

Supplementary material to the paper ‘A simulation-based assessment of the relation between Stone Age sites and relative sea-level change along the Norwegian Skagerrak coast’

Isak Roalkvam

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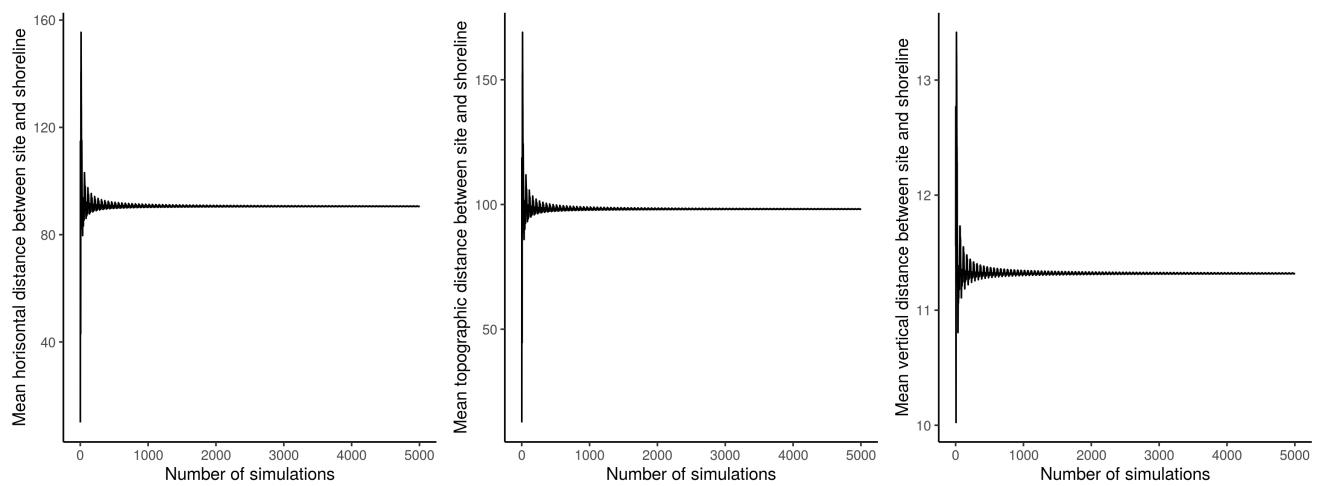
0.1 Contents

This document presents the sensitivity analysis performed for informing the number of simulation runs in the analysis of each site, the analysis of each individual site, the evaluation of different models for characterising the results, and the results of re-dating previously shoreline dated sites. All underlying and derived data are available in the online repository for the paper at <https://osf.io/7F9SU>

0.2 Sensitivity analysis

The first figure shows the result of a test run for the site Hovland 5, where the simulations were run 5000 times to identify when the means for the different distance measures converged. This was used to inform the use of 1000 simulation runs for the subsequent analysis of the other sites, as the means appear to have stabilised sufficiently by this point. Hovland 5 was chosen because the site only has a single ^{14}C -date, giving an uncertain age, and because it is located in an area of the landscape where the landscape results in quite large variability on the distance measures.

Test-run on Hovland 5 to inform number of simulation runs



0.3 Site analyses

The presentation of simulation results for each individual site also has some additional notes pertaining to edits to the DTM, treatment of ^{14}C -dates and other relevant information. The sites are presented in alphabetical order.

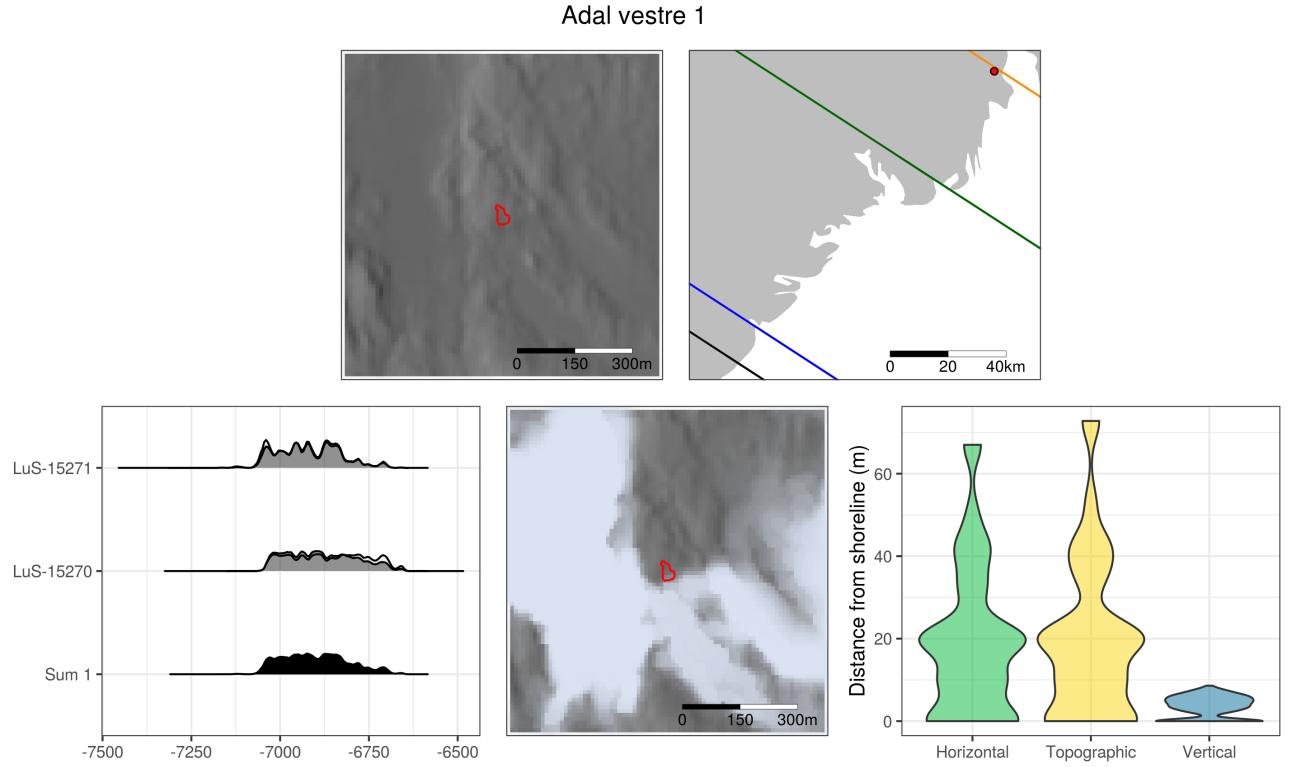
Stone Age sites for which no spatial data was readily available are Frebergsvik A–C (Mikkelsen 1975), Nedre Holtan (Glørstad 1998; Sjursen 1991), Rugtvedt (Odgaard 1994), Tangen (Glørstad 2005), and Torsrød (Østmo 1976). These sites are therefore not included in the analysis. Furthermore, Nielsen (2021) has recently interpreted features from the otherwise younger sites Bratsberg and Larønningen as possibly related to farming activity in the Early Neolithic. However, given the limited number of features, the lack of any artefacts directly related to these, and the therefore somewhat speculative nature of this suggestion, the sites are kept out of the analysis here.

The first plot on the first row for each site shows all calibrated radiocarbon dates from the Stone Age associated with the site (see `analysis/data/raw_data/radiocarbon.csv` for all dates, including those falling outside of the period). The fill colour of the radiocarbon dates indicates whether they are interpreted as belonging to the same phase, and each sum indicates that multiple dates for a phase have been modelled using the Boundary function and then summed using OxCal. Each phase is assumed to be independent of other phases. A red outline indicates that the date(s) were not seen as related to the artefact inventory in the original report. The second plot on the first row displays the site location in the present day landscape on the edited DTM (i.e. highways and railways impacting the adjusted sea-level have been removed, and elevation values are interpolated from the surroundings; see main text and `analysis/script/03dtm_edit.R`). The third plot on the first row shows the site location within the study area relative to the isobases of the shoreline displacement curves in use.

Subsequent rows for each site then show the simulation results. The first plot on these rows shows the probability density function from which site dates were drawn during simulation. The second plot shows the result of the simulation runs, where the intensity of the colour indicates the number of times the sea was simulated to be present at any given location. The third plot displays a violin plot of the measured distances between site and shore-line across all simulation runs.

Table 1: Adal vestre 1

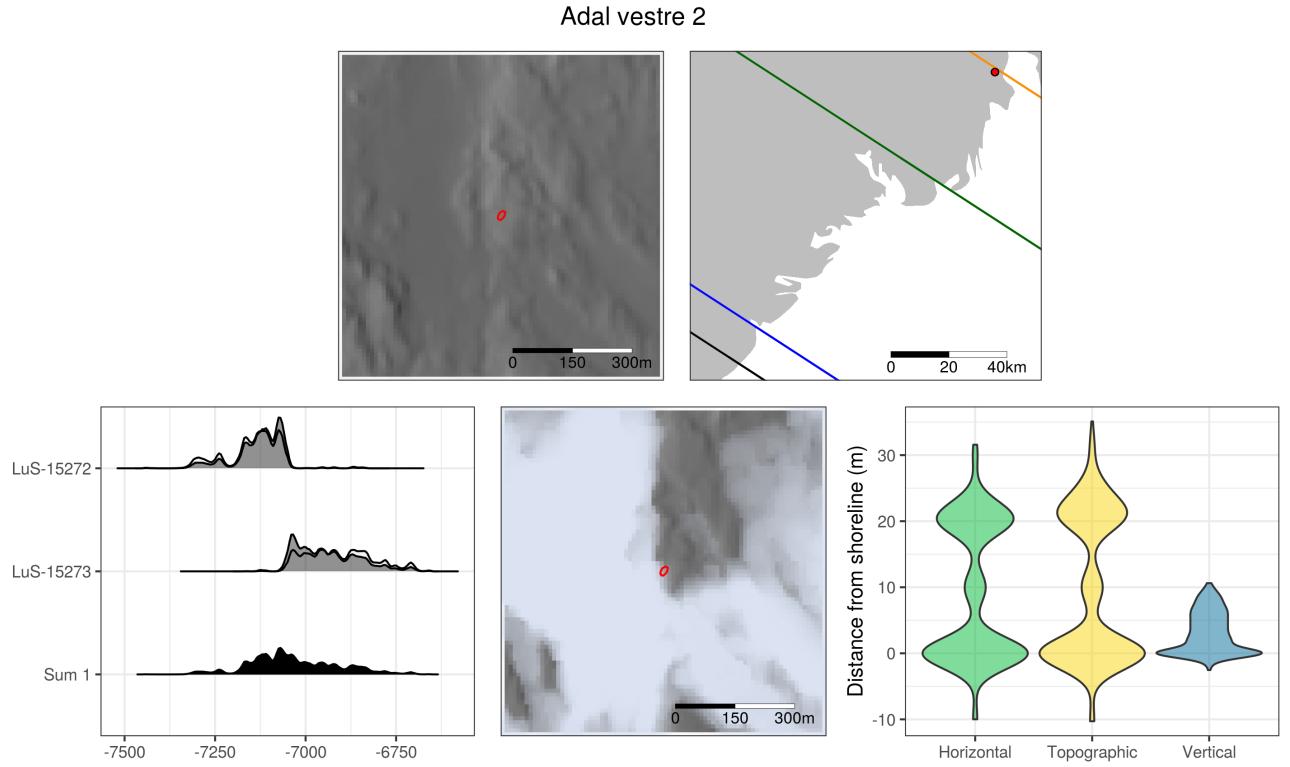
ID	^{14}C BP	Error	Material	Context
LuS-15264	665	35	Spruce (Picea)	Possible post hole (ID 4050)
LuS-15265	770	35	Pine (Pinus)	Possible post hole (ID 4050)
LuS-15266	1885	35	Pine (Pinus)	Fireplace (ID 6032)
LuS-16260	3255	35	Conifer (Coniferae indet.)	Cooking pit/fireplace (ID 11485)
LuS-15268	2445	35	Pine (Pinus)	Cooking pit (ID 11508)
LuS-15269	1020	35	Birch (Betula)	Cooking pit (ID 11508)
LuS-15270	7950	45	Hazel (Corylus), nutshell	Cooking pit/fireplace (ID 11521)
LuS-15267	2250	35	Hazel (Corylus), nutshell	Cooking pit/fireplace (ID 11556)
LuS-15271	8020	45	Hazel (Corylus), nutshell	Quadrant (574x401ySW, layer 2/3)



The single-phased lithic inventory matches the radiocarbon dates to the Middle Mesolithic at Adal vestre 1 (Granados 2022). The site is situated close to a field, but this does not appear to have resulted in any relevant changes to the terrain.

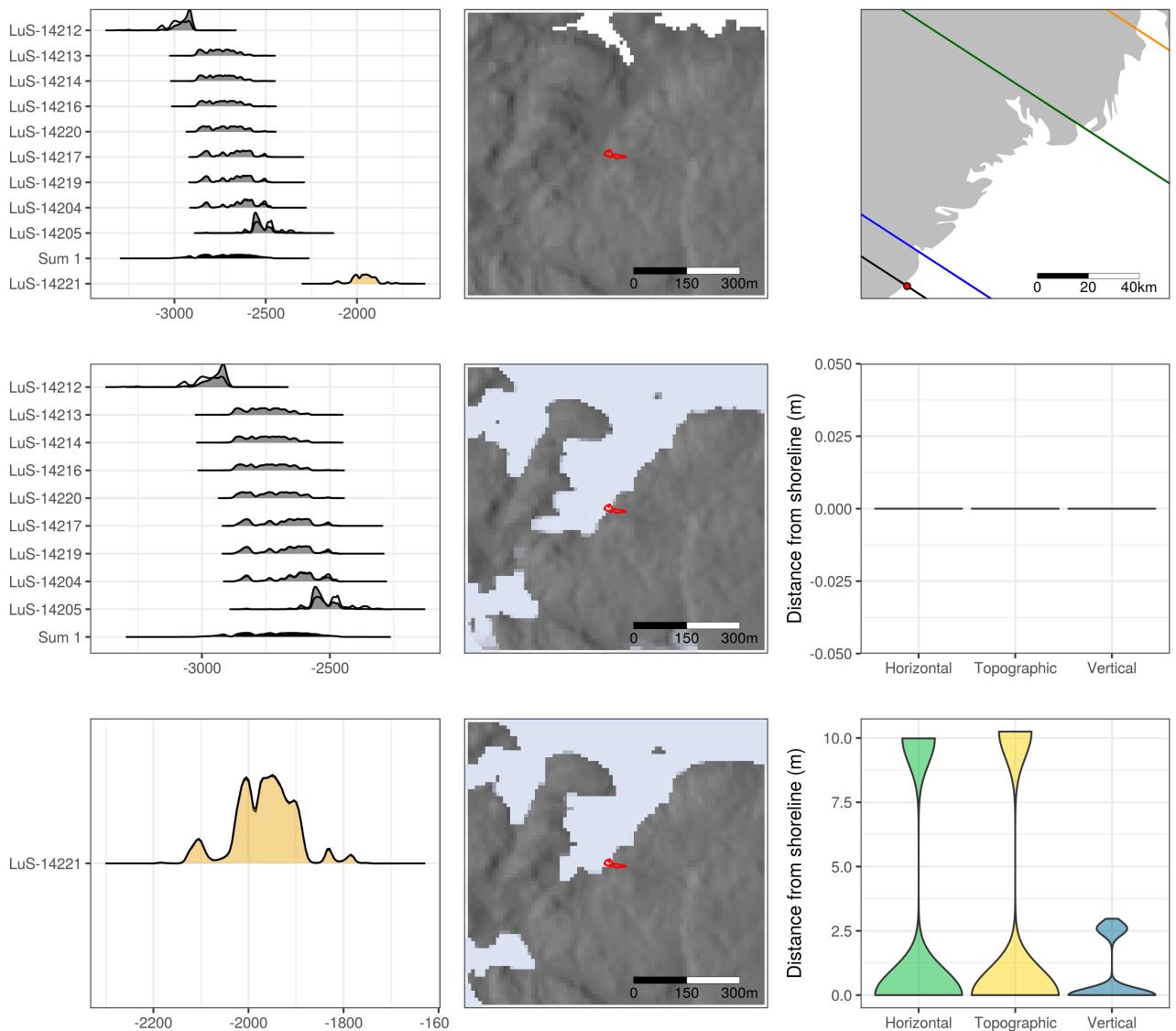
Table 2: Adal vestre 2

ID	^{14}C BP	Error	Material	Context
LuS-15272	8140	45	Hazel (<i>Corylus</i>), nutshell	Cooking pit/fireplace (ID 10036)
LuS-15273	8000	45	Hazel (<i>Corylus</i>), nutshell	Cooking pit/fireplace (ID 10051)



The artefact inventory from Adal vestre 2 is single-phased and matches the ^{14}C -dates (Granados 2022). The site has a similar location in the present day landscape to that of Adal vestre 1 (above) with no apparent indications of relevant impact to the DTM from modern activities.

Alveberget 8



The artefact inventory at Alveberget 8 matches the radiocarbon dates (Mansrud and Berg-Hansen 2021). The site is located in an undisturbed area of the DTM.

Table 3: Alveberget 8

ID	^{14}C BP	Error	Material	Context
LuS-14212	4360	40	Pome fruit tree (Pomoideae)	Profile bench (ID 1600)
LuS-14213	4165	40	Alder (Alnus)	Profile bench (ID 1600)
LuS-14214	4155	40	Pine (Pinus)	Profile bench (ID 1600)
LuS-14216	4145	40	Alder (Alnus)	Profile bench (ID 1750)
LuS-14220	4130	40	Alder/birch (Alnus/Betula)	Square (253x351y, layer 8)
LuS-14217	4095	40	Alder (Alnus)	Profile bench (ID 1537)
LuS-14219	4090	40	Oak (Quercus)	Profile bench (ID 2502)
LuS-14204	4070	40	Alder (Alnus)	Profile bench (ID 1306)
LuS-14205	3975	40	Alder (Alnus)	Fireplace (ID 1752)
LuS-14221	3605	40	Linden (Tilia)	Square (253x347y, layer 8)
LuS-14211	3500	40	Willow/aspen (Salix/Populus)	Profile bench (ID 1600)
LuS-14201	3480	40	Hardwood	Profile bench (ID 1770)
LuS-14210	3280	40	Alder (Alnus)	Profile bench (ID 1600)
LuS-14208	3095	40	Alder/hazel (Alnus/Corylus)	Profile bench (ID 1306)
LuS-14200	2950	40	Linden (Tilia)	Fireplace (ID 1332)
LuS-14209	1750	40	Hazel (Corylus)	Profile bench (ID 1600)
LuS-14203	1690	40	Hazel (Corylus)	Profile bench (ID 1770)
LuS-14215	1690	40	Hazel (Corylus)	Profile bench (ID 1750)
LuS-14206	1670	40	Hazel (Corylus)	Profile bench (ID 1306)
LuS-14202	1215	40	Alder/birch (Alnus/Betula)	Profile bench (ID 1770)
LuS-14207	1190	35	Hazel (Corylus)	Profile bench (ID 1306)
LuS-14218	1175	35	Hazel (Corylus)	Profile bench (ID 2504)

