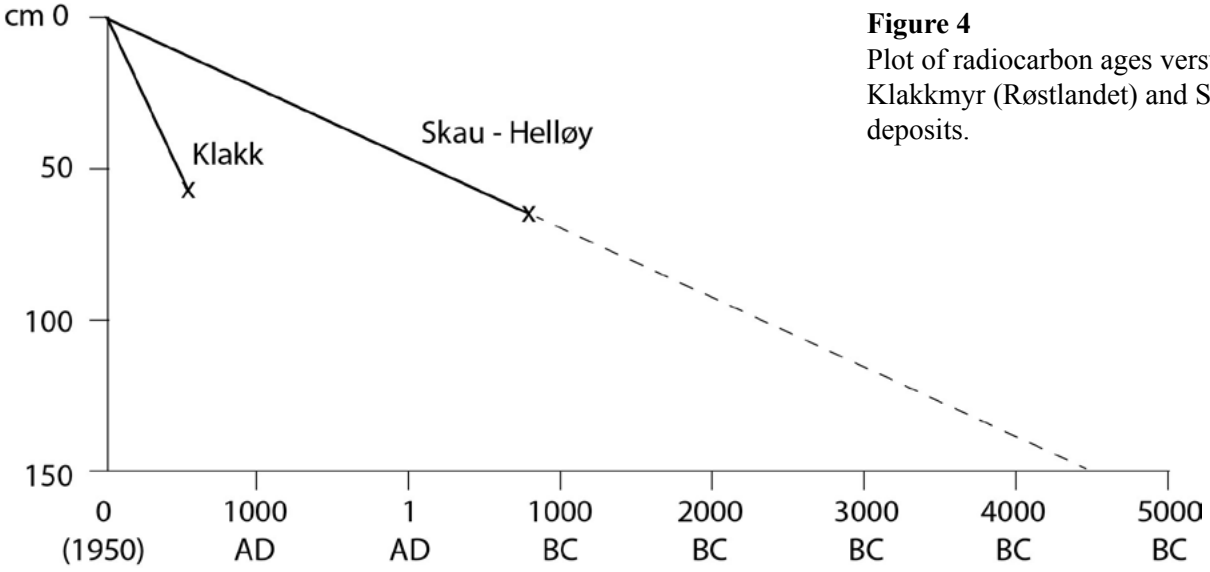

Figure 4
Plot of radiocarbon ages versus depth for the Klakkmyr (Røstlandet) and Skau-Helløy deposits.

THE SITES

KLAKK. The Klakk profile was collected from wet mire (mean depth about 55 cm), a partly filled in shallow lake, of about 150 m^2 in size (2.5 m a.s.l.), using 11 cm diameter hard plastic tubes. In the open part, freshwater plants such as *Hippuris vulgaris* and *Potamogeton natans* nearly covered the water table. Frequent stands of *Carex rostrata, C. nigra, Eriophorum angustifolium, Drosera rotundifolia, Menyanthes trifoliata* and *Comarum palustre* predominated on the filling in. Grass species predominated on drier soil. Pollen data are presented in Fig. 4. The Klakk diagram has been divided into three local pollen assemblage zones (LPAZ) (Table 6). A pollen morphological study of the *Rumex* pollen in three levels shows changes in the relationship between *R. acetosella* t and *R. acetosa* t.: for 35cm: 5 – 1; for 45cm: 8-1; and 65cm: 13-1.

Zone	Depth	Characterization	Time span cal AD/BC
Klakk (Røstlandet)			
Klakk 3	27 cm surface	*Cyperaceae-Poaceae-Ericales-Asteraceae aster.*	c. 1550/1500- present day
Klakk 2	42 cm - 27 cm	*Cyperaceae-Ericales-Poaceae*	c. AD 1350 - c. AD 1550/1500
Klakk 1	68 cm - 42 cm	*Poaceae-Rumex-Cyperaceae-Juniperus-Filipendula*	c. AD 800 - c. AD 1350
Skau-Helløy			
Hel 5	14 cm - surface	*Cyperaceae-Poaceae-Ericales-Rubus chamaemorus*	c. AD 500 - present day
Hel 4	32 cm - 14 cm	*Poaceae-Ericales-Rubus chamaemorus*	c. AD 1300 - c. AD 500
Hel 3	47 cm - 32 cm	*Ericales-Rumex*	c. AD 1 - c. AD 1300
Hel 2	62 cm - 47 cm	*Ericales-Campanula-Poaceae*	c. 600 BC - c. AD 1
Hel 1	90 cm - 62 cm	*Ericales-Rumex*-tall herb	c. 2000 BC - c. 760 BC