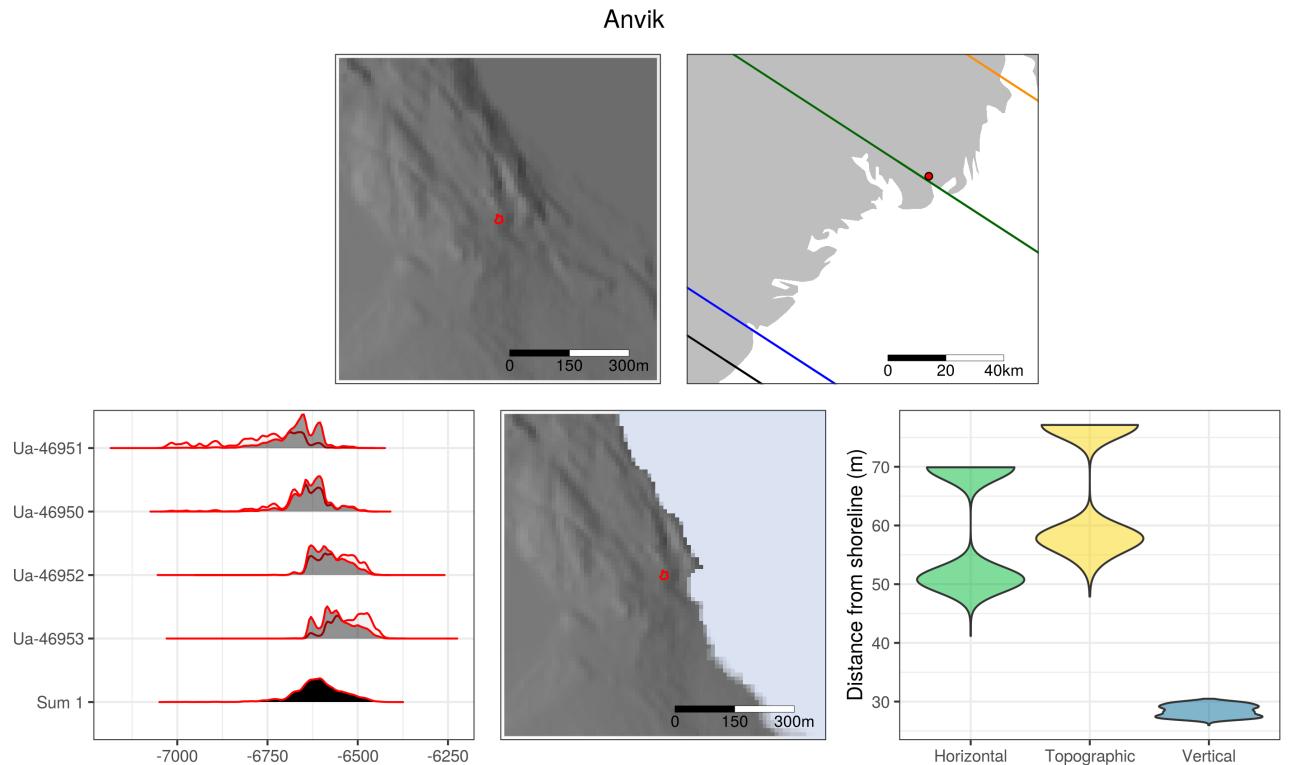
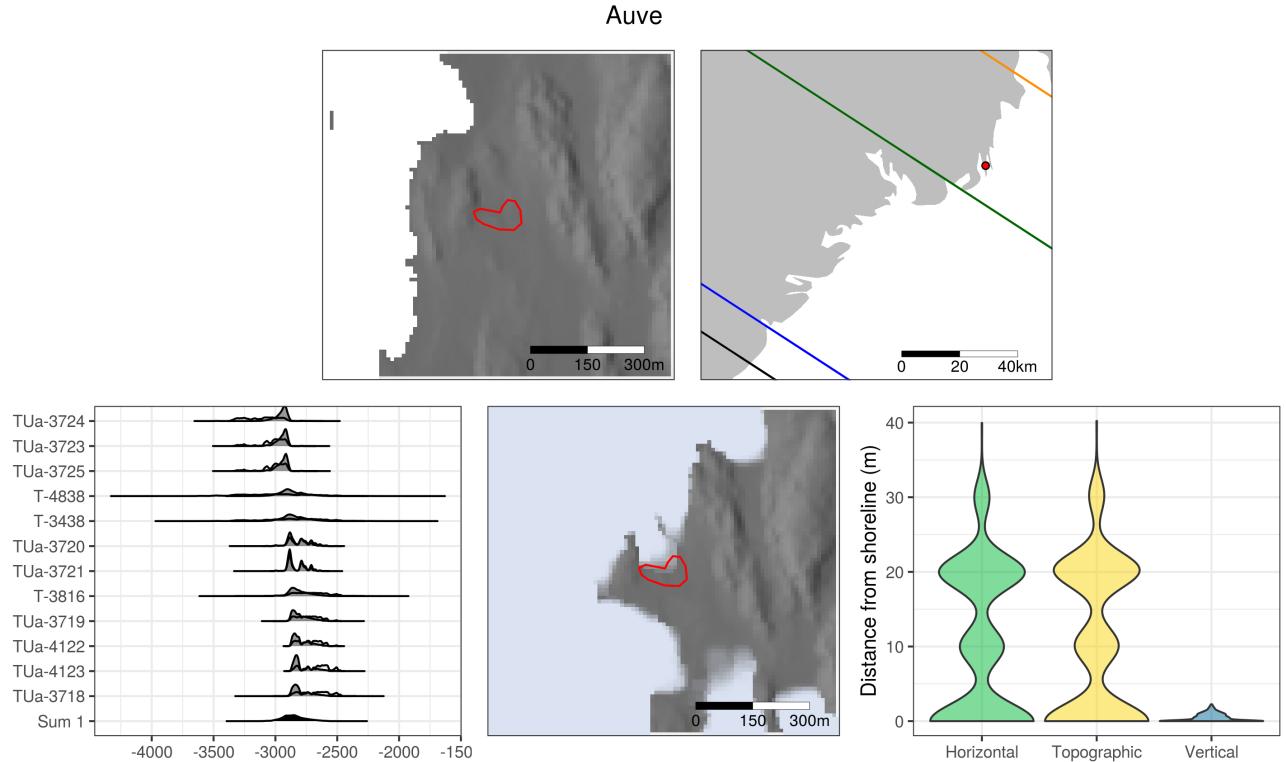


Table 4: Anvik

ID	^{14}C BP	Error	Material	Context
Ua-46950	7818	49	Hazel (<i>Corylus</i>), nutshell	Fireplace (ID 10520)
Ua-46951	7875	52	Willow (<i>Salix</i>)	Fireplace (ID 10520)
Ua-46952	7744	49	Willow (<i>Salix</i>)	Fireplace (ID 10520)
Ua-46953	7678	49	Pine (<i>Pinus</i>)	Fireplace (ID 10520)

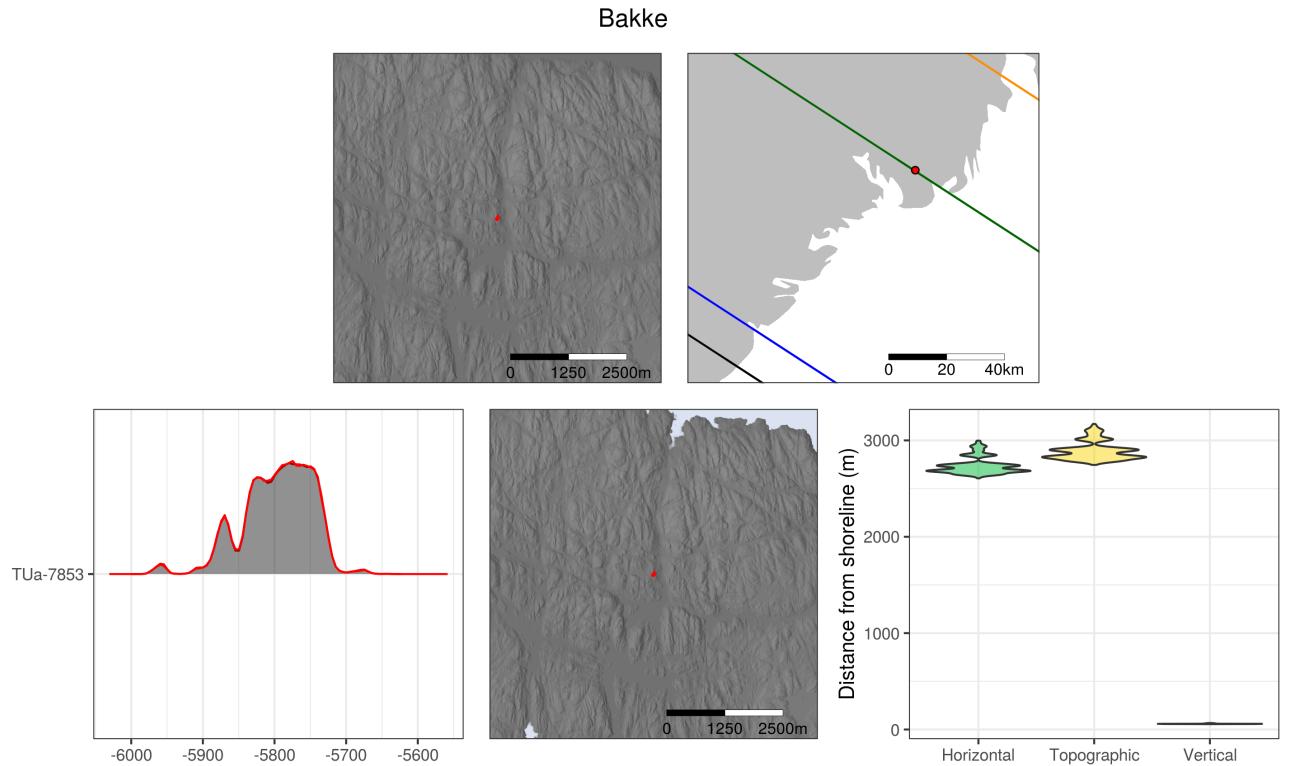
Anvik (Eymundsson 2014a) is situated by the highway and a smaller road. Neither appear to impact the simulation results. The dated fireplace is not seen as related to lithic material, which is believed to hail from the latest part of the Early Mesolithic (c. 8500-8250 BCE).



The site limit for Auve was drawn manually based on the description in the publication of the site and the site geometry available in the national heritage database Askeladden (Norwegian Directorate for Cultural Heritage 2018). The site is located in and around an intersection of the road, parts of the area has been levelled and farmed, and an area to north-west of the site has reportedly been affected by land-slides (Østmo 2008:16–29), but the extent of this is difficult to ascertain based on maps of the area. As the simulation results appear reasonable (see also map in Østmo 2008:Figure 142), nothing was done to try to correct for these factors.

Table 5: Auve

ID	^{14}C BP	Error	Material	Context
TUa-3716	1640	40	Pine/rowan/birch (<i>Pinus/Sorbus/Betula</i>)	Sand layer
TUa-3717	1215	70	Willow/pine/hazel (<i>Salix/Pinus/Corylus</i>)	Sand layer
TUa-3722	130	65	Pine/birch (<i>Pinus/Betula</i>)	Sand layer
TUa-3724	4420	80	Pine/birch (<i>Pinus/Betula</i>)	Square (ID AE21)
T-3437	3570	160	Pine (<i>Pinus</i>)	Excavation unit, unknown
TUa-3723	4365	55	Willow/pine (<i>Salix/Pinus</i>)	Square (ID AC22)
TUa-3719	4150	55	Willow/deciduous/pine (<i>Salix/Decid. indet./Pinus</i>)	Square (ID R9)
T-4838	4330	190	Elm/willow/linden/pine (<i>Ulmus/Salix/Tilia/Pinus</i>)	Excavation unit, unknown
T-3438	4240	160	Pine (<i>Pinus</i>)	Excavation unit, unknown
TUa-3721	4240	45	Willow/hazel/pine/birch (<i>Salix/Corylus/Pinus/Betula</i>)	Square (ID W14)
TUa-3720	4230	60	Deciduous (Decid, indet.)	Square (ID W12)
T-3816	4150	110	Pine/aspen (<i>Pinus/Populus</i>)	Excavation unit, unknown
TUa-3725	4355	55	Birch/pine (<i>Betula/Pinus</i>)	Square (ID AC22)
TUa-4122	4130	40	Deciduous/pine (Decid, indet./ <i>Pinus</i>)	Square (ID S11)
TUa-3718	4095	70	Willow/pine/birch (<i>Salix/Pinus/Betula</i>)	Square (ID Q11)
TUa-4123	4090	45	Birch/willow/pine (<i>Betula/Salix/Pinus</i>)	Square (ID Z17)
T-3436	3570	160	Pine (<i>Pinus</i>)	Excavation unit, unknown



The radiocarbon date to the Stone Age is not related to the site inventory at Bakke, which is distinctly Early Mesolithic in character (Nyland and Amundsen 2012).

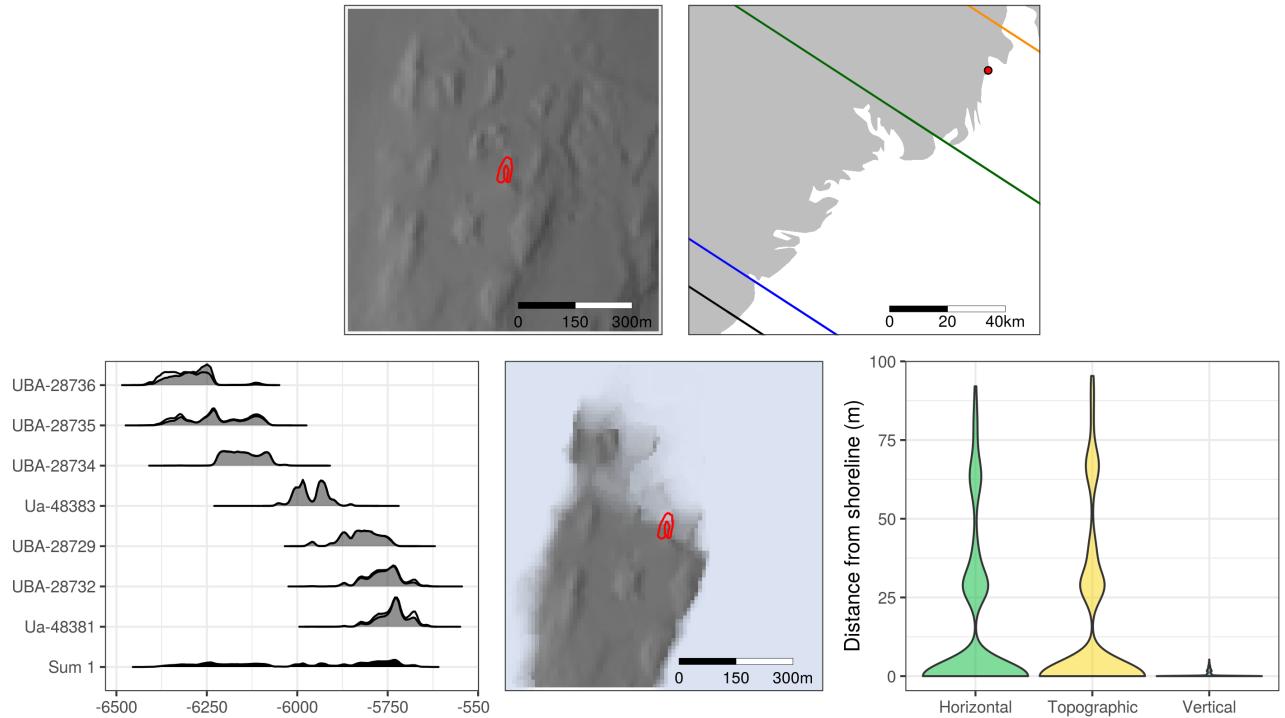
Table 6: Bakke

ID	^{14}C BP	Error	Material	Context
TUa-7852	2115	30	Birch (Betula)	Fireplace (ID 2)
TUa-7853	6915	40	Birch (Betula)	Fireplace (ID 2)

Table 7: Brunstad 24

ID	^{14}C BP	Error	Material	Context
UBA-28736	7439	39	Hazel (Corylus)	Cooking pit (ID 4990)
UBA-28735	7374	45	Hazel (Corylus)	Cooking pit (ID 4979)
UBA-28734	7285	37	Deciduous (Decid, indet.)	Cooking pit (ID 4967)
Ua-48383	7090	35	Hazel (Corylus)	Quadrant (50x54yNE, layer 3)
UBA-28729	6948	35	Aspen/willow (Populus/Salix)	Cooking pit (ID 2574)
UBA-28732	6873	43	Beech (Fagus)	Cooking pit (ID 4200)
Ua-48381	6850	35	Birch (Betula)	Quadrant (50x54yNE, layer 2)
Ua-48384	2715	30	Ash (Fraxinus)	Cooking pit (ID 2000)
Ua-48382	2646	30	Oak (Quercus)	Quadrant 50x50x10 cm (50x54y NE, layer 3)
UBA-28728	2460	26	Ash (Fraxinus)	Cooking pit (ID 2000)
UBA-28730	2403	26	Hazel (Corylus)	Cooking pit (ID 3934)
UBA-28733	2250	27	Linden (Tilia)	Cooking pit (ID 4362)
UBA-28731	2240	27	Hazel (Corylus)	Cooking pit (ID 4010)

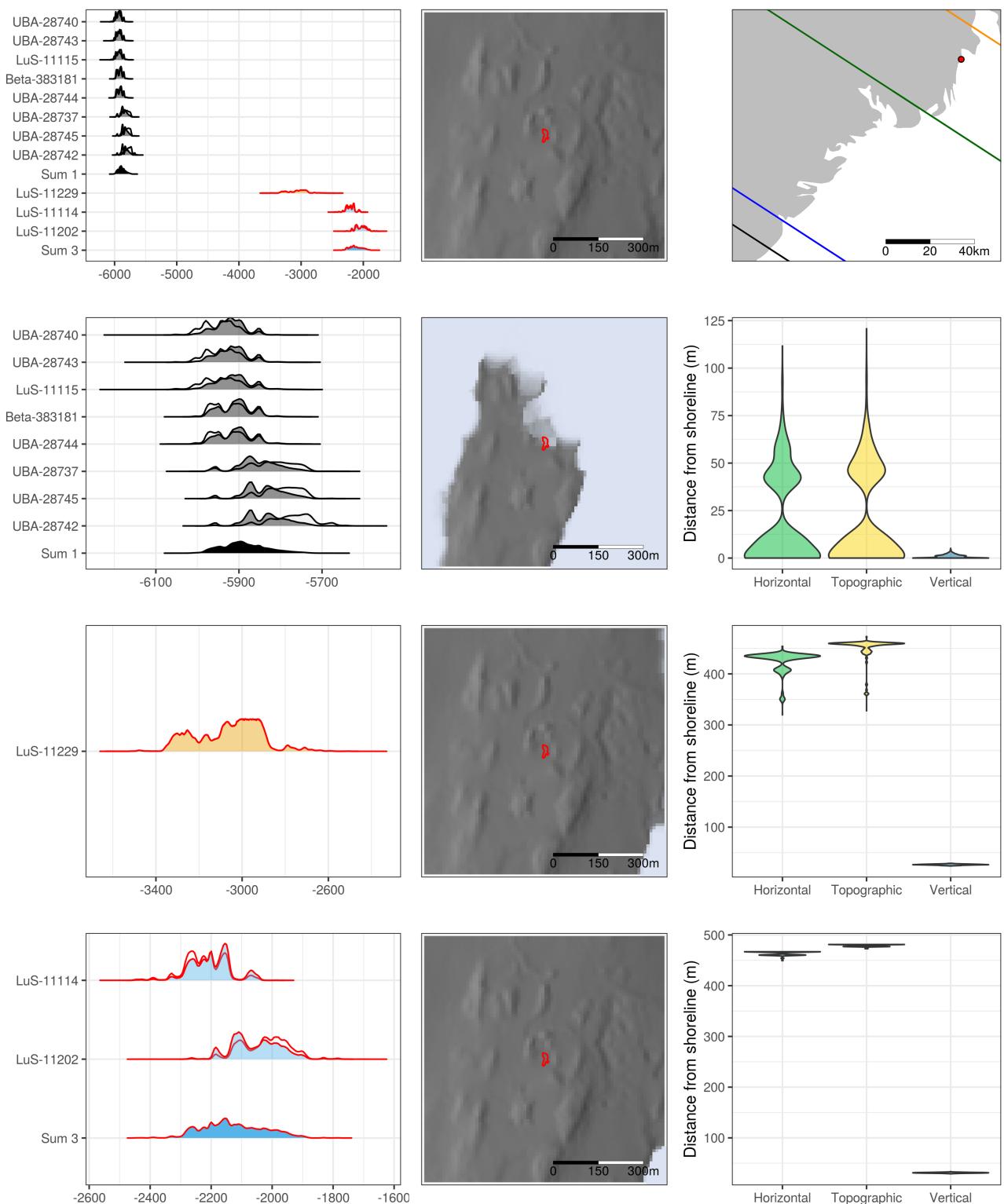
Brunstad 24



Typological indicators in the lithic inventory from Brunstad 24 matches the ^{14}C -dates (Danielsen et al.

2018). The footprint of a large building structure covering a large part of the site from the south required editing of the DTM. Apart from that the landscape appears relatively undisturbed. 8 fragments from a pot could potentially correspond with the ^{14}C -dates to the Late Bronze Age and Early Iron Age, but given their uncertain nature and the limited number of sherds, this was disregarded here.

Brunstad 25

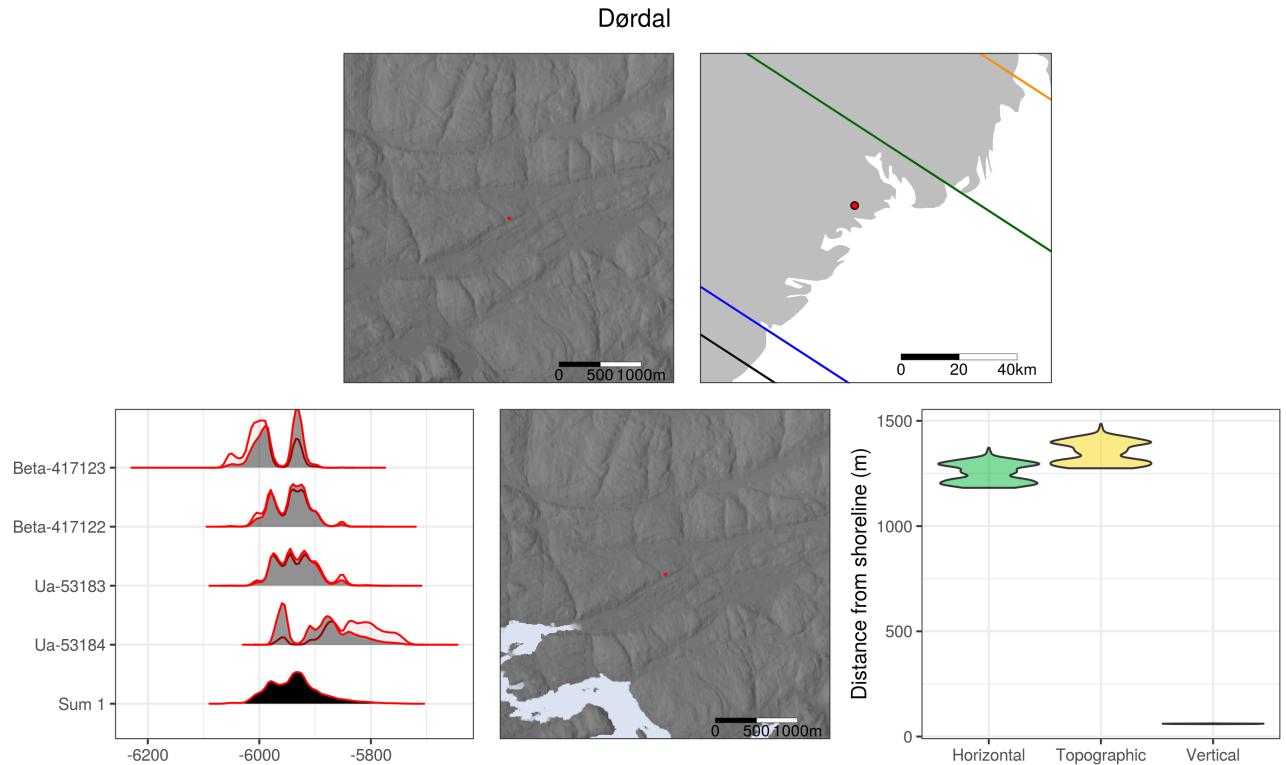


As with Brunstad 24 (above), the artefact inventory from Brunstad 25 matches the radiocarbon dates (Reitan and Solberg 2018a), and the building structure covering the southern part of the site had impacted the DTM

Table 8: Brunstad 25

ID	^{14}C BP	Error	Material	Context
LuS-11202	3645	50	Unburnt bone, human, skull	Grave (ID 2400)
LuS-11114	3790	35	Unburnt bone, human, skull	Grave (ID 2400)
LuS-11229	4370	95	Unburnt bone, human, right femur	Grave (ID 2400)
LuS-11115	7060	45	Maple (Acer)	Grave, layer 8 (ID 2400)
Beta-383181	7030	30	Charcoal, not determined	Grave, layer 5 (ID 2400)
UBA-28737	6943	44	Aspen (Populus)	Grave, layer 6/7 (ID 2400)
UBA-28740	7067	37	Aspen (Populus)	Cooking pit (ID 3185)
UBA-28743	7057	38	Hazel (Corylus), nutshell	Fireplace (ID 4663)
UBA-28744	7032	34	Eml (Ulmus)	Floor layer? (ID 4604)
UBA-28745	6920	37	Deciduous (Decid, indet.)	Cooking pit (ID 4895)
UBA-28742	6886	47	Alder/hazel (Alnus/Corylus)	Cooking pit (ID 3783)
UBA-28739	2749	27	Alder (Alnus)	Post hole (ID 2429)
UBA-28738	2715	28	Alder (Alnus)	Post hole (ID 2409)
UBA-28741	2659	26	Hazel (Corylus)	Post hole (ID 3737)

and had to be removed.



The ^{14}C -dates from two fireplaces at Dørdal are not related to the lithic inventory, where there are no typological indicators pointing the Late Mesolithic. The report suggest that the results might reflect a contamination through a natural process of some sort (Solheim et al. 2017).

Table 9: Dørdal

ID	^{14}C BP	Error	Material	Context
Beta-417122	7070	30	Pine (Pinus)	Fireplace (ID 1134)
Ua-53184	6956	31	Pine (Pinus)	Fireplace (ID 1134)
Beta-417123	7120	30	Pine (Pinus)	Fireplace (ID 792)
Ua-53183	7050	31	Pine (Pinus)	Fireplace (ID 792)

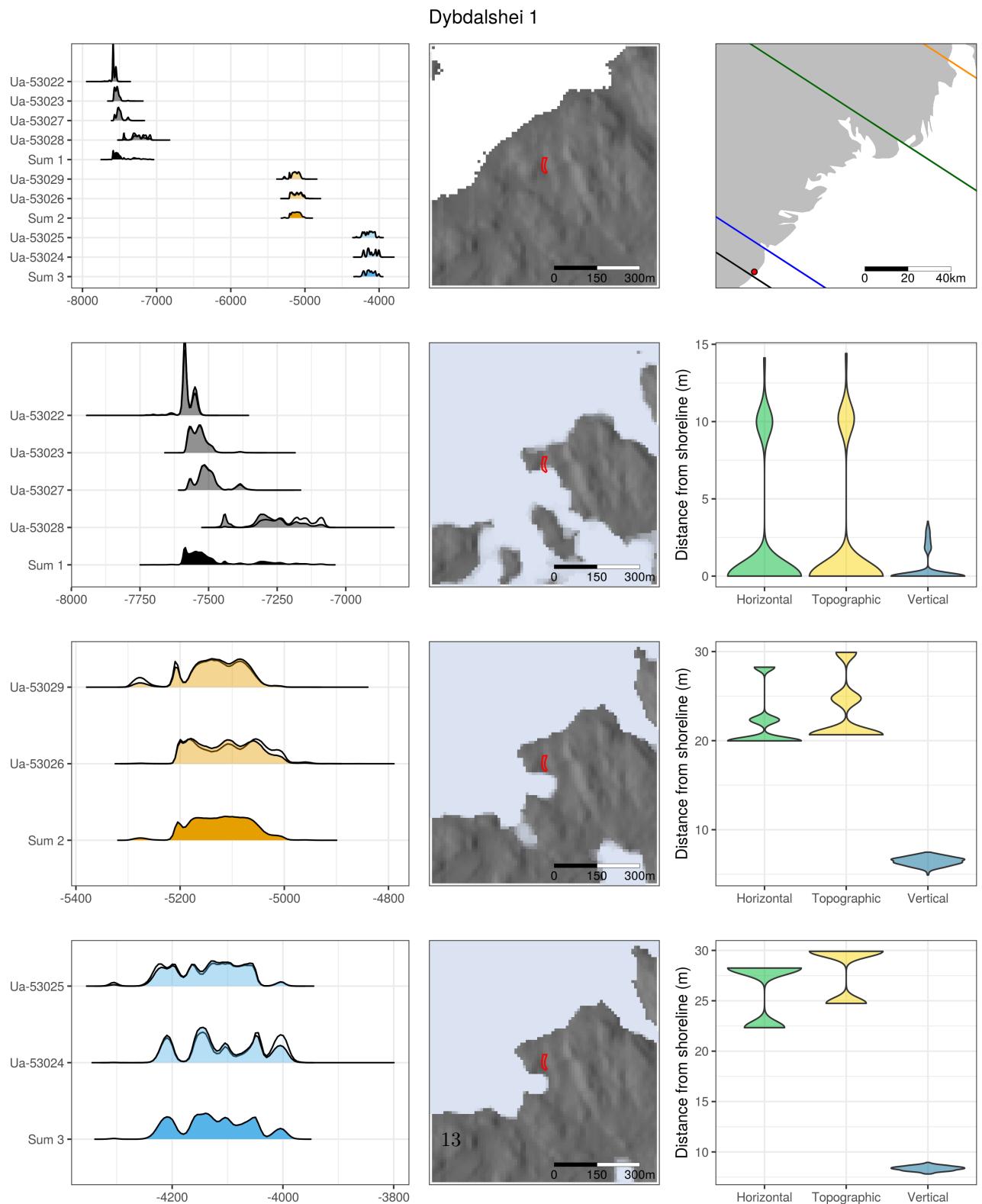


Table 10: Dybdalshei 1

ID	^{14}C BP	Error	Material	Context
Ua-53022	8566	36	Willow (Salix)	Cooking pit (ID 501)
Ua-53023	8462	36	Pomoideae (Malinae)	Cooking pit (ID 519)
Ua-53027	8422	36	Pomoideae (Malinae)	Cooking pit (ID 545)
Ua-53028	8199	35	Pomoideae (Malinae)	Cooking pit (ID 556)
Ua-53029	6202	32	Birch (Betula)	Cooking pit (ID 566)
Ua-53026	6150	32	Alder (Alnus)	Cooking pit (ID 537)
Ua-53025	5310	31	Aspen (Populus)	Cooking pit (ID 531)
Ua-53024	5262	31	Oak (Quercus)	Cooking pit (ID 526)

Table 11: Dybdalshei 2

ID	^{14}C BP	Error	Material	Context
Ua-53030	3868	30	Pine (Pinus)	Cooking pit (ID 650)

Dybdalshei 1 was subject to a very limited excavation (Granum and Schülke 2018), and the lack of data might therefore lead one to question whether or not the site actually represent a settlement area. Furthermore, what little lithic material was retrieved is too generic to offer any typological support to the radiocarbon dates of the dated cooking pits. Nonetheless, the site and the ^{14}C -dates are still treated the same way as the other sites. This is based on the agreement between the ^{14}C -dates and the spatial relation between the lithic artefacts and the features, which offers some additional support to the notion that the cooking pits represent remnants from visits in the Mesolithic.

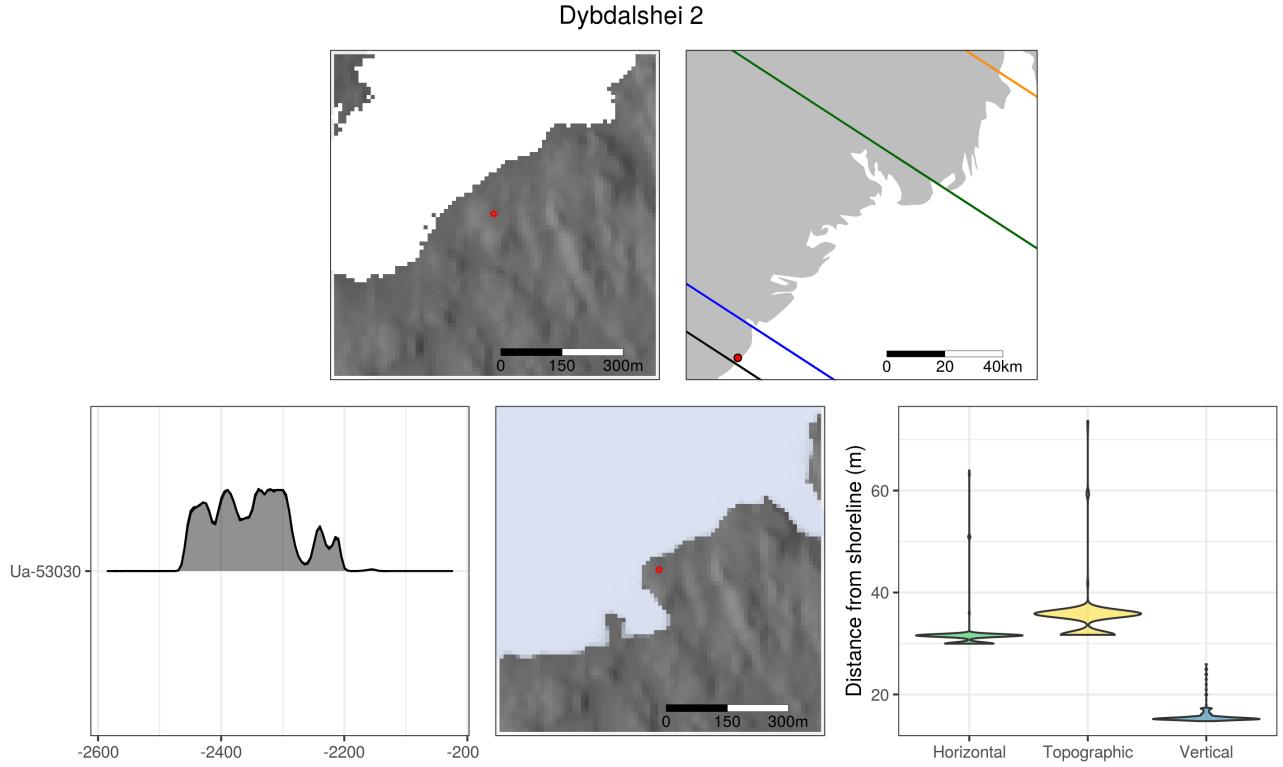
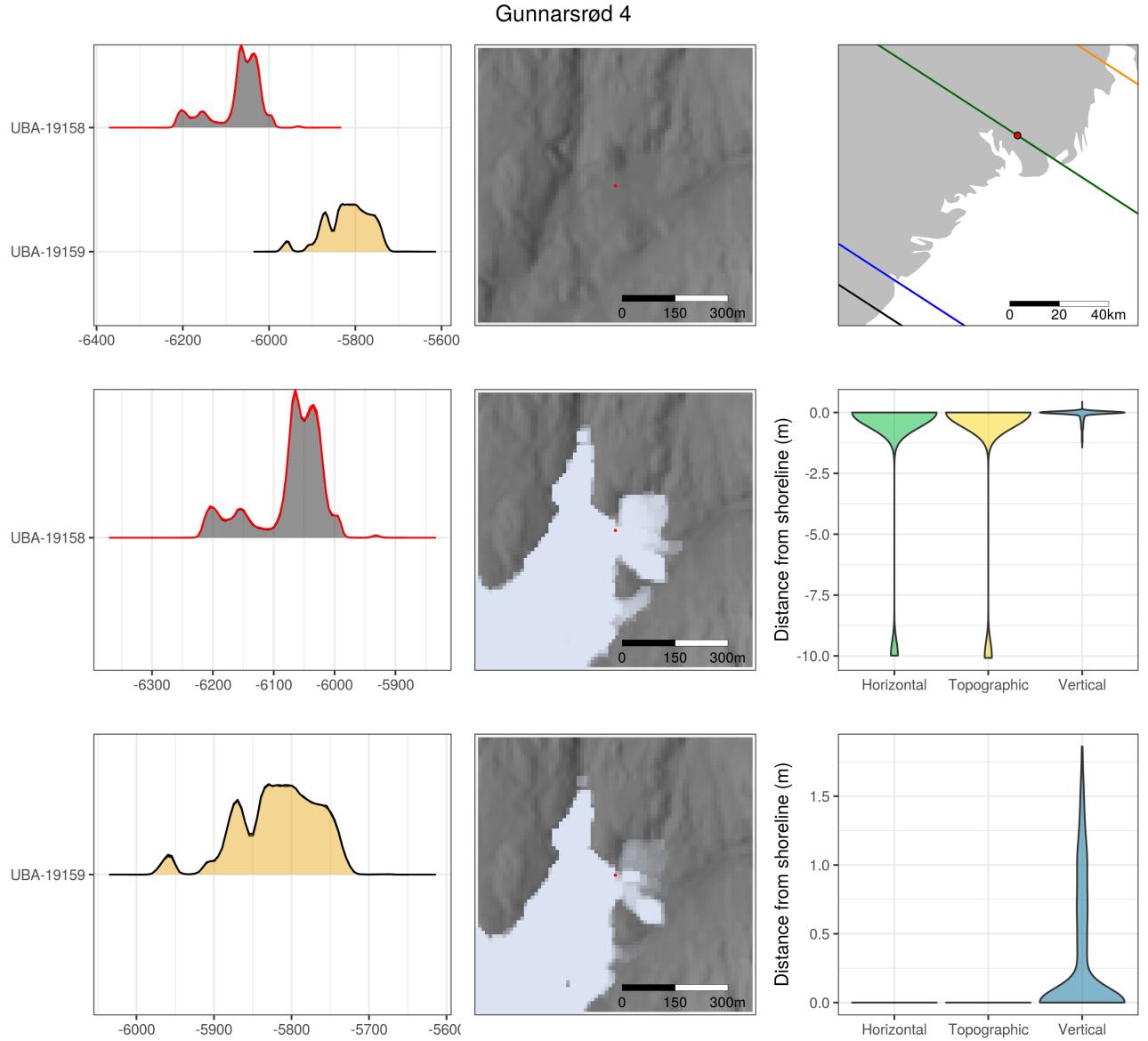


Table 12: Gunnarsrød 4

ID	^{14}C BP	Error	Material	Context
UBA-19134	2396	24	Hazel (<i>Corylus</i>)	Fireplace (ID 100000)
UBA-19159	6941	36	Birch (<i>Betula</i>)	Cultural layer, top (ID 100002)
UBA-19158	7210	38	Pine (<i>Pinus</i>)	Cultural layer, bottom (ID 100002)

The situation on Dybdalshei 2 is similar to that on Dybdalshei 1 (above, Granum and Schülke 2018), but with only a single date from a single feature and no lithics, the site is not included in subsequent analysis.



The rock-shelter site Gunnarsrød 4 (Reitan 2014a), and Gunnarsrød 5 (below), were situated close to where the railway runs today, and therefore required editing of the DTM. Based on maps from the report, this appears to have given adequate, although not perfect results (Reitan 2014a:Figure 14.7.1). The date from the

bottom of the cultural layer was seen as possibly impacted by old-wood effect, a notion that is in line with the simulation results, as this date would have the site located beneath the sea-level (Reitan 2014a).

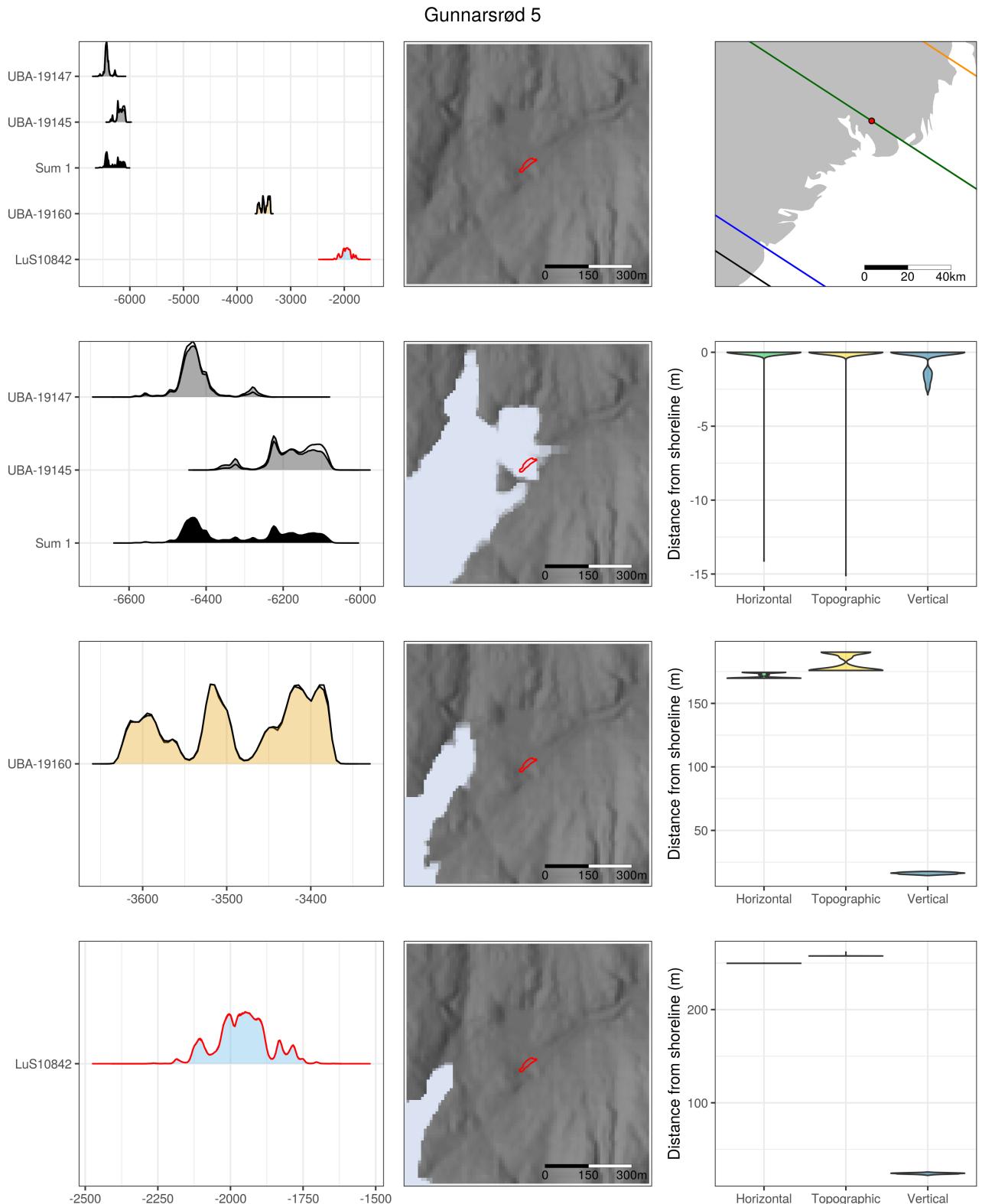
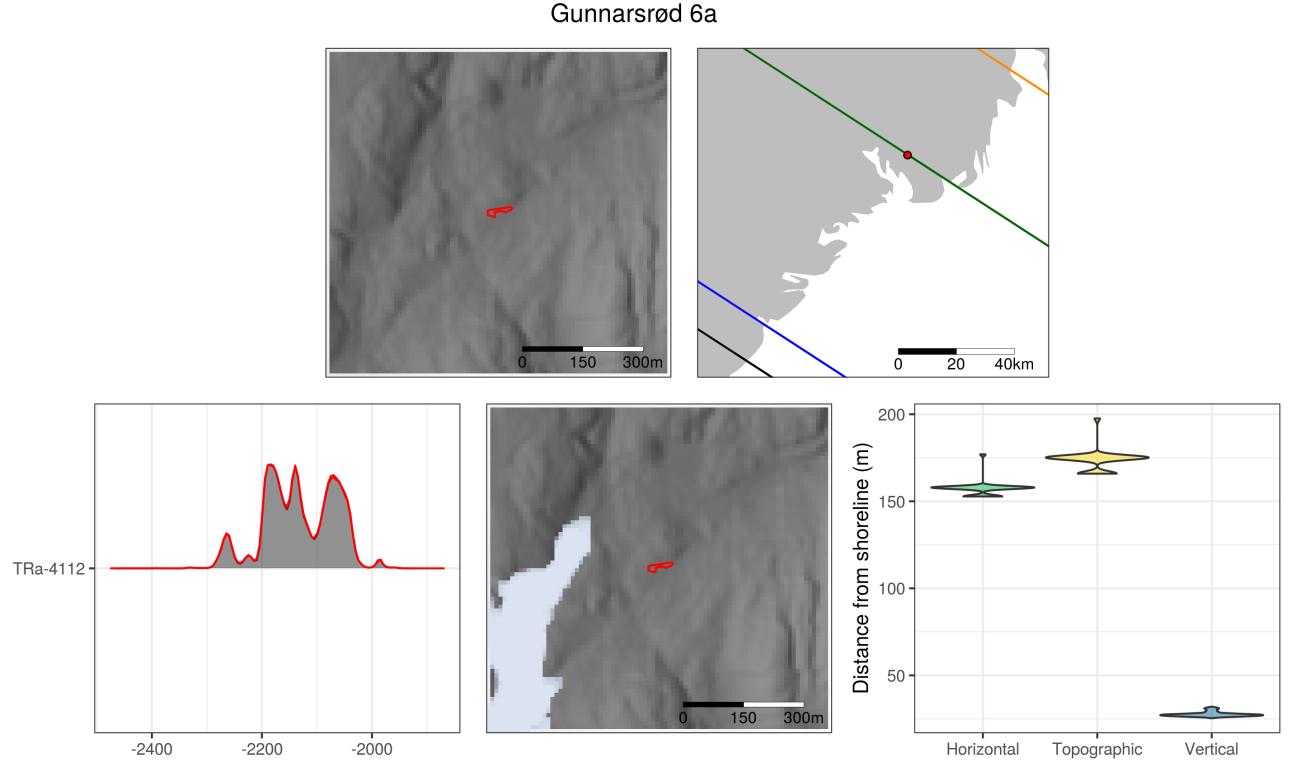


Table 13: Gunnarsrød 5

ID	^{14}C BP	Error	Material	Context
UBA-19147	7582	47	Hazel (<i>Corylus</i>), nutshell	Fireplace (ID 1206)
UBA-19145	7336	38	Birch (<i>Betula</i>)	Undefined feature (ID 1420)
UBA-19160	4716	31	Hazel (nutshell)/birch (<i>Corylus/Betula</i>)	Pit with pottery (ID 1519)
LuS-10842	3600	60	Soot extracted from pottery sherd	Pit with pottery (ID 1519)
UBA-19146	168	29	Birch (<i>Betula</i>)	Disturbance (ID 1085)

The location of Gunnarsrød 5 is today situated at the exit of a railway tunnel. The construction of the tunnel entrance has lead to a removal of parts of what used to be a hill on which the site was situated (Reitan 2014b). While the editing and interpolation of the DTM appears to give reasonable results for the rest of the flatter marsh area where the railway runs today (see also Gunnarsrød 4, above), the site itself would have been situated slightly higher. This has likely led to the negative values on the distance measures. In combination, the simulation results and the site map in the report (Reitan 2014b:Figure 9.1) indicate that the site would not have been situated any significant distance from the shoreline. The negative values have therefore been set to zero for the final aggregative analysis. A note can also be made on the date that is seen as unrelated to the artefact inventory. This is from charcoal from a pit with ceramics which had a far younger date. The date was therefore interpreted as the result of contamination of some kind.