Table 6. Local pollen assemblage zonation (LPAZ) of the two profiles Klakk and Skau-Helløy.

SKAU-HELLØY. The second profile was directly sampled from an open exposed peat (13.5 m a.s.l.), 90-100 cm in thickness situated a few meters from a man-made freshwater reservoir of about 15 m^2 in size. The undulating island (c.10,000-15,000 m^2) is a low, not more than c. 20 m a.s.l. Therefore a limited part is suggested above the critical sea level during the Tapes transgression. The island is, historically known used for haymaking. Visible charcoal particles of different sizes were colouring the soil black in most of the vertical open section. The island had relative well-established vegetation, a mosaic pattern of grass meadows dominated by *Melampyrum pratense, Lychnis flos-cuculi, Melandrium rubrum, Carex* spp., stands with ferns and grass species. *Deschampsia flexuosa* predominated. The heath fields were dominated by *Empetrum nigrum* together with *Vaccinium uliginosum, V. myrtillus, Euphrasia* sp. *Trientalis europaea, Cornus suecica, Carex bigelowii, Luzula multiflora, Nardus stricta, Rubus chamaemorus.* (Moe 1970a).

The results are presented in Fig. 6. A surface sample was collected from a hay-meadow field at the island Stor-Hansøy, used as pastureland during the winter (lowermost spectrum in Fig. 6). The Skau-Helløy diagram has been divided into five local pollen assemblage zones (LPAZ) (Table 6). It is of special importance to see that despite the historical known use of the Skau-Helløy, no traditional anthropogenic pollen is recorded.