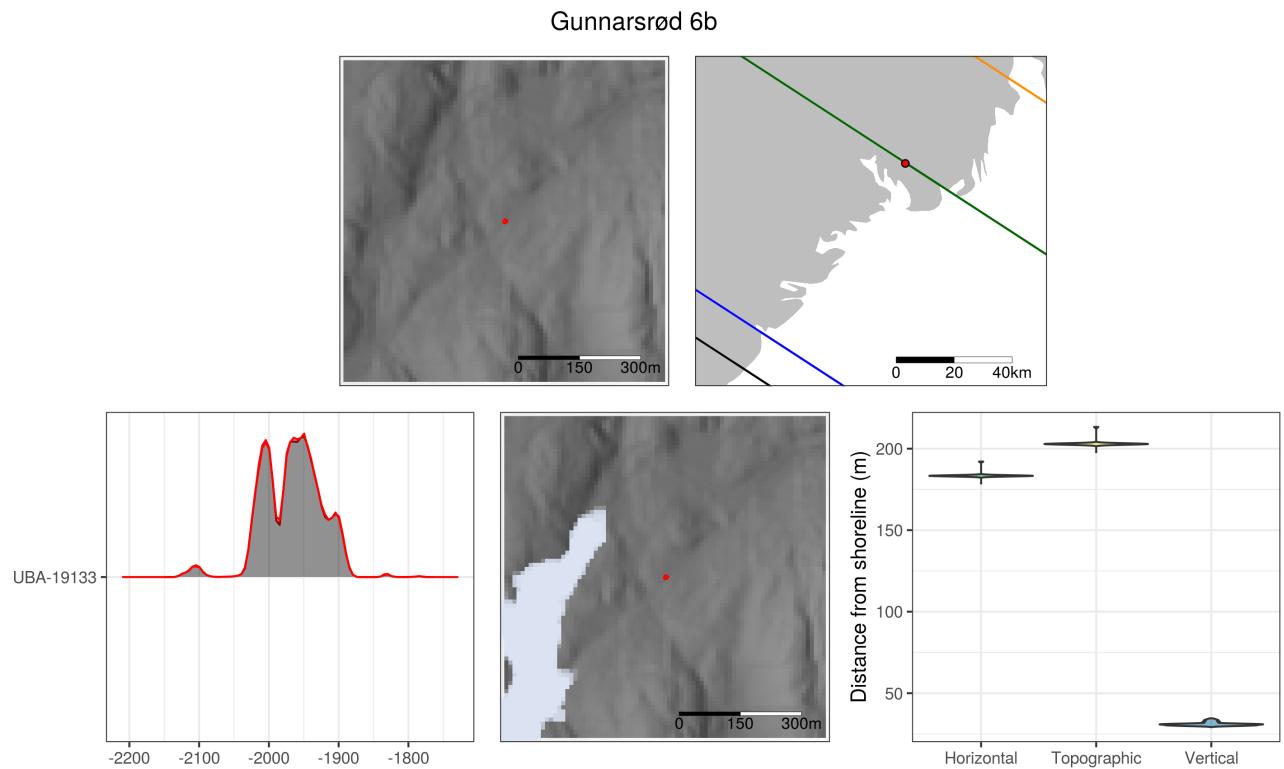
The ^{14}C -date to the Neolithic from Gunnarsrød 6a is not related to the lithic inventory on the site, which is clearly Mesolithic (Carrasco et al. 2014).

Table 14: Gunnarsrød 6a

ID	^{14}C BP	Error	Material	Context
TRa-4112	3735	35	Birch/ash (Betula/Fraxinus)	Cooking pit/fireplace (ID 600)
UBA-19130	2369	24	Birch (Betula)	Charcoal layer
UBA-19131	1330	27	Hazel (Corylus), nutshell	Square (965x46y, layer 4)
UBA-19132	883	23	Hazel (Corylus), nutshell	Quadrant (969x49ySE, layer 3)

Table 15: Gunnarsrød 6b

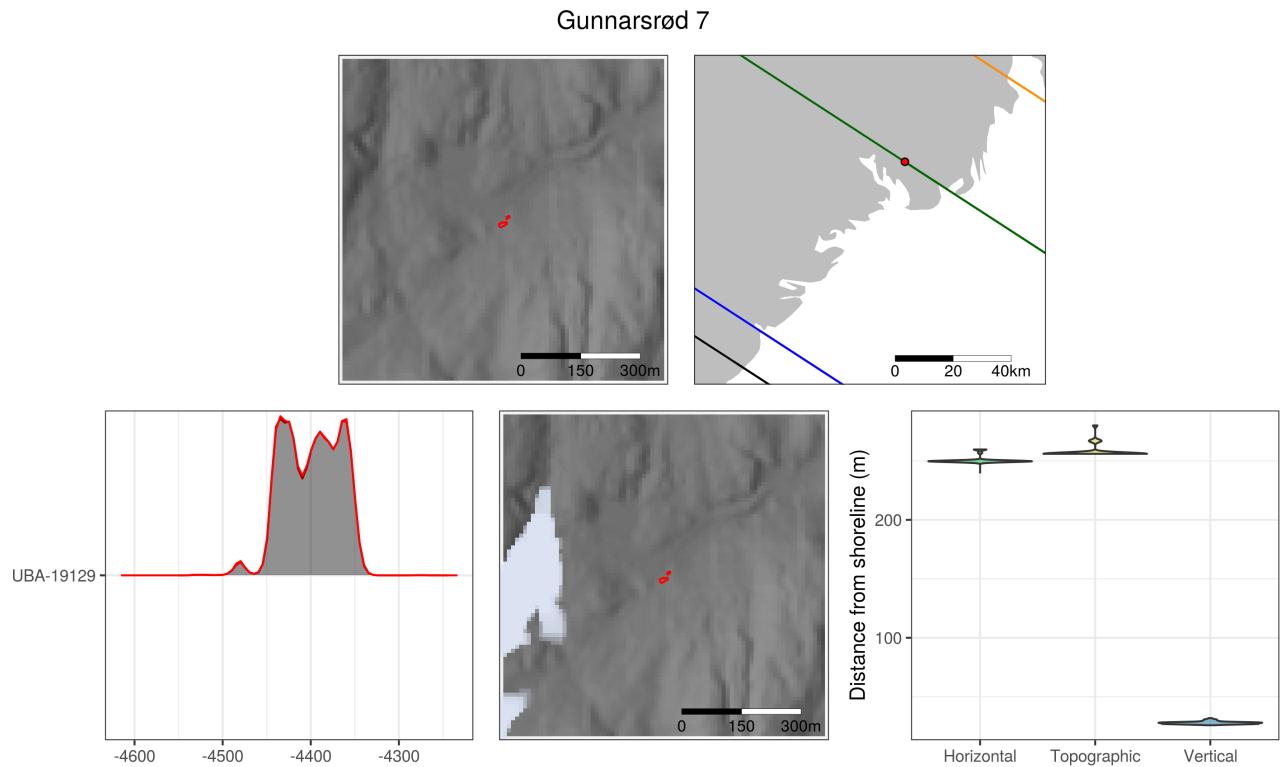
ID	^{14}C BP	Error	Material	Context
TRa-4113	335	25	Pine (Pinus)	Undefined feature (ID 1313)
UBA-19133	3608	25	Hazel (Corylus), nutshell	Squares (917x626y, 916x626y, layer 5)



As with Gunnarsrød 6a above, the ^{14}C -date to the Neolithic from Gunnarsrød 6b is not related to the Mesolithic inventory on the site (Carrasco et al. 2014).

Table 16: Gunnarsrød 7

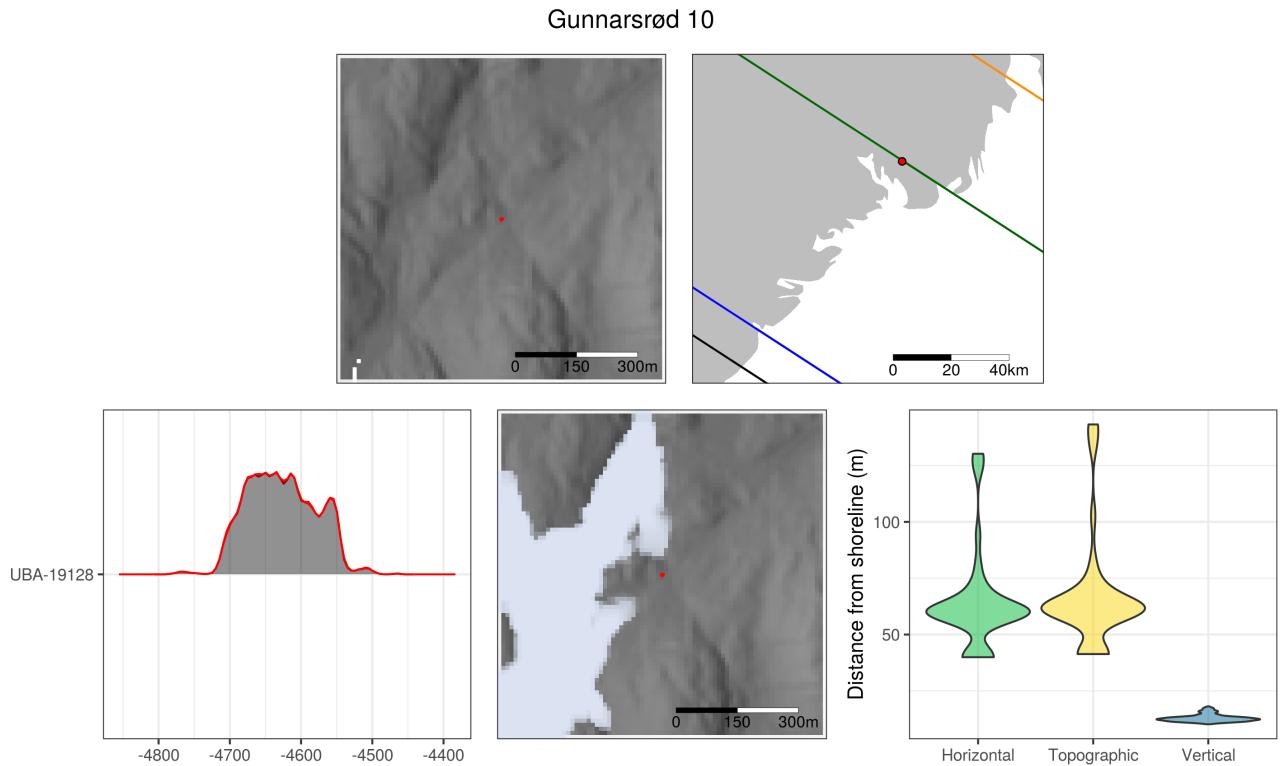
ID	^{14}C BP	Error	Material	Context
UBA-19129	5563	30	Birch (Betula)	Undefined feature (ID 1000)
UBA-19162	1697	26	Birch/oak (Betula/Quercus)	Undefined feature (ID 1016)



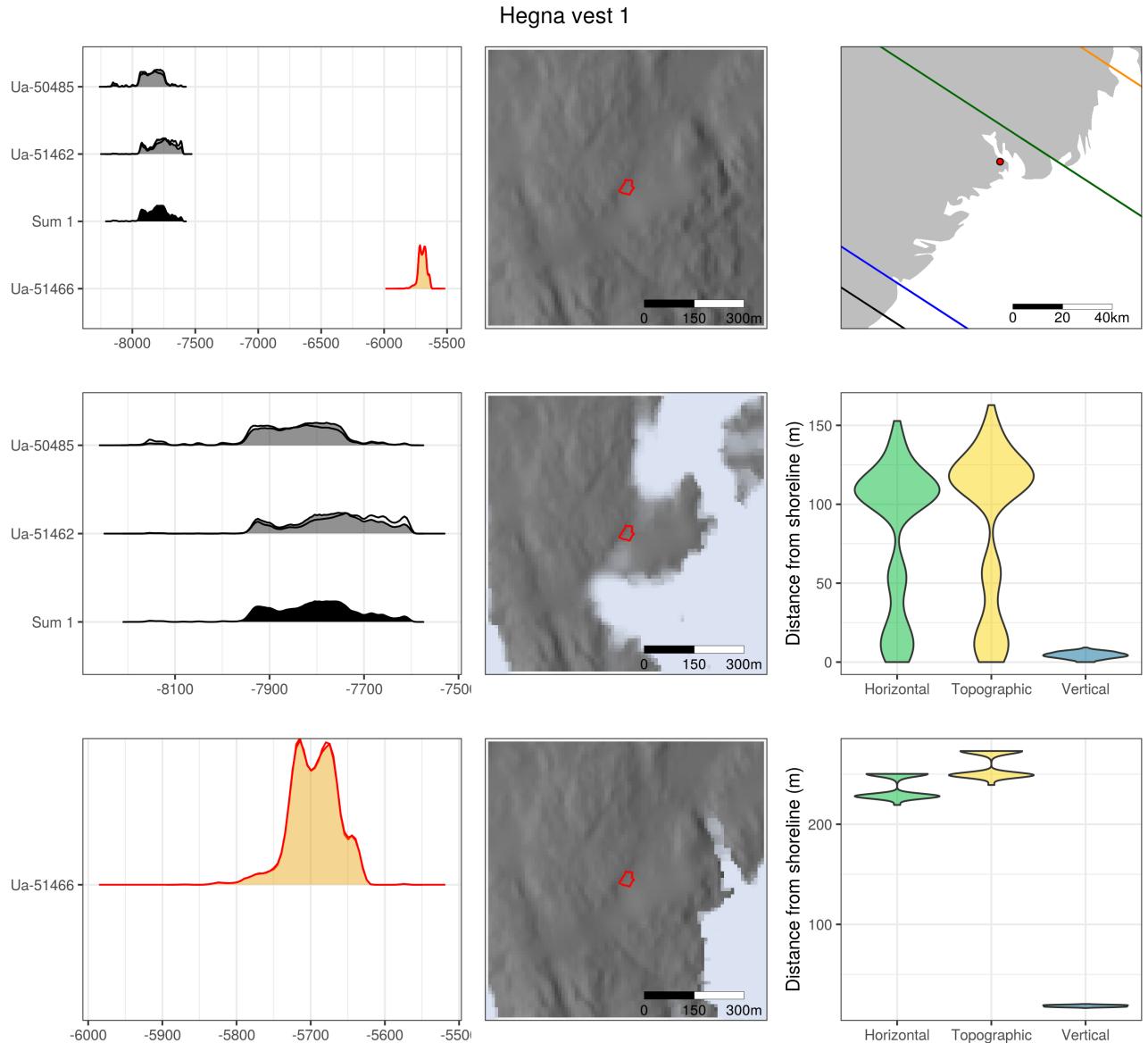
The lithic inventory from Gunnarsrød 7 is of a Middle Mesolithic character and does not match the ^{14}C -dates (Fossum 2014a).

Table 17: Gunnarsrød 10

ID	^{14}C BP	Error	Material	Context
UBA-19128	5778	31	Birch (Betula)	Fireplace (ID 100001)



Based on the location of Gunnarsrød 10 on a steep ledge indicating a shore-bound location, and the site inventory, the ^{14}C -date is not believed to be related to the main occupation of the site (Reitan and Fossum 2014).

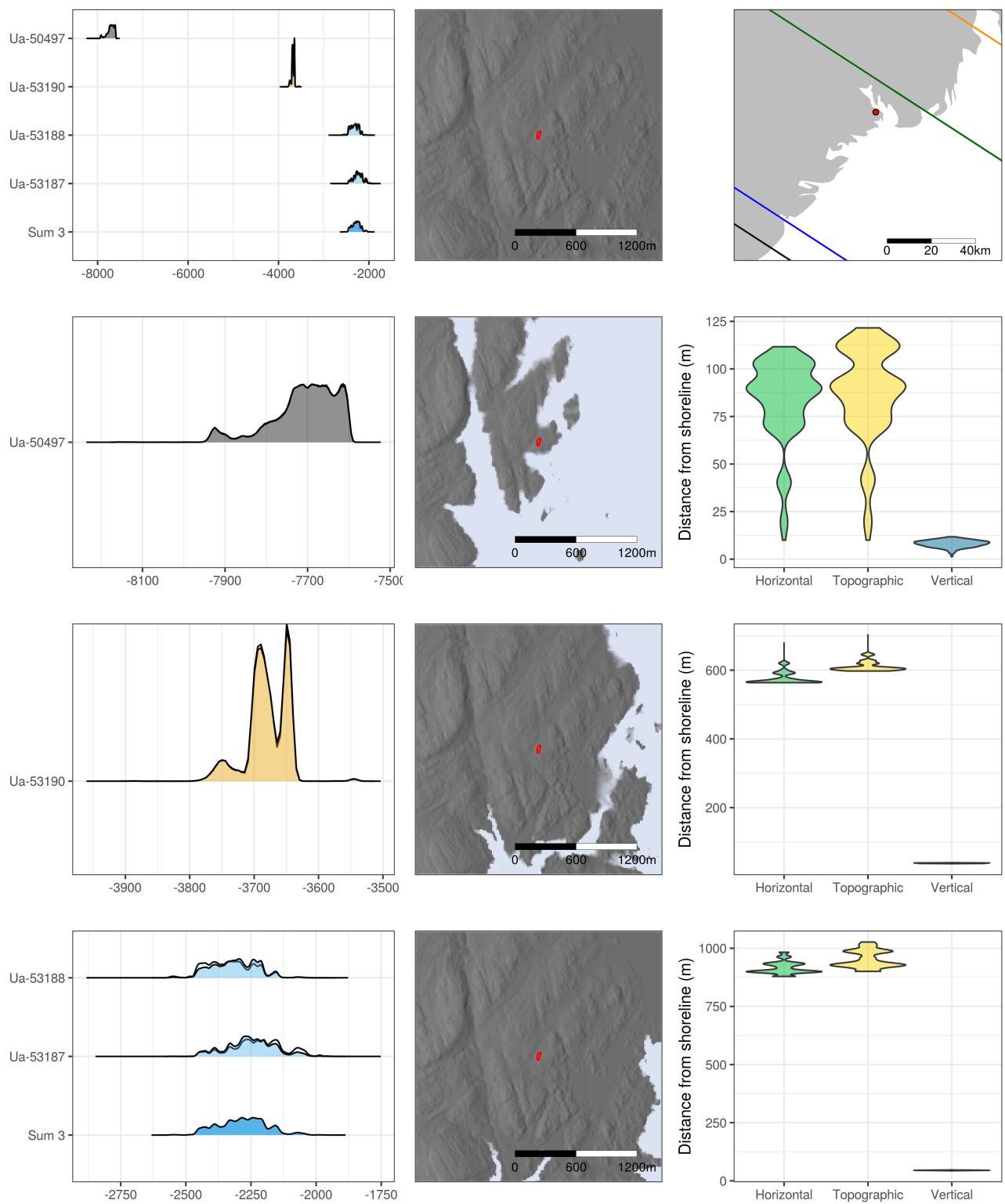


Example site from the main text. Hegna vest 1 has been visited multiple times throughout prehistory. The lithic inventory is distinctly Middle Mesolithic and Neolithic in character, with some finds that might be even younger. This is also reflected in the pottery finds, which are deemed to be from the Bronze Age–Early Iron Age. The ^{14}C -date to the Late Mesolithic is therefore considered unrelated to the main occupation of the site, as it cannot be related to any elements of the site inventory (Fossum 2017a). The highway runs right by Hegna vest 1 and has been removed. This seems successful in that it doesn't appear to impact the simulated sea-levels.

Table 18: Hegna vest 1

ID	¹⁴ C BP	Error	Material	Context
Ua-50485	8788	34	Aspen/willow (<i>Populus/Salix</i>)	Fireplace (ID 14834)
Ua-51462	8732	40	Willow (<i>Salix</i>)	Fireplace (ID 9819)
Ua-51466	6816	36	Willow (<i>Salix</i>)	Undefined feature/three throw (ID 100079)
Ua-51461	3318	32	Alder (<i>Alnus</i>)	Undefined feature (ID 9807a)
Ua-50484	2831	24	Ash (<i>Fraxinus</i>)	Cooking pit (ID 14417)
Ua-51467	2724	34	Hazel (<i>Corylus</i>), nutshell	Undefined feature (ID 11663)
Ua-51463	2670	33	Birch (<i>Betula</i>)	Undefined feature (ID 11663)
Ua-51460	2667	33	Alder (<i>Alnus</i>)	Stone packing/fireplace (ID 9725)
Ua-51465	2474	33	Hazel (<i>Corylus</i>)	Undefined fure (ID 15034)
Ua-50472	2440	24	Pine (<i>Pinus</i>)	Fireplace (ID 9642)
Ua-50475	2225	28	Aspen (<i>Populus</i>)	Cooking pit (ID 10127)
Ua-50482	2215	21	Hazel (<i>Corylus</i>)	Undefined feature (ID 14324)
Ua-50483	2197	21	Hazel (<i>Corylus</i>)	Undefined feature (ID 14383)
Ua-50486	2186	23	Hazel (<i>Corylus</i>)	Undefined feature (ID 100078)
Ua-50473	2186	21	Birch (<i>Betula</i>)	Fireplace (ID 9659)
Ua-50480	2186	23	Aspen (<i>Populus</i>)	Cooking pit (ID 14280)
Ua-50481	2178	24	Aspen (<i>Populus</i>)	Cooking pit (ID 14298)
Ua-50477	2174	27	Birch (<i>Betula</i>)	Undefined feature (ID 11767)
Ua-50479	2154	23	Hazel (<i>Corylus</i>)	Cooking pit (ID 14637)
Ua-51464	2124	33	Birch (<i>Betula</i>)	Undefined feature (ID 11683)
Ua-50476	2118	30	Birch (<i>Betula</i>)	Undefined feature (ID 100077)
Ua-51468	2063	33	Hazel (<i>Corylus</i>), nutshell	Undefined feature (ID 15034)
Ua-50474	1702	22	Birch (<i>Betula</i>)	Cooking pit (ID 9745)
Ua-50478	1685	20	Birch (<i>Betula</i>)	Cooking pit (ID 11828)
Ua-50487	971	26	Birch (<i>Betula</i>)	Fireplace (ID 11707)

Hegna vest 2



As with Hegna vest 1 (above), Hegna vest 2 has been used throughout prehistory. This includes the Middle Mesolithic, the Neolithic, the Bronze Age and the Early Iron Age. The ^{14}C -dates are believed to be related to

Table 19: Hegna vest 2

ID	¹⁴ C BP	Error	Material	Context
Ua-50497	8708	38	Pine (Pinus)	Cooking pit (ID 11906)
Ua-53190	4900	30	Burnt bone, mammal	Square (523x346y)
Ua-53188	3863	57	Burnt bone, beaver (Castor)	Undefined feature (ID 11546)
Ua-53187	3789	60	Burnt bone, Sus/Canis	Undefined feature (ID 11546)
Ua-50494	3337	27	Pine (Pinus)	Undefined feature (ID 11546)
Ua-51469	3121	31	Ash (Fraxinus)	Undefined feature (ID 9029)
Ua-51470	3085	31	Ash (Fraxinus)	Concentration of stones (ID 9057)
Ua-53189	3083	29	Burnt bone, mammal	Undefined feature (ID 11546)
Ua-53191	3079	28	Burnt bone, sheep/goat (Ovis/Capra)	Square (523x346y)
Ua-50499	2659	25	Aspen (Populus)	Cooking pit (ID 11954)
Ua-50490	2239	25	Aspen (Populus)	Fireplace (ID 9238)
Ua-50493	2216	23	Hazel (Corylus)	Cooking pit (ID 8903)
Ua-50496	2203	27	Birch (Betula)	Cooking pit (ID 9181)
Ua-50495	2193	23	Birch (Betula)	Undefined feature (ID 9002)
Ua-50492	2190	23	Birch (Betula)	Undefined feature (ID 8940)
Ua-50498	2188	24	Hazel (Corylus)	Cooking pit (ID 11926)
Ua-50500	2180	22	Birch (Betula)	Cooking pit/ditch (ID 11975)
Ua-50491	2168	28	Pine (Pinus)	Cooking pit/fireplace (ID 9261)
Ua-50488	1810	23	Alder (Alnus)	Cooking pit (ID 9181)
Ua-50489	1781	24	Hazel (Corylus)	Cooking pit (ID 9211)

the site activities (Fossum 2017b). Hegna vest 2 is located where the highway runs today. This was removed, which appears to have been successful in relation to the simulation results.

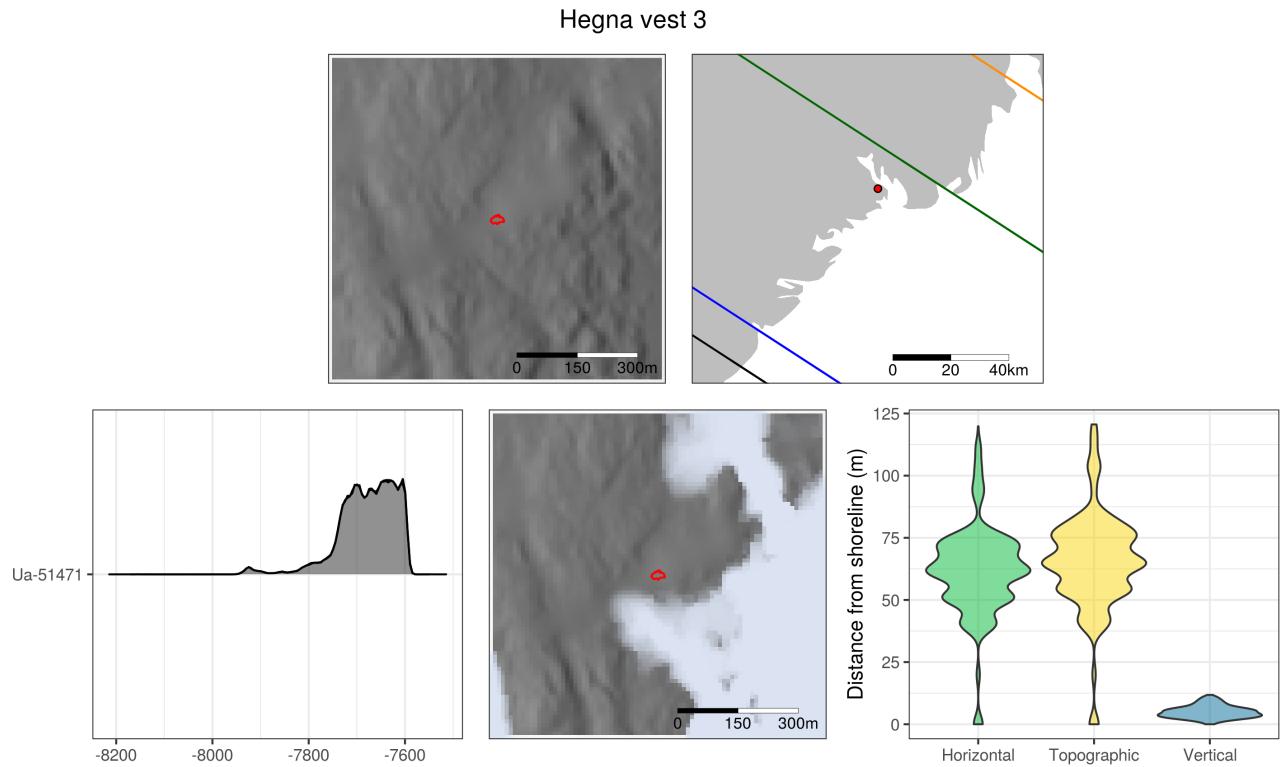
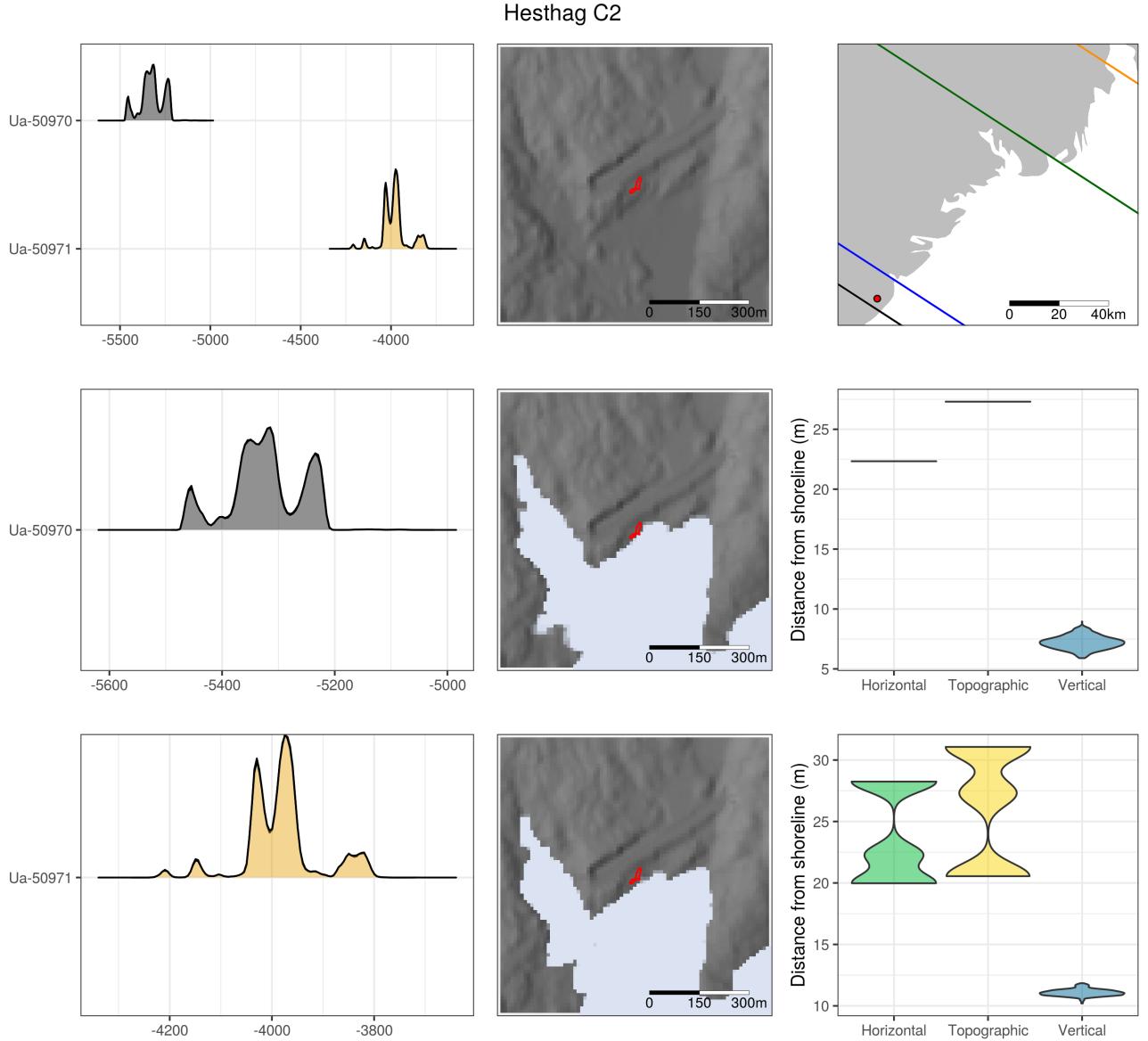


Table 20: Hegna vest 3

ID	^{14}C BP	Error	Material	Context
Ua-51471	8679	39	Aspen/willow (<i>Populus/Salix</i>)	Cooking pit (ID 11620)

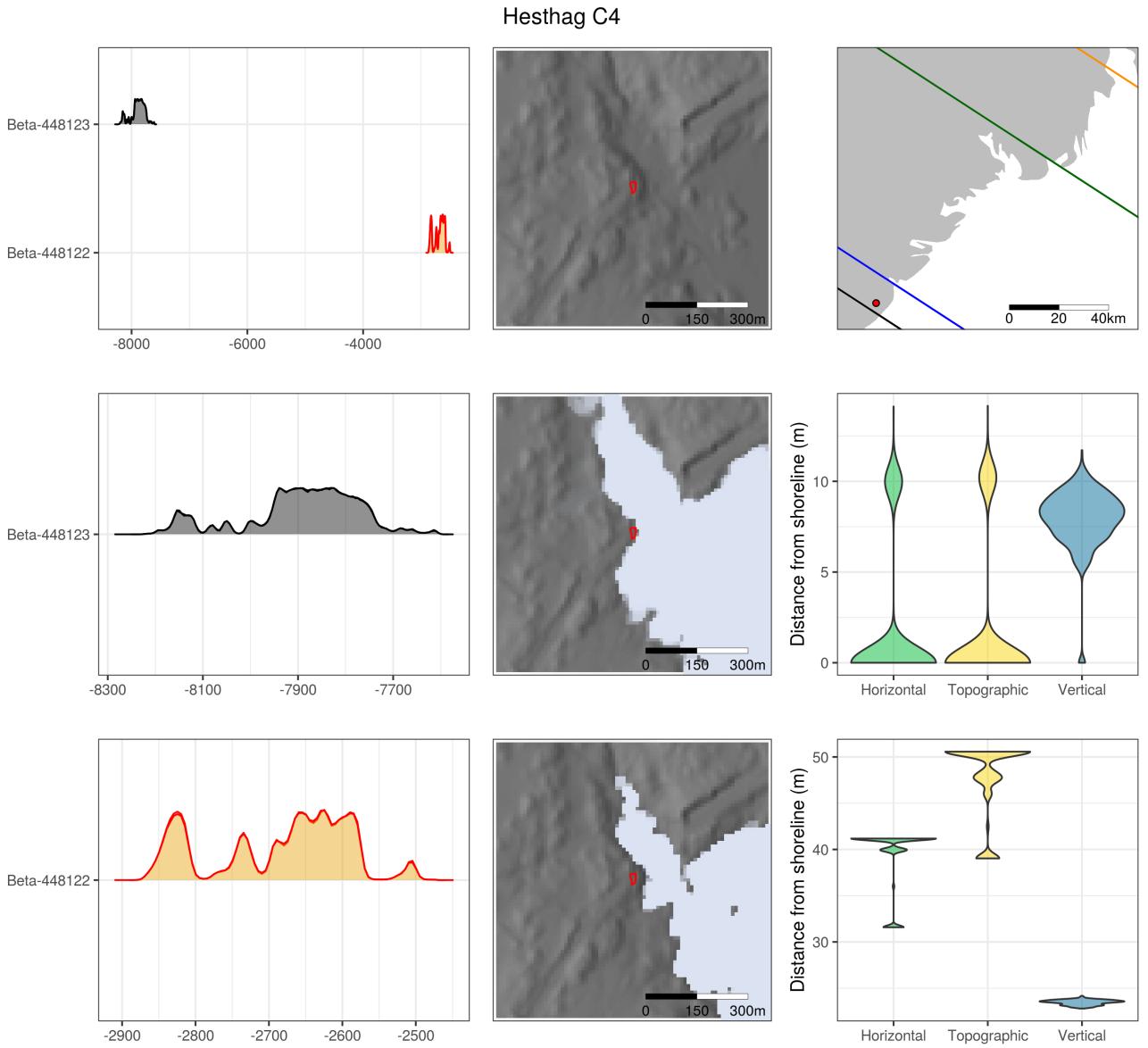
Along with Hegna vest 2 (above), Hegna vest 3 was situated where the highway runs today. The highway has been removed, and it would seem successfully so, as related to the sea-level adjustments. The ^{14}C -date to the Middle Mesolithic fits well with the lithic inventory (Eigeland and Fossum 2017a).



Hesthag C2 has seen repeated use, as evidenced both by ^{14}C -dates and the artefact inventory (Viken 2018a). While only a few finds can be typologically dated to the Late Mesolithic, these were deemed substantial enough to trust the two ^{14}C -dates to the period (Viken 2018a:271). No editing of the DTM was necessary.

Table 21: Hesttag C2

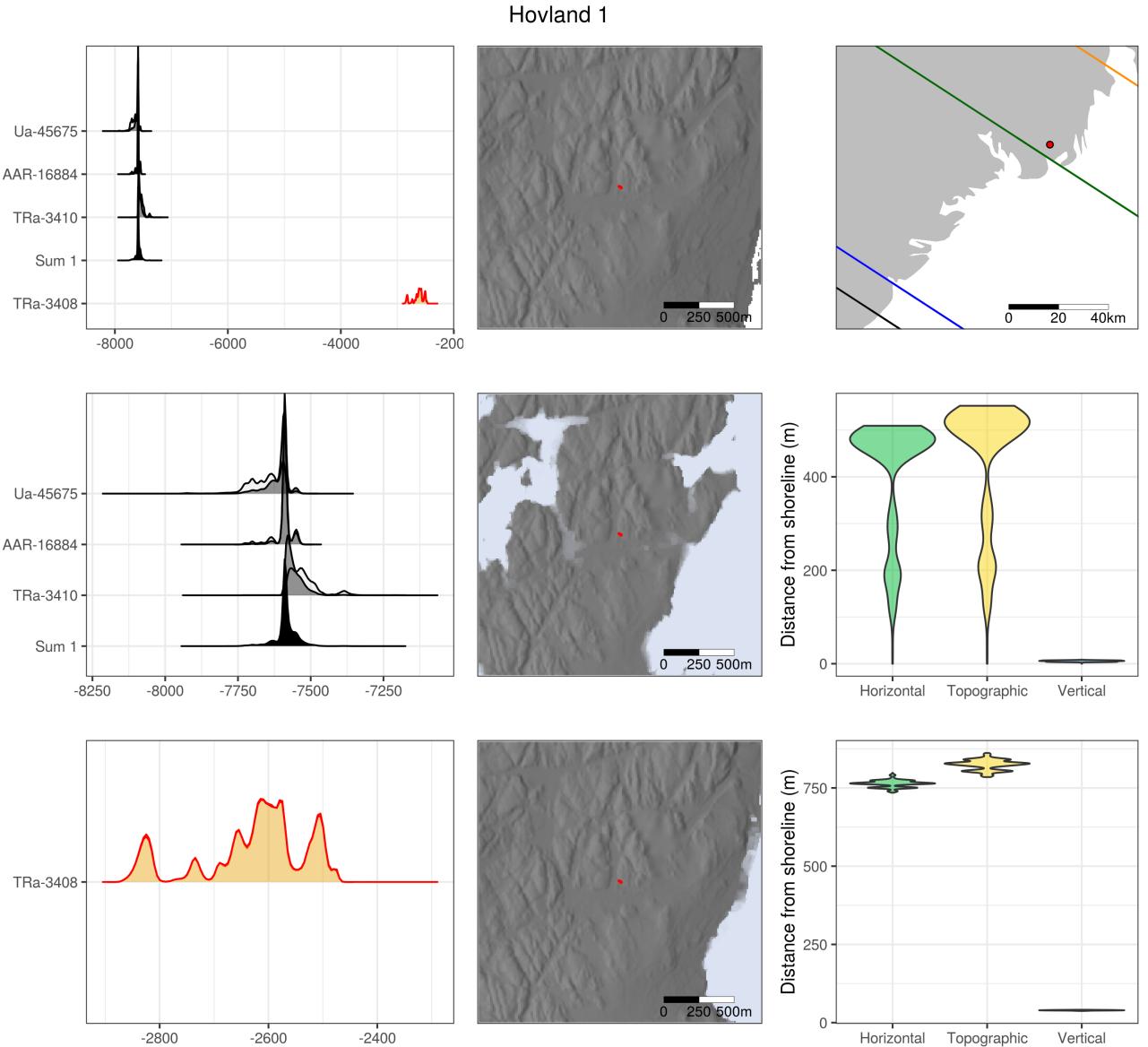
ID	^{14}C BP	Error	Material	Context
Ua-50970	6351	45	Oak (<i>Quercus</i>)	Fireplace (ID 2726)
Ua-50971	5172	44	Hazel (<i>Corylus</i>)	Fireplace (ID 2736)
Ua-50972	2182	30	Birch (<i>Betula</i>)	Fireplace (ID 4049)
Ua-50984	2143	32	Hazel (<i>Corylus</i>)	Cooking pit (ID 5366)
Ua-50973	1977	30	Birch (<i>Betula</i>)	Fireplace (ID 4063)
Ua-50974	1866	31	Birch (<i>Betula</i>)	Fireplace (ID 4224)



Typology and radiocarbon date match, and there are no modern disturbances in the vicinity of Hesttag C4 (Viken 2018b). The second ^{14}C -date is a reference date of charcoal from a context believed not to be anthropogenic.

Table 22: Hesttag C4

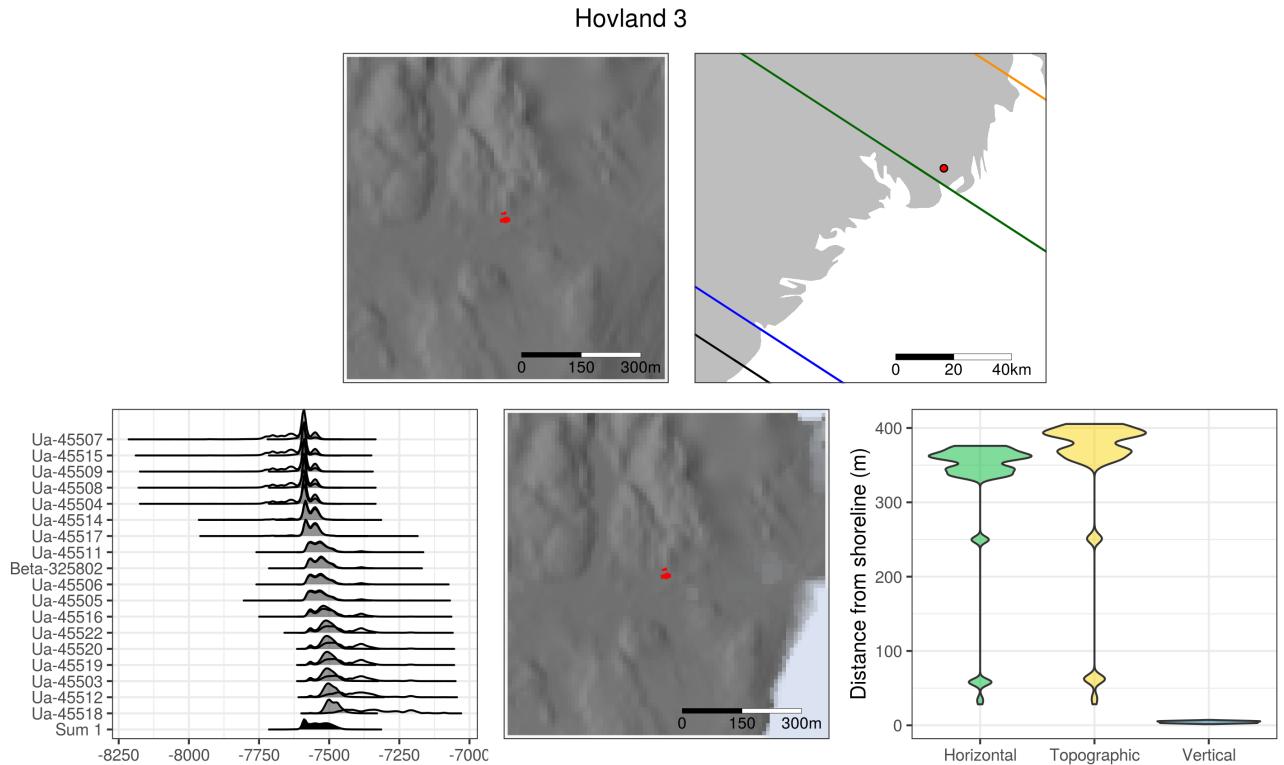
ID	^{14}C BP	Error	Material	Context
Beta-448123	8800	40	Pine (<i>Pinus</i>)	Cooking pit (ID 41178)
Beta-448122	4100	30	Birch (<i>Betula</i>)	Quadrant (993x863yNW)



It was noted in the report that it is uncertain how close to the shoreline Hovland 1 would have been situated, based on the ^{14}C -dates (Olsen 2013a). The earliest dates match the lithic inventory. The later date is the only indication of activity from the Early Bronze Age/Early Iron Age. The site is not located far from the highway, which was also edited for the analysis of Hovland 1 and 4, as well as Torstvet (see below). It could be noted that all of the Hovland sites and Torstvet (sites from the E18 Brunlanes project) are located at a relatively short vertical distance from the sea, but the terrain makes this result in quite high horizontal and topographic distances.