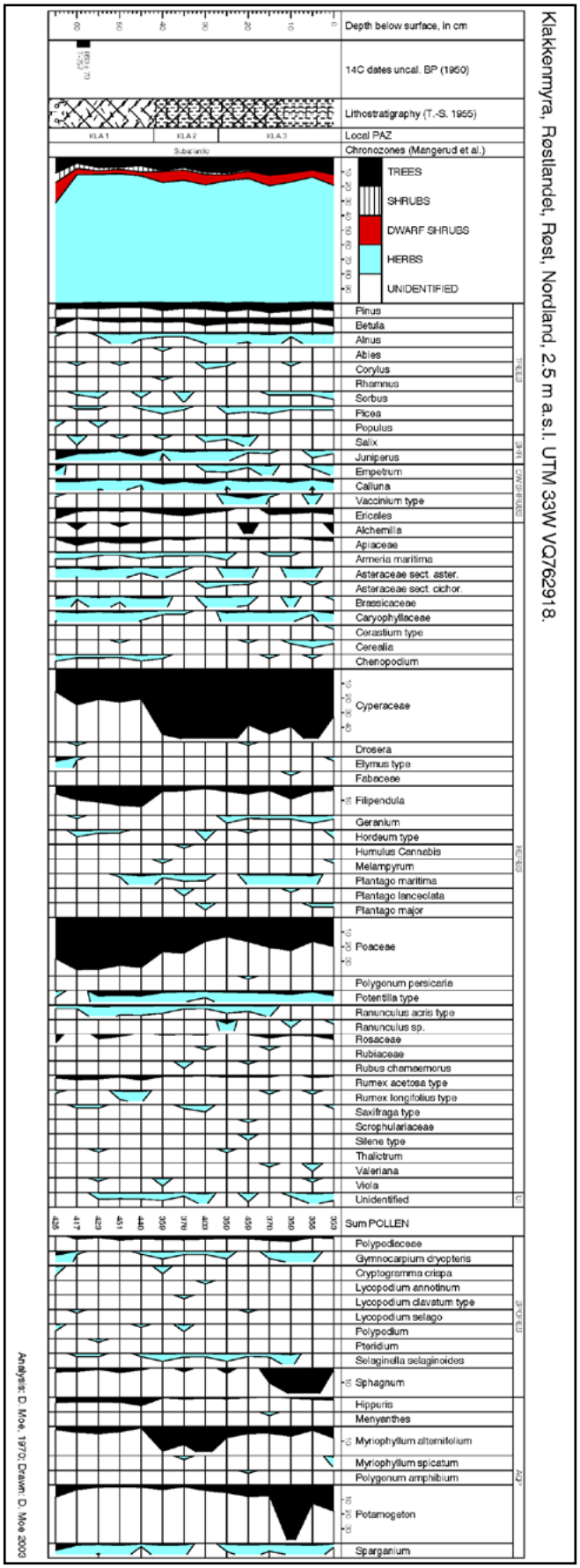

Figure 5. Pollen diagram (selected taxa) in % of total pollen from Klakk, Røstlandet. Calculation of spores and charcoal dust are based on Sum Pollen + spores respectively charcoal. (Records of algae: Scenedesmus is found at the depth of 64,5 to 65,5 cm level; Nine Pediastrum taxa is found in the profile and the study is available on request.)

THE VEGETATION DEVELOPMENT.

The Klakk diagram covers the last 1000-1200 years and characterized by low values of tree pollen, mostly long-distant transported. Despite no present stands of juniper (*Juniperus communis*), the pollen might be of local origin, together with willow (*Salix*) and Ericales. Pollen of *Plantago maritima, Armeria maritima* and Chenopodiaceae need to reflect local seashore-vegetation while Cyperaceae and *Sphagnum* are to linked to the extended filling-in process. The earliest stage (Klakk 1) might have been an open, small, and shallow lake with taxa like *Hippuris vulgaris, Myriophyllum, Sparganium* and *Potamogeton* together with several *Pediastrum* species (Table 6). Later on the filling process and more humus may have changed the habitat.

The records of pollen connected to anthropogenic activity like *Plantago lanceolata, P. major,* pollen of *Hordeum* and Cerealia type from a depth of 35 cm, reflect presence of the human activity not far away.

While the Klakk site is below the maximum level of the Tapes transgression, the Skau-Helløy site is above. Low values of tree pollen are found in both diagrams, reflecting only long distant transport, as for spruce (*Picea)* from c.600 BC (Moe 1970b). Contrary, pollen such as *Salix*, Ericales (dominated by *Empetrum*), and perhaps occasionally rowan (*Sorbus*) need to be of local origian.

The *Betula* values in zone Hel 1 follow changes in fern spores and *Rumex* pollen. Despite no macro wood remains of birch being found, temporary local stands of either *B. nana* or *B. pubescens* should not be excluded. During zones Hel 1, 2 and 3 Ericales pollen dominate as to day, by *Empetrum nigrum*. Northeast of Røst and the

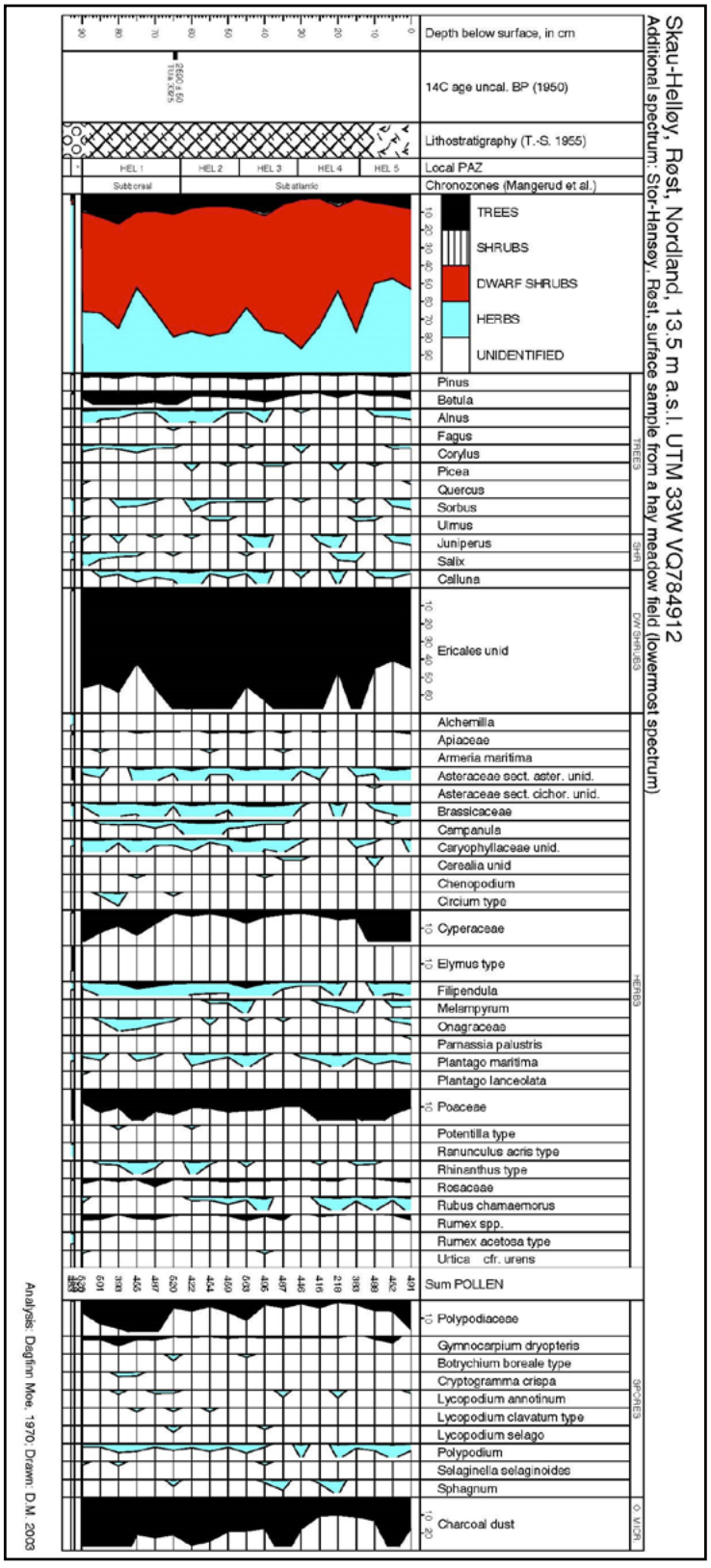

Figure 6. Pollen diagram (selected taxa) from the island Skau-Helløy. (For calculation see caption Fig. 5.)

Lofoten archipelago presence of *Empetrum* heath has been studied and discussed (Edvardsen et al. 1988). Climatic conditions including strong wind and sea spray are suggested to be of importance for such *Empetrum* heath development, probably also in the Røst area (e.g. Kaland 1986; Prøsch-Danielsen & Simonsen 2000; Moe 2003). The presence of burning during the whole sequence on this island must be connected to human management even though heath burning tradition is locally unknown at present. During zones Hel 4 and 5 (between 25 cm and 7.5 cm), increased values of grass (Poaceae) correspond with a reduction of charcoal. A local change in use of the island from pasture to more hayfields is possible, ref. the lowermost spectrum from the known hayfield island Stor-Hansøy (Fig. 6).

The temporary higher values of *Myriophyllum alterniflorum* in zones Hel 2 and 3, dated to c.600 BC (Table 6), relate to the freshwater reservoir as a new habitat. The sudden increase of pollen of Cyperaceae, *Potamogeton* and *Sphagnum* spores in zone Hel 5 a, also needs to be connected to the reservoir, and reflect a start of a filling in process of the basin.

To be able to understand the data from Røst, the pollen profile from Rømdalen (Værøy) has been of special interest (Fig. 7)(Griffin 1976). The profile covers the period from c.4500 BC to the present day, and older than the data from Røst. A first temporary deforestation is seen at Værøy c.4300 BC. (Fossil birch (*Betula*) wood is found in the lowermost layers.) A second and final deforestation took place c.600 BC (assumed age) parallel with the development of Ericales dominated vegetation. This last change coincides with the reduction in long distant transported of *Betula* pollen in the Skau-Helløy diagram. (The long distant transported *Picea* pollen is dated to c.600 BC both places (Moe 1970b)).