Table 23: Hovland 1

ID	¹⁴ C BP	Error	Material	Context
TRA-3410	8465	55	Hazel (<i>Corylus</i>)	Cooking pit (ID 4)
Ua-45675	8623	50	Aspen/willow (<i>Populus/Salix</i>)	Cooking pit (ID 4)
AAR-16884	8582	33	Birch resin (<i>Betula</i>) on microblade	Quadrant (172x159ySW, layer 2)
TRA-3408	4070	35	Hazel (<i>Corylus</i>), nutshell	Square (158x164y, layer 2)
TRA-3409	2435	35	Hazel (<i>Corylus</i>)	Cooking pit (ID 2)



Hovland 3 is securely dated both typologically and radiometrically (Solheim and Olsen 2013). The site located right by the highway, but this appears to have been successfully removed.

Table 24: Hovland 3

ID	^{14}C BP	Error	Material	Context
Ua-45507	8609	54	Birch (<i>Betula</i>)	Post hole (ID 13)
Ua-45515	8606	50	Hazel (<i>Corylus</i>), nutshell	Quadrant (99x66yNE, layer 2)
Ua-45509	8594	48	Birch (<i>Betula</i>)	Post hole? (ID 17)
Ua-45508	8591	50	Rowan (<i>Sorbus</i>)	Post hole (ID 14)
Ua-45504	8584	49	Birch (<i>Betula</i>)	Undefined feature (ID 24)
Ua-45514	8552	50	Rowan (<i>Sorbus</i>)	Dwelling structure (0-5 cm)
Ua-45517	8540	51	Hazel (<i>Corylus</i>), nutshell	Dwelling structure (10-15 cm)
Ua-45505	8467	53	Rowan (<i>Sorbus</i>)	Undefined feature (ID 23)
Ua-45511	8465	48	Birch (<i>Betula</i>)	Undefined/ditch/post hole (ID 18)
Ua-45506	8458	48	Rowan (<i>Sorbus</i>)	Cooking pit (ID 21)
Beta-325802	8450	40	Hazel (<i>Corylus</i>), nutshell	Quadrant (100x66yNE, layer 3)
Ua-45516	8428	50	Hazel (<i>Corylus</i>), nutshell	Dwelling structure (0-5 cm)
Ua-45522	8398	49	Hazel (<i>Corylus</i>), nutshell	Undefined/ditch/post hole (ID 18)
Ua-45520	8387	47	Hazel (<i>Corylus</i>), nutshell	Dwelling structure (30-35 cm)
Ua-45519	8383	47	Hazel (<i>Corylus</i>), nutshell	Dwelling structure (25-30 cm)
Ua-45503	8376	51	Birch (<i>Betula</i>)	Cooking pit (ID 25)
Ua-45512	8348	47	Birch (<i>Betula</i>)	Post hole (ID 7)
Ua-45518	8291	48	Hazel (<i>Corylus</i>), nutshell	Dwelling structure (20-25 cm)
Ua-45523	3423	34	Hazel (<i>Corylus</i>), nutshell	Post hole (ID 8)
Ua-45521	2674	32	Hazel (<i>Corylus</i>), nutshell	Stone packing (ID 15)
Ua-45502	2408	34	Hazel (<i>Corylus</i>)	Fireplace (ID 5)
Ua-45501	2188	33	Hazel (<i>Corylus</i>)	Fireplace (ID 27)
Ua-45510	1833	30	Birch (<i>Betula</i>)	Fireplace (ID 11)
Ua-45513	1334	30	Birch (<i>Betula</i>)	Quadrant (101x67ySW, layer 3)

Table 25: Hovland 4

ID	^{14}C BP	Error	Material	Context
Ua-45500	8747	64	Burnt bone	Quadrant (93x46yNW, layer 2)
Ua-45499	8630	49	Hazel (Corylus), nutshell	Quadrant (90x45ySW, layer 2)
Ua-45493	8568	51	Birch (Betula)	Cooking pit (ID 6)
Ua-45494	8526	52	Birch (Betula)	Fireplace (ID 1)
Ua-45495	3534	34	Hazel (Corylus)	Fireplace (ID 8)
Ua-45496	3016	32	Hazel (Corylus)	Fireplace (ID 10)
Ua-45497	2327	32	Hazel (Corylus)	Cooking pit (ID 14)
Ua-45492	2090	32	Birch/hazel (Betula/Corylus)	Fireplace (ID 3)
Ua-45498	1751	31	Hazel (Corylus), nutshell	Quadrant (101x59yNE, layer 2)

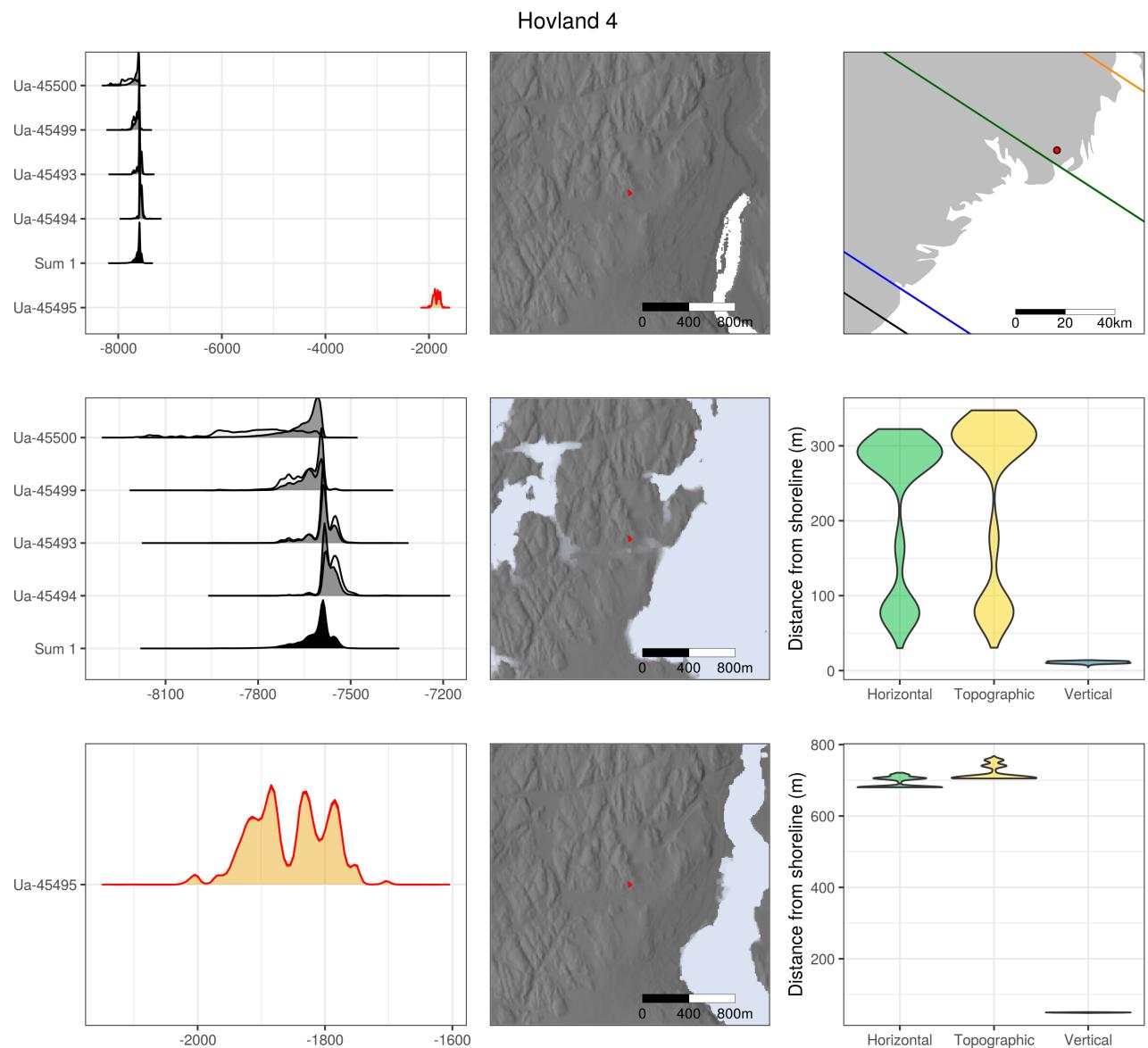
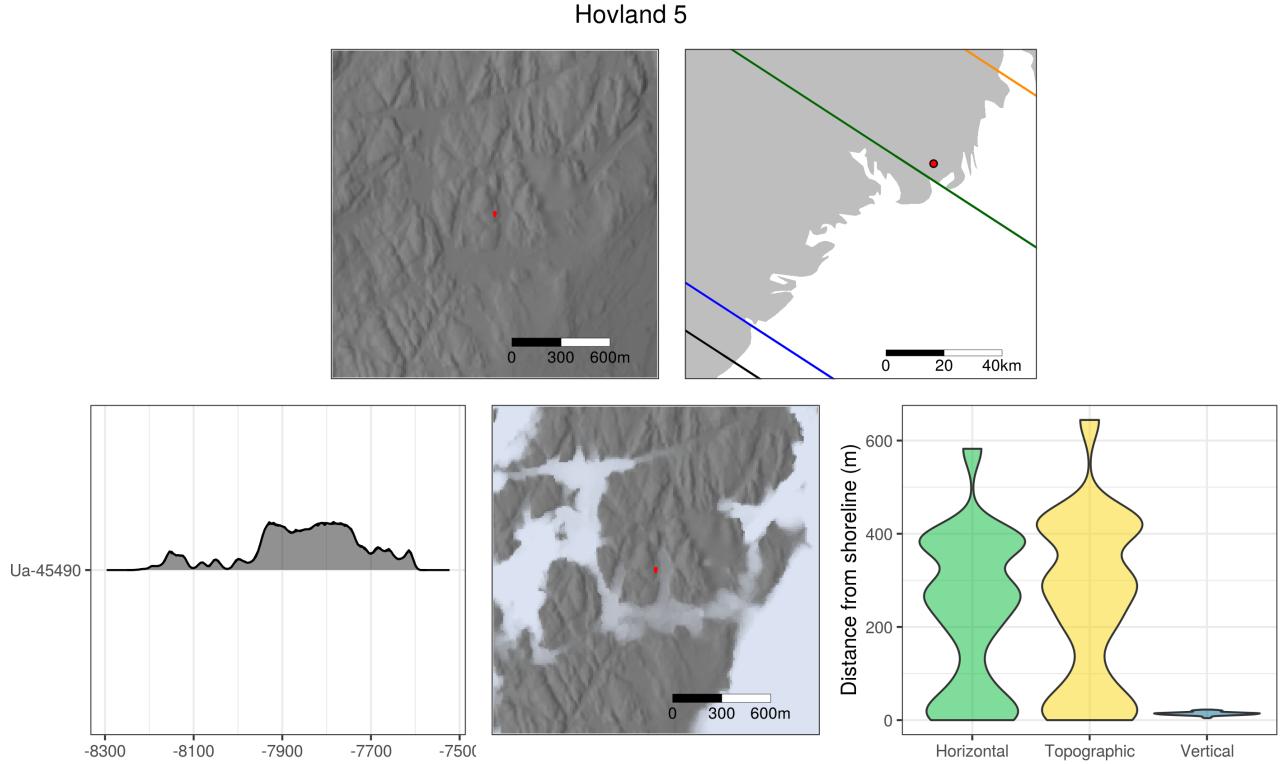


Table 26: Hovland 5

ID	^{14}C BP	Error	Material	Context
Ua-45490	8775	52	Hazel (<i>Corylus</i>), nutshell	Quadrant (66x104ySE, layer 2)
Ua-45491	2674	34	Hazel (<i>Corylus</i>), nutshell	Quadrant (67x104ySE, layer 1)

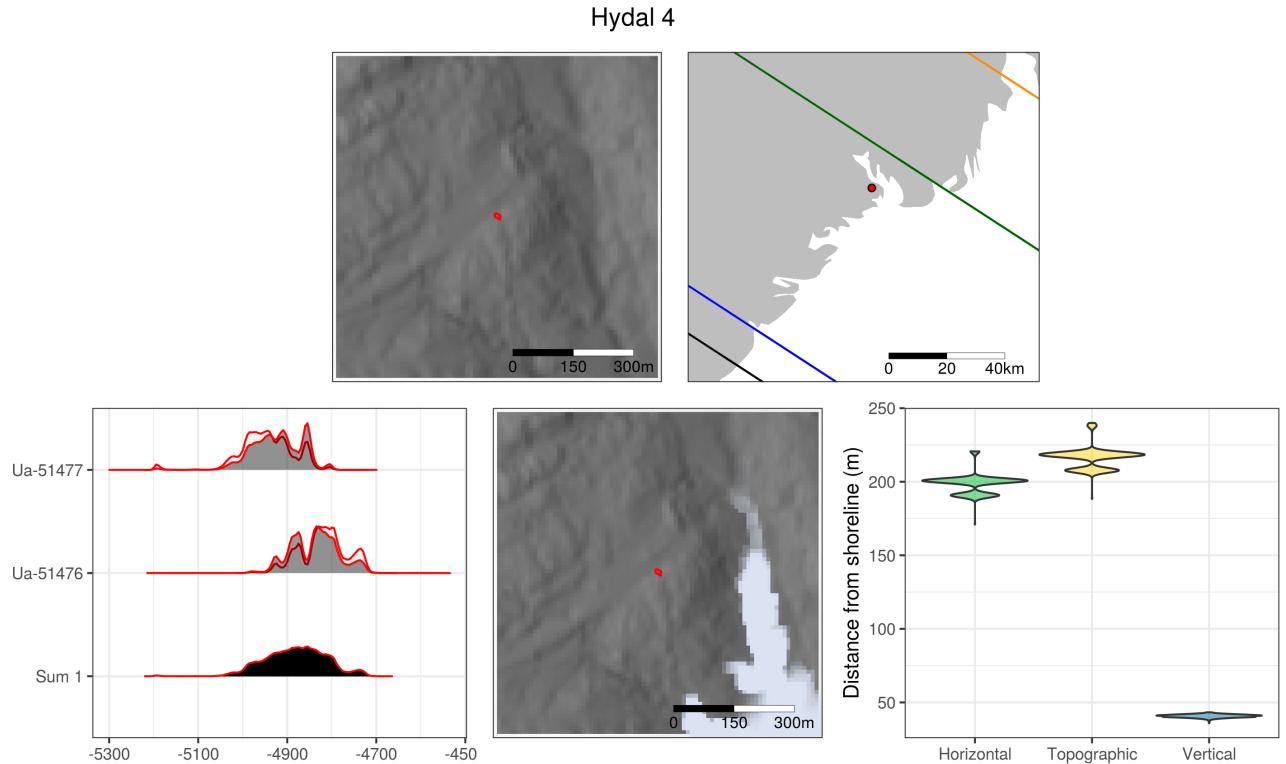
Hovland 4 is well-dated both typologically and with ^{14}C -dates to the Mesolithic (Mansrud 2013a). It has a similar location to that of Hovland 3 (above), and editing of the highway seems to have been successful.



Hovland 5 is situated more withdrawn from the highway than the other Hovland sites (above), and the DTM did therefore not require any editing. The site only has a single ^{14}C -date to the Stone Age, but this does match the typological indicators of the assemblage (Mansrud and Koxvold 2013).

Table 27: Hydal 4

ID	^{14}C BP	Error	Material	Context
Ua-51475	2064	33	Willow (Salix)	Grave, urn (ID 5442)
Ua-51476	5944	35	Oak (Quercus)	Fireplace (ID 5459)
Ua-51477	6049	36	Hazel (Corylus), nutshell	Square (107x604y, layer 2)
Ua-51478	2361	29	Burnt bone, human	Grave, urn (ID 5442)



The lithic inventory from Hydal 4 is distinctly Middle Mesolithic in character, and therefore does not match the ^{14}C -dates to the Late Mesolithic (Koxvold 2017a). The simulation of the sea-level does not appear impacted by any modern disturbances.

Krøgenes D1

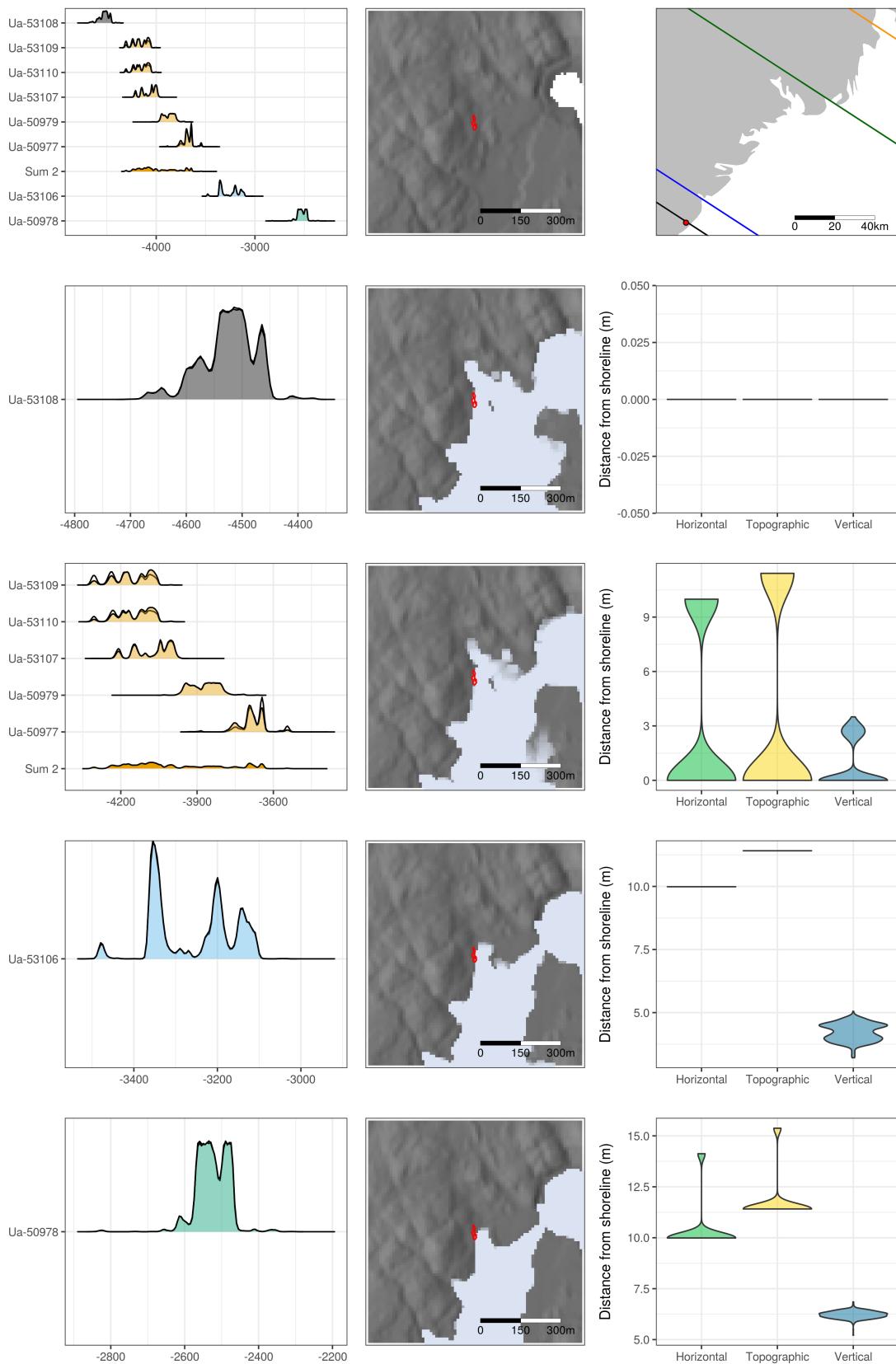


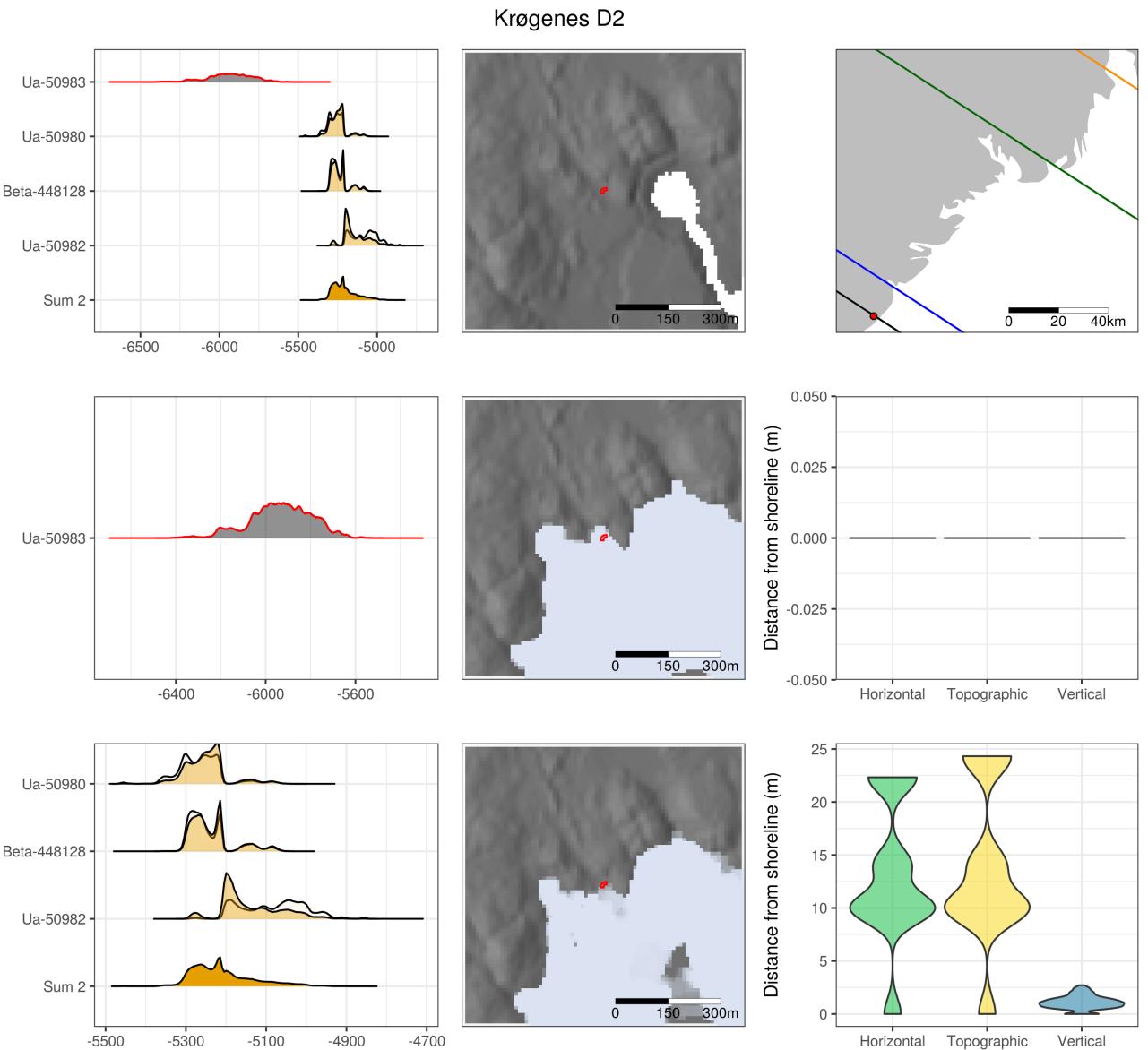
Table 28: Krøgenes D1

ID	^{14}C BP	Error	Material	Context
Ua-53108	5694	32	Ash (<i>Fraxinus</i>)	Cooking pit/fireplace (ID 204387)
Ua-53109	5351	31	Pine (<i>Pinus</i>)	Cooking pit/fireplace (ID 207098)
Ua-53110	5334	31	Pine (<i>Pinus</i>)	Cooking pit/fireplace (ID 207811)
Ua-53107	5249	31	Birch (<i>Betula</i>)	Posthole? (ID 204397)
Ua-50979	5082	40	Willow/alder (<i>Salix/Alnus</i>)	Ditch (ID 204424)
Ua-50977	4883	40	Willow/alder (<i>Salix/Alnus</i>)	Cooking pit/fireplace (ID 204413)
Ua-53106	4559	31	Pine (<i>Pinus</i>)	Ditch (ID 203549)
Ua-50978	4005	34	Ash (<i>Fraxinus</i>)	Cooking pit/fireplace (ID 206352)
Ua-50975	1641	30	Ash (<i>Fraxinus</i>)	Cooking pit/fireplace (ID 203533)

All ^{14}C -dates from Krøgenes D1 are believed to be related to use of the site, which has been reused multiple times over a long time-span (Reitan and Solberg 2018a). This is evidenced by the artefact inventory as well. To what degree the different dates are related to different or the same settlement phases is difficult to ascertain, but is here, as with for the rest of the sites, simply based on grouping dates overlapping with 99.7% probability. The site is situated around 100 meter from a road to the south, but this does not appear to impact simulation results, which is therefore left unedited in the DTM.

Table 29: Krøgenes D2

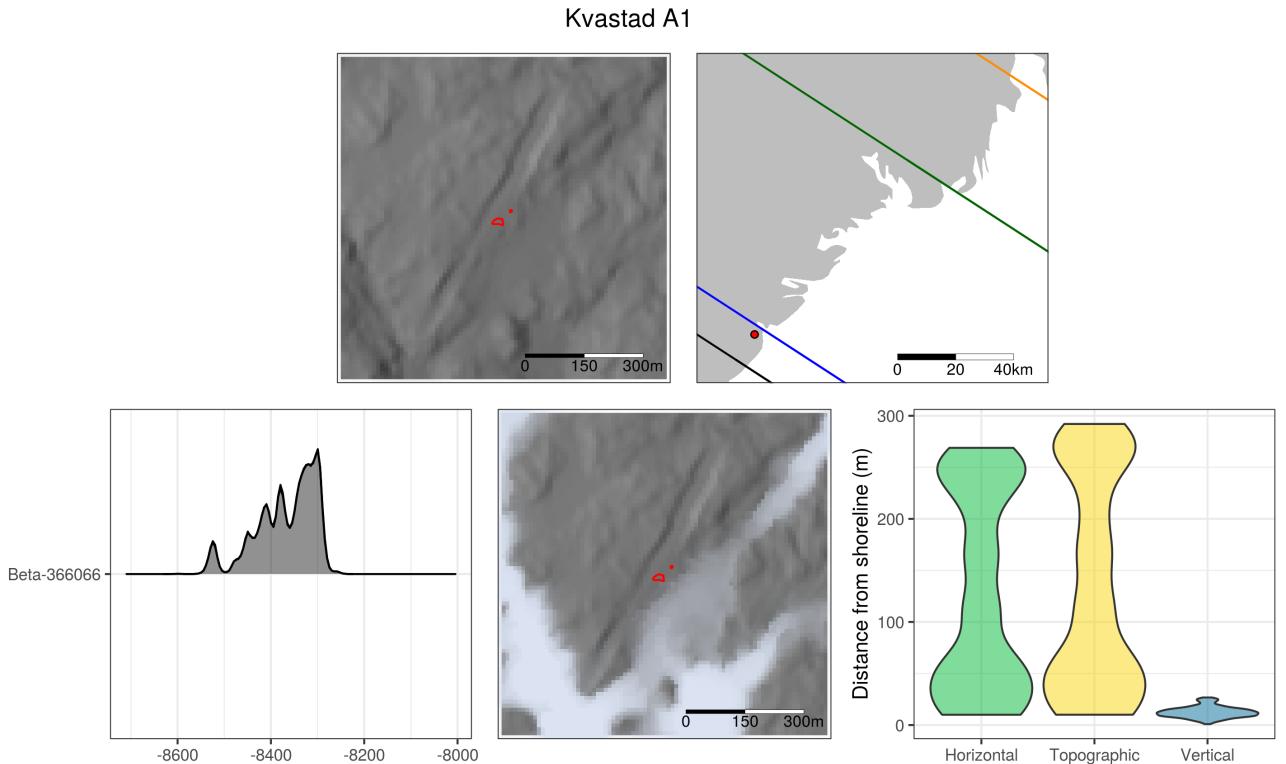
ID	^{14}C BP	Error	Material	Context
Ua-50983	7059	143	Pine (<i>Pinus</i>)	Stone packing (ID 206735)
Ua-50982	6132	45	Pine (<i>Pinus</i>)	Cultural layer (ID 206712)
Beta-448128	6260	30	Alder (<i>Alnus</i>)	Cultural layer (K2, sample ID 3102)
Ua-50980	6297	44	Pine (<i>Pinus</i>)	Cultural layer (ID 206712)
Ua-50981	3379	34	Birch (<i>Betula</i>)	Sand layer (ID 206652)
Beta-448127	1760	30	Hazel (<i>Corylus</i>)	Cultural/Cultivation layer (K1, sample ID 3646)



Dates match the artefact inventory of Krøgenes D2, with the exception of the oldest date which is not seen as relevant for the main occupation of the site, in part also due to the large error (Mansrud et al. 2018). The site location is similar to that of Krøgenes D1 (above), and did not require any editing of the DTM.

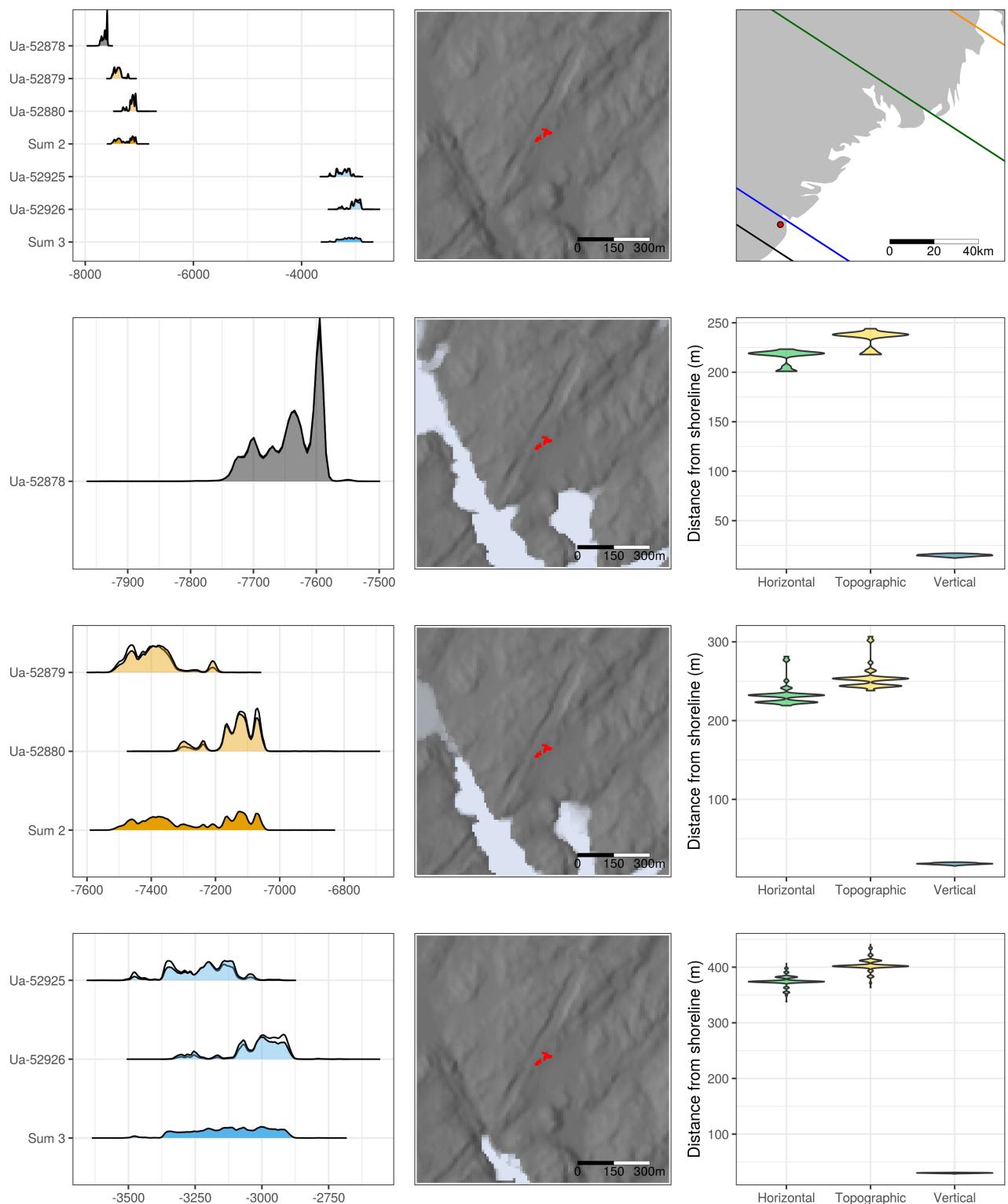
Table 30: Kvastad A1

ID	^{14}C BP	Error	Material	Context
Ua-53920	2400	30	Yew (<i>Taxus</i>)	Fireplace (ID 1108)
Ua-53921	2388	29	Indet.	Fireplace (ID 1108)
Ua-53918	2249	29	Alder (<i>Alnus</i>)	Fireplace (ID 1108)
Ua-53917	2176	29	Birch (<i>Betula</i>)	Fireplace (ID 1108)
Ua-53919	2164	29	Indet.	Fireplace (ID 1108)
Ua-52872	2264	27	Birch (<i>Betula</i>)	Fireplace (ID 1108)
Beta-366066	9150	40	Pine (<i>Pinus</i>)	Test pit (ID 20993)



^{14}C -date and lithic inventory at Kvastad A1 correspond with a date to the end of the Early Mesolithic (Stokke et al. 2018). The highway to north of the site is clearly visible on the DTM, but does not impact the simulation results.

Kvastad A2



The two find areas at Kvastad A2 are predominantly Mesolithic (to the south-west) and Neolithic (to the north-east) but were treated in combination here as one Mesolithic date was from the Neolithic area (Stokke

Table 31: Kvastad A2

ID	¹⁴ C BP	Error	Material	Context
Ua-52878	8625	35	Pine (Pinus)	Fireplace (ID 57753)
Ua-52879	8339	35	Pine (Pinus)	Fireplace (ID 57995)
Ua-52880	8130	34	Coniferous (Conif. indet.), cone seed scale	Undefined feature (ID 54075)
Ua-52925	4551	56	Hulless barley (<i>Hordeum vulgare</i> var. <i>nudum</i>)	Fireplace (ID 54643)
Ua-52926	4351	55	Emmer (<i>Hordeum vulgare</i> var. <i>nudum</i>)	Fireplace (ID 54643)
Ua-52875	3464	28	Hulless barley (<i>Hordeum vulgare</i> var. <i>nudum</i>)	Fireplace (ID 54643)
Ua-52876	3477	28	Oat (<i>Avena</i> sp.)	Fireplace (ID 54643)
Ua-52877	3470	29	Oat (<i>Avena</i> sp.)	Fireplace (ID 54643)
Ua-52874	3431	28	Oat (<i>Avena</i> sp.)	Cultivation layer (ID 53485)

Table 32: Kvastad A4

ID	¹⁴ C BP	Error	Material	Context
Ua-52887	2395	27	Ash (<i>Fraxinus</i>)	Cooking pit (ID 153273)
Ua-52882	809	26	Oak (<i>Quercus</i>)	Fireplace (ID 150637)
Ua-52886	1100	26	Pine (Pinus)	Trench profile (ID 153311)
Beta-366067	8760	40		Test pit (ID 21410)

and Reitan 2018a). There is also a late Neolithic element in the lithic inventory that is not reflected in the ¹⁴C-dates. As with Kvastad A1 (above) the highway runs north of the site, clearly visible on the DTM, but does not impact the simulation results.

Kvastad A4

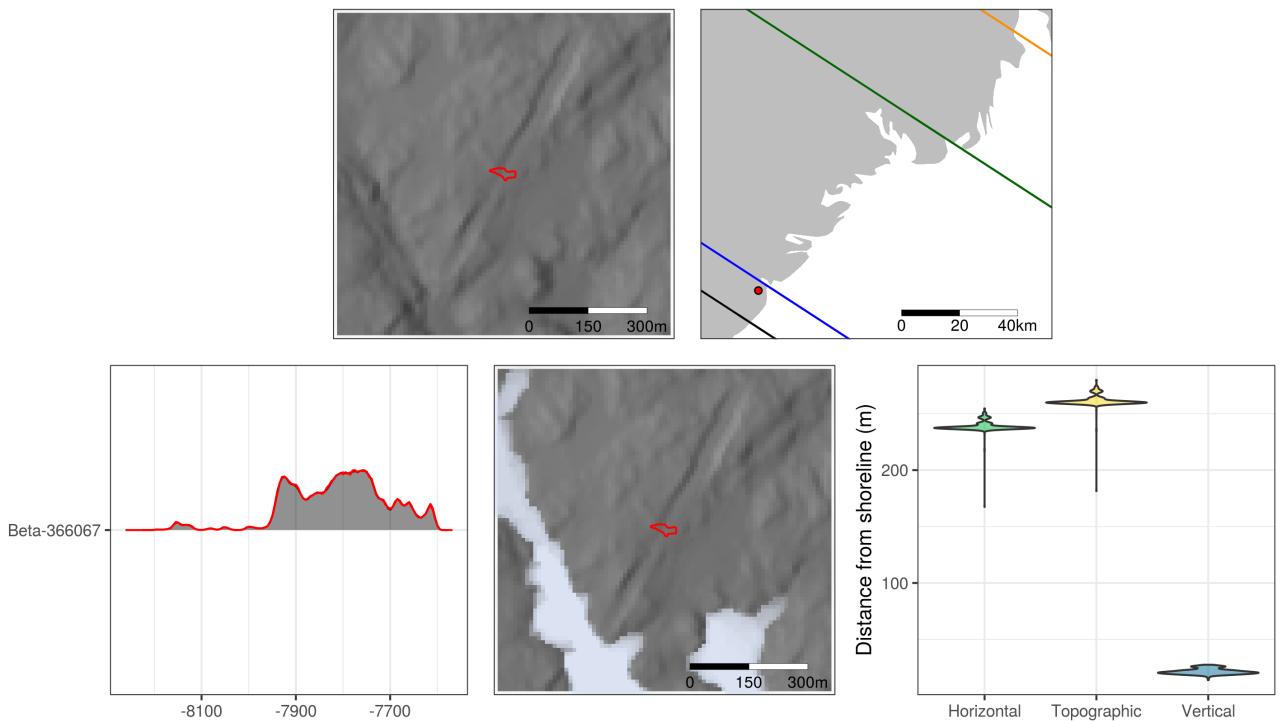
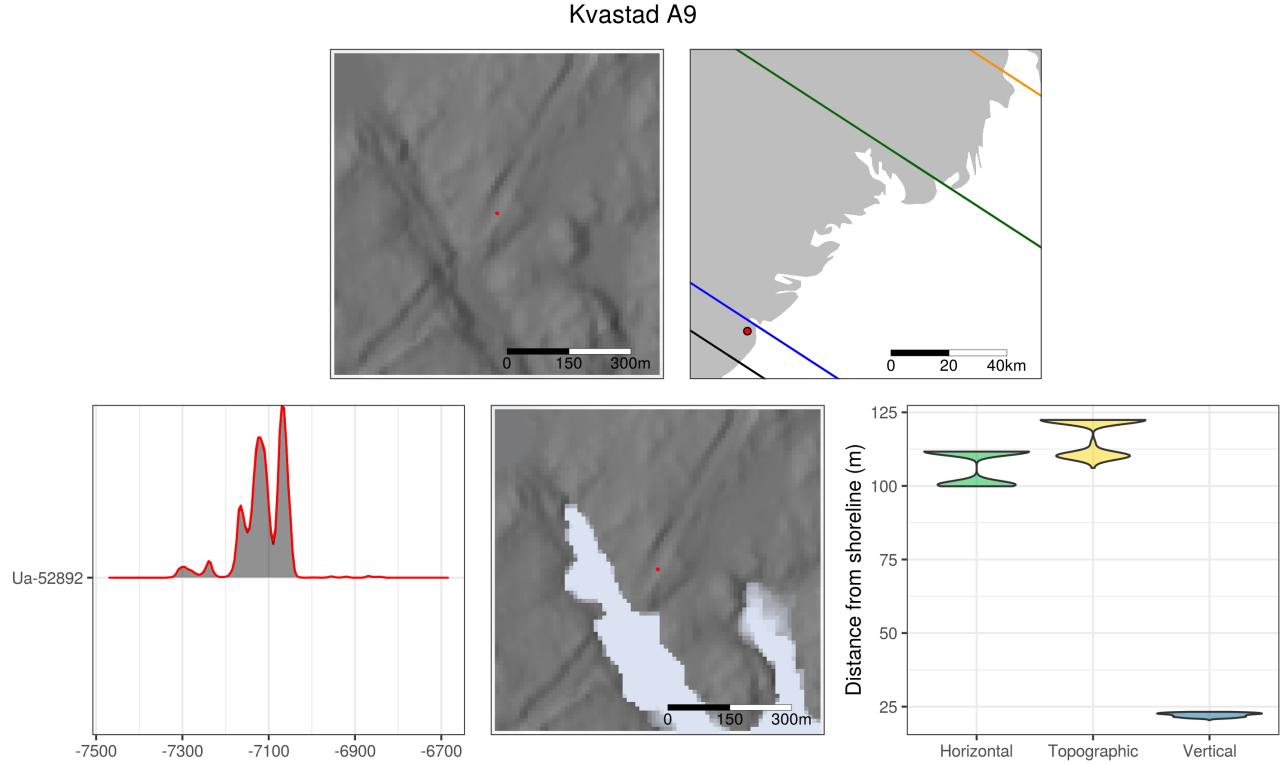


Table 33: Kvastad A9

ID	^{14}C BP	Error	Material	Context
Ua-52891	2476	27	Oak (<i>Quercus</i>)	Fireplace (ID 400076)
Ua-52892	8119	34	Pine (<i>Pinus</i>)	Stone packing (ID 400159)
Ua-52893	3187	28	Pine (<i>Pinus</i>)	Fireplace (ID 400180)

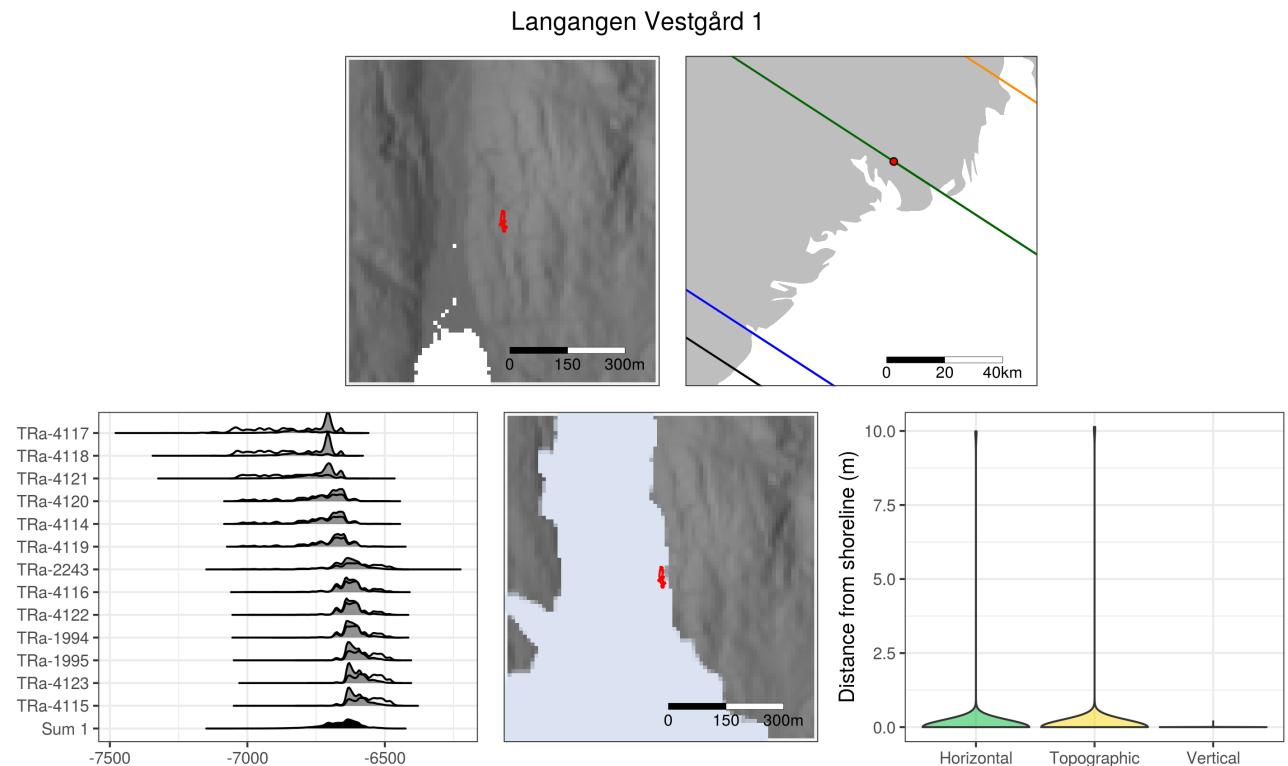
While there are a few elements of the lithic inventory from Kvastad A4 that could be related to the late Middle Mesolithic ^{14}C -date, it is not related to the main visits to the site, which are Early Mesolithic in character (Darmark et al. 2018). The highway runs over the site today, but this is not relevant for the shore-line reconstruction done here.