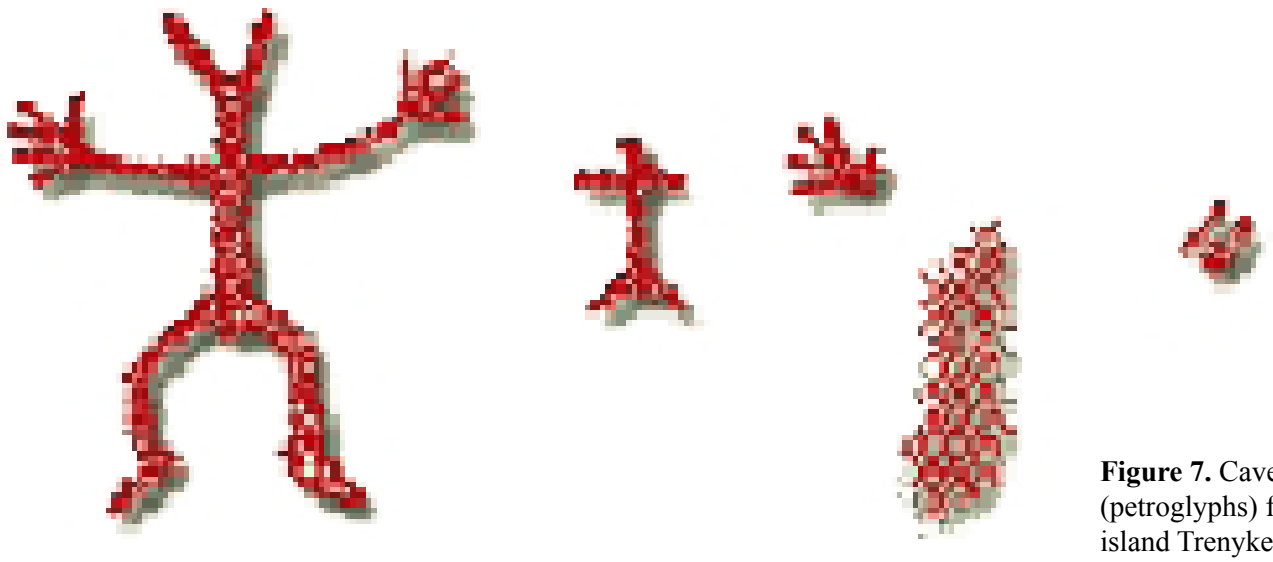

Figure 7. Cave paintings (petroglyphs) from the island Trenyken at Røst. (After: Bjerck (1995))

DISCUSSION

The taller islands at Røst may have been partly ice-free during the maximum of the Weichselian. During Late Glacial/Early Holocene a much lower sea level existed, perhaps -20 m to -30 m below present, and larger parts of the present day submerged archipelago were dry land (Figs. 1, 2 and 3)(Sollid & Torp 1984; Andersen & Karlsen 1986). Depending on habitats, different kinds of vegetation have existed. Permanent or seasonal colonization, by palaeolithic or mesolitic tribes should not be excluded. As an effect of increased sea level, large areas have been submerged. Mesolithic hunting sites are found at the mainland in Salten and north of Lofoten (e.g. Moe 2003;), but so far not known in the western part of the Lofoten archipelago. Food supply from the sea and the bird cliffs have probably been sufficient to survive, while transport between the islands has been a most critical challenge in all periods.

The earliest evidence so far for presence of human at Røst is dated to the Neolithic at c. 3700-3300 BC at Stavøy (a pit-house above 4-5 m a.s.l.), more or less at the same time as at Vedøy, ("house 16"). Here the bottom level in the western house was dated to 3639-3322 BC and the uppermost level to c. AD 950 (Myrvoll & Myrvoll 2008). The suggested but not dated oldest archaeological site known at Røstlandet is at Skau, (the farm Nes, c.7 m a.s.l.), an open settlement, and more than 1000 m^2 (Figs. 1, 2 and 3). The assumed age, middle and late Neolithic, composed of a 30-40 cm thick layer of burned stones, ashes/ dark earth, and stone implements mixed with bones (Simonsen 1957; Bratrein 1965). The identified osteological material is dominated by sea mammals, and some remnants of bird and fish (Table 2). The data set corresponds mostly with the bone content from Storbåthallaren further east in the Lofoten archipelago in addition to different fragments of hunting and fishing tools (Utne 1973).

A mostly ever changing mosaic of smaller islands and tidal streams had been the main history for Røstlandet from the Neolithic time onwards. At the beginning, the Skau mostly likely was a smaller island only used as a hunting seasonal site. To make a guess, the Stavøy may have been a better alternative for a more permanent settlement.

With the lowering of the sea level during the Bronze Age and into the early Iron Age, more and more areas

became dry land on Røstlandet, separated by shallow and narrow tidal streams. At Grindteigen on the island Vedøy, 26 house ruins are found well above the sea level, in addition to a shore sites for boats. The ^{14}C dates, c.2800 BC to AD 650-865 (Table 1) are from test pits and concern 4 houses (Benonisen 2005; Myrvoll & Myrvoll 2008 (house 1, 2, 16 and 19)). The dates demonstrate so far a long lasting, and a necessary, continuous interest in the island Vedøy, even today for seasonal use.

The cave "Helvete" (= Hell) on Trenyken (Fig. 1) has rock paintings of 22 humans (Fig. 7) next to dated bone material (1615-1395 BC) (Table 1, 2) of butchered seals (*havert*) (*Halichoerus grypus*) on the cave floor (Bjerck & Møller 1992; Hufthammer 1993; Bjerck 1995). This period overlaps with the date of the shallow pit-houses (house 19) in the bay Hyttebukta on Vedøy (1608-1569 BC).

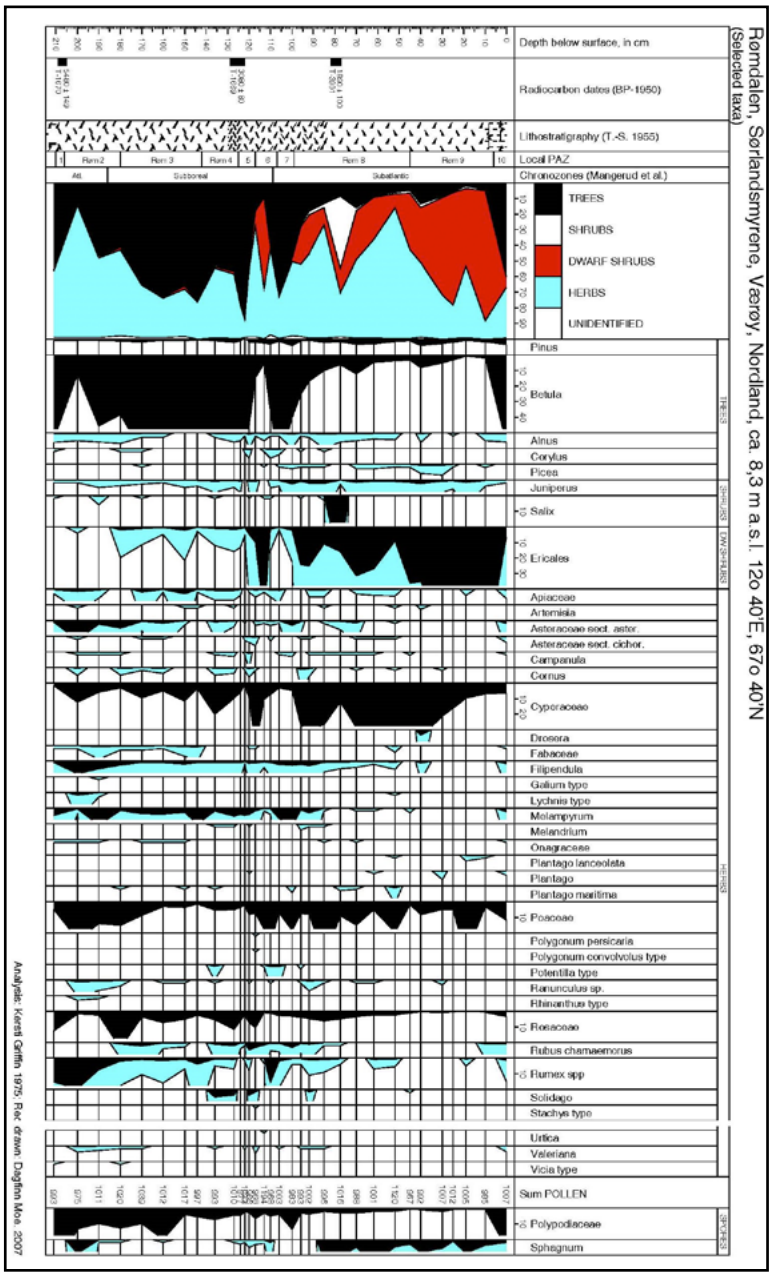

Figure 8. Pollen diagram (selected taxa) from the site Rømdalen, Værøy, northeast of Røst (ref. Fig. 1) (For calculation see caption Fig. 5.) (Redrawn: D. Moe after Griffin (1976))

The diagram from Skau-Helløy from c.2080 BC shows treeless conditions and local charcoal dust through the whole profile and with more than 40% (% of sum pollen + charcoal) in zone Hel 1 (Fig. 6). Presence of humans and local burning must be the only possible explanation for charcoal, despite neither documentation of domestic animals nor archaeological sites being found. Both Stavøy and Røstlandet are not far away (Fig. 1).

The temporary, marked reduction of tree cover at Rømdalen (Værøy) and increased pollen values of different herbs like goldenrod (*Solidago*), cinquefoil (*Potentilla* type) and some bladder-champion (*Melandrium*), traditionally pastures may have dominated between 135 cm to 120 cm (c.2000 BC to c.1350 BC) (Fig. 8). This corresponds in time with the ruins at Nordlandet (Værøy) with a lot of bones (not dated) from birds, with estimated ages between c.1700-1000 BC (Knut Helskog pers. comm.), and also in time with the charcoal rich sequences at Skau-Helløy 8 (Fig. 6). So far dates of bones of domestic animals are not known from either Røstlandet or Værøy (Table 3)(Hultgreen et al. 1984; Andreassen 2002, 94). Because of mild coastal conditions, sheep/goat, contrary to cows, are easier to keep during

the winter and may have been preferred before cows, which normally need shelters and often additional hay during the winter.

The cave paintings (petroglyphs) at Trenyken (Fig. 1 and 7) and probably similar paintings from sites at the coast further south (Nordland and Nord-Trøndelag) are supposed to be from this period (Bjerck 1995; Norsted 2008), and assumed to have ritual significance. If this idea is right also for Røst, the population at Røst has used several smaller and larger islands as a part of their interest.

The second and final marked deforestation at Værøy (Fig. 8) from 100 cm (c.600 BC) onwards shows increased values of locally produced Ericales, Cyperaceae and grasses. These changes might correspond in time with the an increased human impact found in the Rystad 1 profile from c.2400 cal. a BP, and also the start of zone 4, dated to c.500 BC in the Bøstad diagram (both Vestvågøy) (Vorren 1979: Vorren et al. 2012). Increased human impact is found in the Salten/Bodø area (Moe 1983, 2003). The variations in the lengths of human impact after this time up to c. AD 1400-1500 differ, but they are followed by a large scale, increased human impact up to the present day.

At the island Vedøy the dated 'house 2' at (Figs. 1) and the youngest date at Stavøy, respectively AD 650-865 and AD 895 (Table 1) are from the same period. A change in the herb flora is seen in the Skau-Helløy profile from c. 25 cm depth (zone Hel 4 and 5). Different use of the each island may have changed the vegetation in different ways.

The historically known oldest farm is situated on the low ridge northeast on Røstlandet (Nilsen 2003; Myrvoll & Myrvoll 2008), including the farm mound at Skau. Farm mounds are typical agricultural elements common in the counties of Nordland and Troms (Lund 1957; Bertelsen & Lamb 1995), and a few are known also in the county of Finnmark (Bertelsen & Lamb 1995). The lowermost level of a farm mound from Bleik, Andøya (250 km NE of Røst) is ^{14}C-dated to c. AD 1 (Jørgensen 1986; Johansen 1990; Urbańczyk 1992). It is assumed that the farm mounds were in use from that time, at least also during medieval and even later times.

In zone Klakk 2 (suggested age between c. AD 1300 and c. AD 1500)(Fig. 5), pollen is found connected to anthropogenic activity like *Hordeum* and *Hummulus/Cannabis)*. Also pollen of the weed *Plantago major* reflects anthropogenic influence, while the pollen of *Chenopodium* more likely belongs to a type of pollen linked to seashore vegetation. The single grains of identified barley and cereal pollen from Røst do not support any local successful cultivation (Prescott 1996; Wold 2004). People may have tried to grow cereals at Røst several times, but with no success. Pollen of cereals needs to be considered as contamination from imported food. The changes in the diagram in zone Klakk 2 might be an indirect but parallel result with a known change in the trade of dried cod from Lofoten along the coast to Bergen and further south is known during the 12th, 13th and 14th centuries. At that time Vågan, further northeast in the Lofoten archipelago, was the main city and marketplace (Bjørgo 1986, 41). A change took place at about AD 1400, and Røst with the island Røstlandet became a new "export" harbour for fish to Bergen, a trade established after the great plague (Black Death *c*. AD 1350) (Vorren et al. 2012)

In the Skau-Helløy diagram, an increase in grass pollen (Poaceae) takes place at c. AD 1500 (beginning of zone Hel 4). Despite small values, this change may indicate a stronger use (hayfield?) of the small island (Fig. 6).

It is known that the 16th century was perhaps the most important period for Røst. The former settlements

at the taller islands like Stavøy, Vedøy etc. were probably abandoned from this time onwards. Today Røstlandet has 12 farms, where some of the smaller islands are common land, others owned by the separate farms.

CONCLUSION

Dry land area of Røst has been affected by sea level changes through thousands of years. Of special interest is the former dry land which today is submerged around the mainland Røstlandet. By contrast, at maximum Tapes transgression, only a limited area of Røstlandet was above sea level.

Contrary to the data from Værøy, the pollen data from Røst have, so far, no indication of any woodland since 4000 cal BC, but single stands of rowan (*Sorbus*) and birch (*Betula pubescens and B. nana*) may have existed. Climatic condition may be one reason; intensive whole year around pasturing by domestic animals (goat/ sheep) after the arrival of humans may be another. Continuous burning has taken place since c. 4000 cal BC. A marked deforestation at about c.500 cal. BC at Rømdalen (Værøy) corresponds with a reduction in long distant transport of birch pollen at Skau-Helløy.

Prehistoric sites are known at Røst back to the middle Neolithic and placed at the taller island like Stavøy. The oldest known site at the present day main island, Røstlandet, is Skau, assumed firstly to only have been a hunting site mainly for sea mammals, while more permanent sites must have been on Stavøy and the other taller islands. With sea level lowering, Røstlandet increased in size and the occupied sites of the tall islands were abundantly in favour of Røstlandet. The present day settlement at Røstlandet is suggested to have been established sometimes between c. AD 1300 and c. AD 1500, probably because of more shelter places for fishing, combined with safer and better harbours, and the establishment of Røst as one of the main harbour for dry cod export. (The Italian visitors in 1432 used the harbour to leave Røst.) The pollen data from Klakk support such change at that time with pollen connected to anthropogenic activity. In zone Hel 4, a simultaneous change is seen, here with more grass and grassland.

The available data sets show, like today, different use of the islands and for different purposes, however dominated by sheep/ goat pasturing. In addition, the major platform for the human economy was fishing (stockfish production), different birds and sea mammal hunting and use of eggs and duck-down (*edderdun*).

For fresh water supply, small artificial freshwater reservoirs have been made, one at Skau-Helløy.

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