The Stone Age date from Kvastad A9 is not related to the Early Mesolithic assemblage (Darmark 2018a). The highway running by the site does not seem relevant to the simulation results.

Table 34: Langangen Vestgård 1

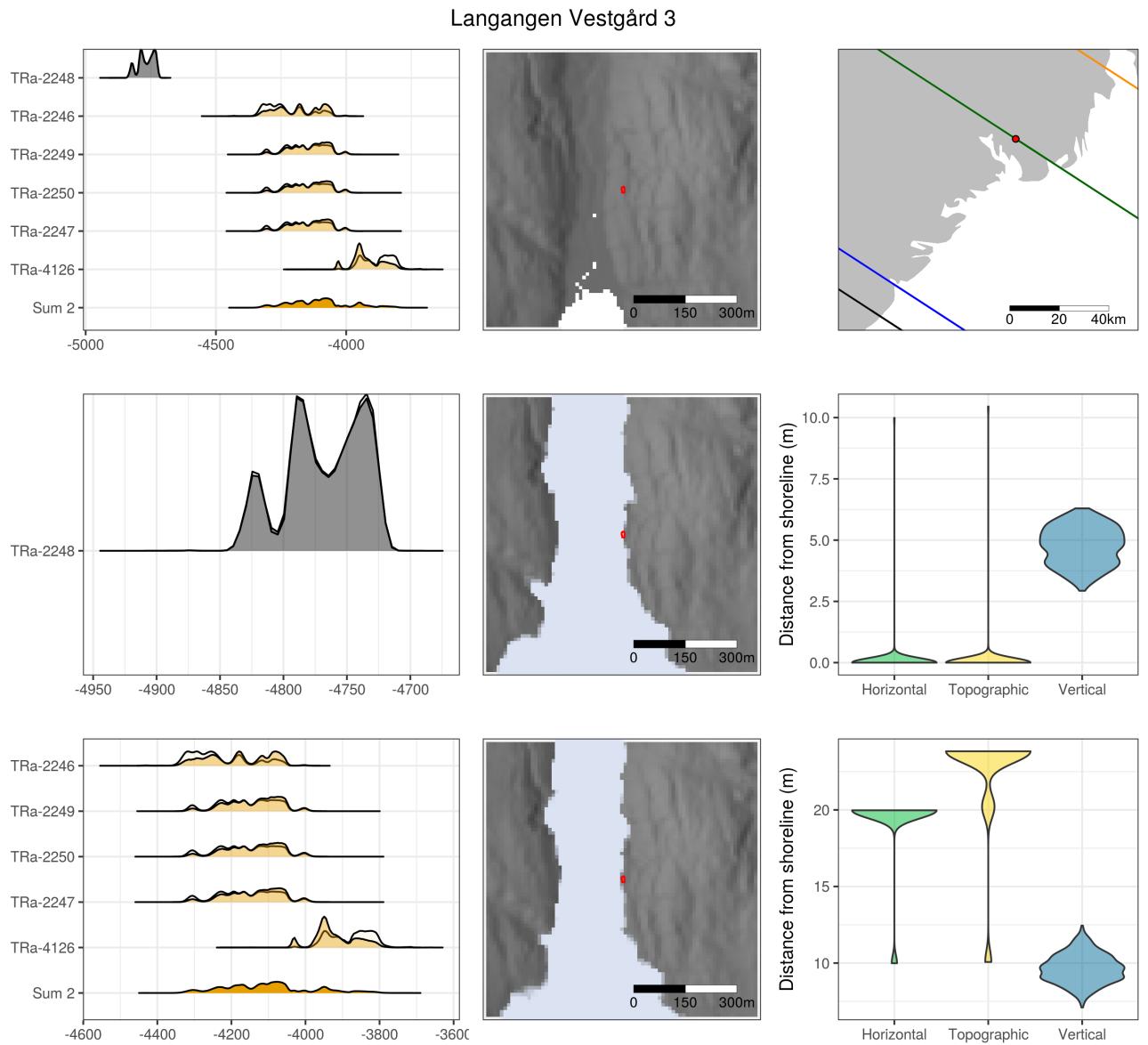
ID	^{14}C BP	Error	Material	Context
TRa-1994	7785	40	Burnt bone	Quadrant (579x937ySW, layer 2)
TRa-1995	7760	40	Burnt bone	Quadrant (580x938yNE, layer 2)
TRa-2243	7780	70	Pine (Pinus)	Floor layer (ID 1)
TRa-4114	7870	45	Birch/rowan (Betula/Sorbus)	Cooking pit (ID 3600)
TRa-4115	7740	45	Hazel (Corylus)	Cooking pit (ID 3601)
TRa-4116	7800	45	Hazel (Corylus)	Cooking pit (ID 4044)
TRa-4117	8030	55	Pine (Pinus)	Cooking pit (ID 4286)
TRa-4118	8005	45	Willow (Salix)	Undefined feature (ID 6)
TRa-4119	7850	45	Birch/hazel (Betula/Corylus)	Undefined feature (ID 8a)
TRa-4120	7875	45	Hazel (Corylus)	Undefined feature (ID 13)
TRa-4121	7945	45	Birch/willow (Betula/Salix)	Undefined feature (ID 12)
TRa-4122	7795	40	Burnt bone	Quadrant (583x929yNE, layer 1+2)
TRa-4123	7745	35	Burnt bone	Quadrant (589x931yNE, layer 2)



Langangen Vestgård 1 is a securely dated site with both ^{14}C -dates and typology (Melvold and Eigeland 2014). No modern disturbances appear relevant for the sea-level adjustment.

Table 35: Langangen Vestgård 3

ID	^{14}C BP	Error	Material	Context
TRa-2245	1080	30	Birch (Betula)	Cooking pit (ID 1640)
TRa-2246	5400	55	Pine (Pinus)	Cooking pit (ID 1600)
TRa-2247	5325	50	Pine (Pinus)	Cooking pit (ID 1600)
TRa-2248	5910	10	Pine (Pinus)	Cooking pit (ID 1664)
TRa-4126	5095	40	Pine (Pinus)	Cooking pit (ID 1664)
TRa-2249	5325	45	Birch (Betula)	Cooking pit (ID 1700)
TRa-2250	5325	50	Birch (Betula)	Cooking pit (ID 1700)

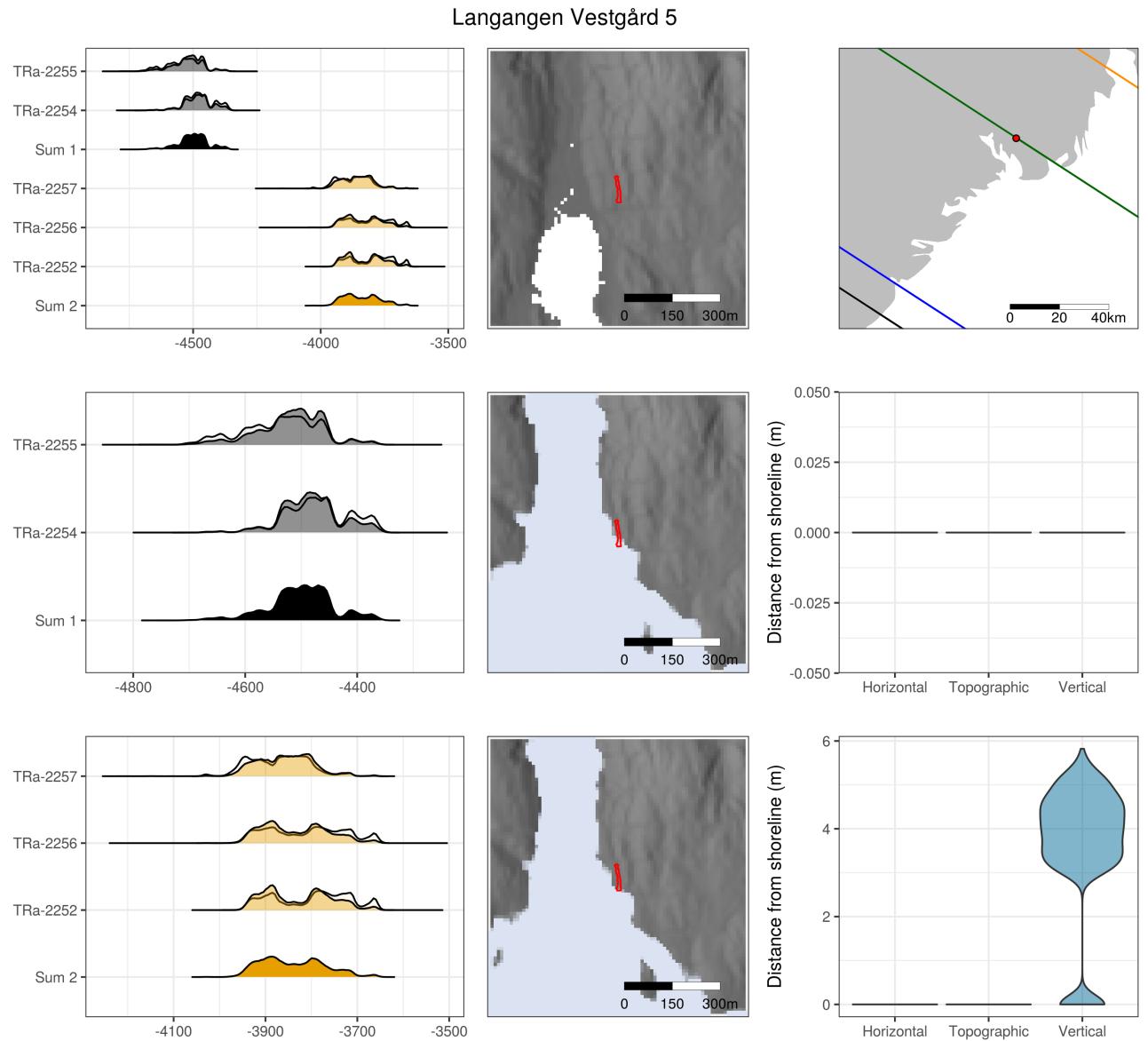


Typology of the site inventory from Langangen Vestgård 3 match the ^{14}C -date (Eggen 2014a). Typological indicators are too coarse to offer any insight on the division into two phases done here for the ^{14}C -dates (see

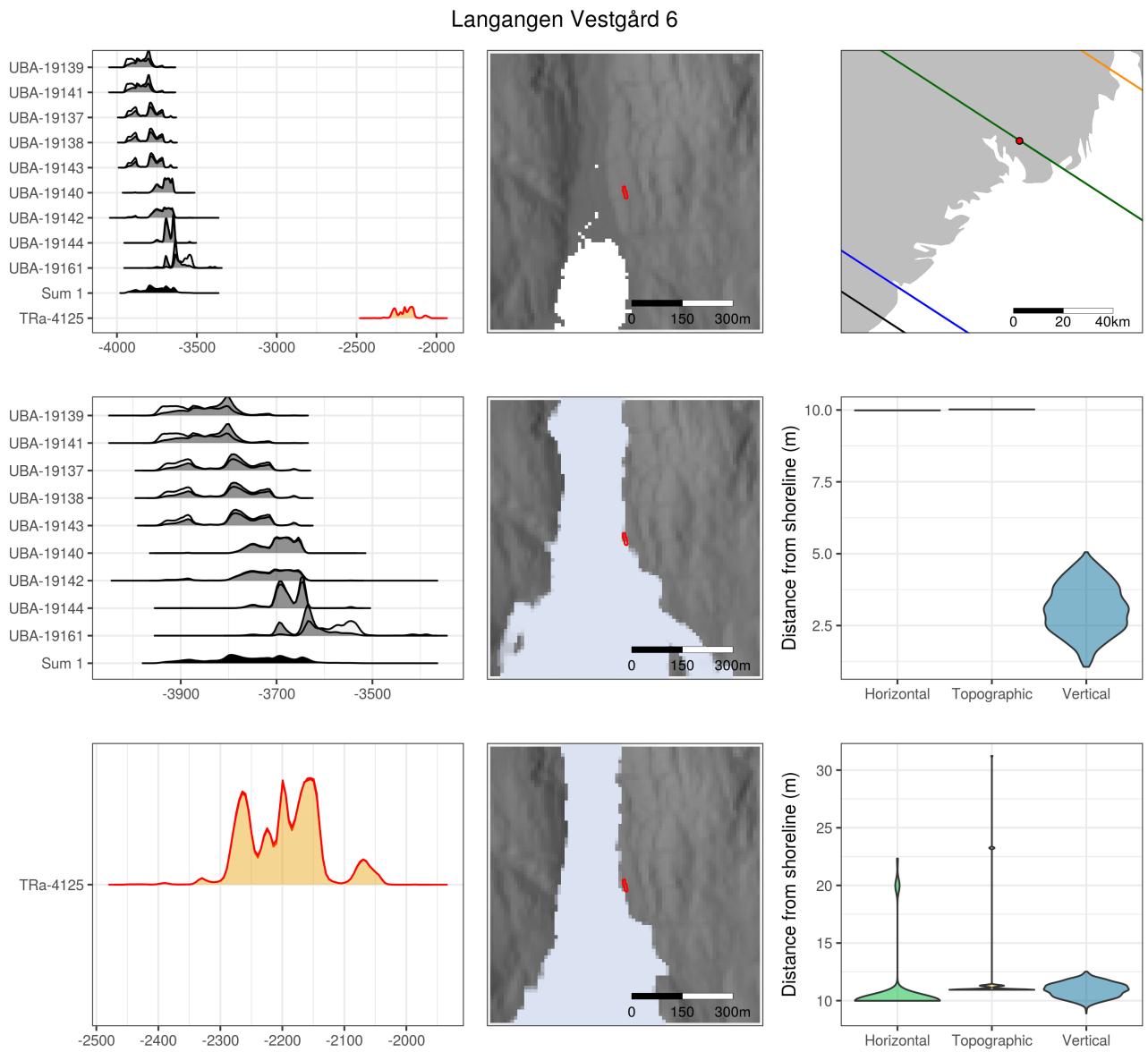
Table 36: Langangen Vestgård 5

ID	¹⁴ C BP	Error	Material	Context
TRa-2255	5695	50	Pine (<i>Pinus</i>)	Cooking pit (ID 2800)
TRa-2254	5645	45	Birch/willow (<i>Betula/Salix</i>)	Cooking pit (ID 2821)
TRa-2257	5085	50	Birch/linden (<i>Betula/Tilia</i>)	Cooking pit/fireplace (ID 395)
TRa-2256	5015	55	Birch/willow/rowan (<i>Betula/Salix/Sorbus</i>)	Cooking pit (ID 2300)
TRa-2252	5005	45	Birch/willow/rowan (<i>Betula/Salix/Sorbus</i>)	Cooking pit (ID 2329)
UBA-19135	3066	25	Birch (<i>Betula</i>)	Cooking pit? (ID 5316)
TRa-2253	2255	45	Birch/hazel/willow/rowan (<i>Betula/Corylus/Salix/Sorbus</i>)	Cultural layer? (ID 352)
UBA-19136	1819	26	Ash (<i>Fraxinus</i>)	Fireplace (ID 3369)
TRa-2251	1785	35	Birch/hazel (<i>Betula/Corylus</i>)	Fireplace (ID 350)
TRa-2258	1785	35	Birch/hazel (<i>Betula/Corylus</i>)	Charcoal/406x46ySWSE,layer 2 (ID 2328)
TRa-1996	100	30	Burnt bone, mammal (1.6g)	Quadrant (369x55yNW, layer 2)

main text). No editing of the DTM was necessary.



Langangen Vestgård 5. Typology match the ^{14}C -dates and a division into two settlement phases, one Late Mesolithic and one Early Neolithic (Reitan 2014c). No editing of the DTM deemed necessary.



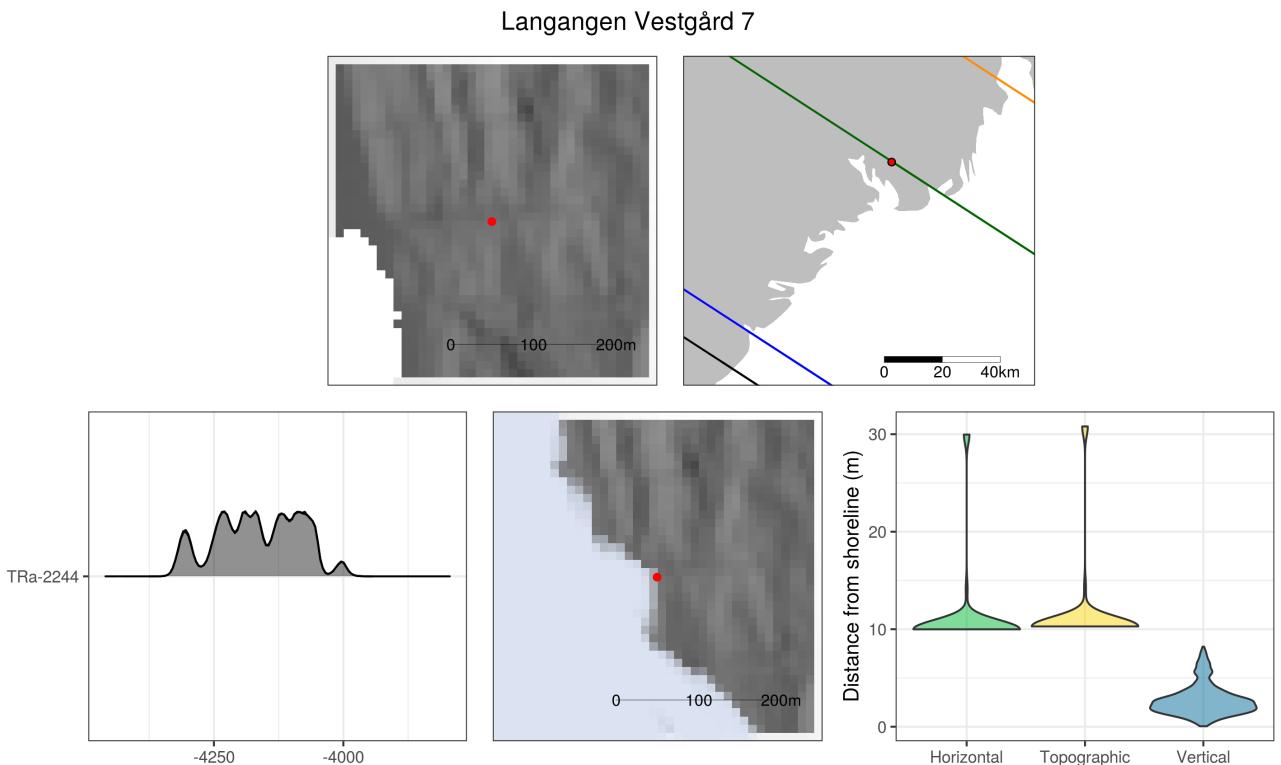
Pottery and the lithic inventory of Langangen Vestgård 6 match ^{14}C -dates to the Early Neolithic (Reitan 2014d). Nothing in the artefact inventory could be related to the Late Neolithic date. The DTM did not require editing.

Table 37: Langangen Vestgård 6

ID	^{14}C BP	Error	Material	Context
UBA-19139	5057	28	Birch (Betula)	Cooking pit (ID 2045)
UBA-19141	5055	27	Birch/aspen (Betula/Populus)	Cooking pit? (ID 214)
UBA-19137	5021	28	Birch (Betula)	Cooking pit (ID 1732)
UBA-19138	5017	29	Birch (Betula)	Cooking pit (ID 2000)
UBA-19143	5010	27	Hazel (Corylus)	Cooking pit (ID 1886)
UBA-19142	4939	47	Birch/hazel (Betula/Corylus)	Undefined feature (ID 572)
UBA-19140	4931	31	Birch (Betula)	Fireplace (ID 1776)
UBA-19144	4891	31	Birch/willow (Betula/Salix)	Cooking pit (ID 163, east)
UBA-19161	4813	46	Birch (Betula)	Cooking pit (ID 2032)
TRa-4125	3775	30	Burnt bone, beaver (Castor)	Quadrant (61x890yNE, layer 1)

Table 38: Langangen Vestgård 7

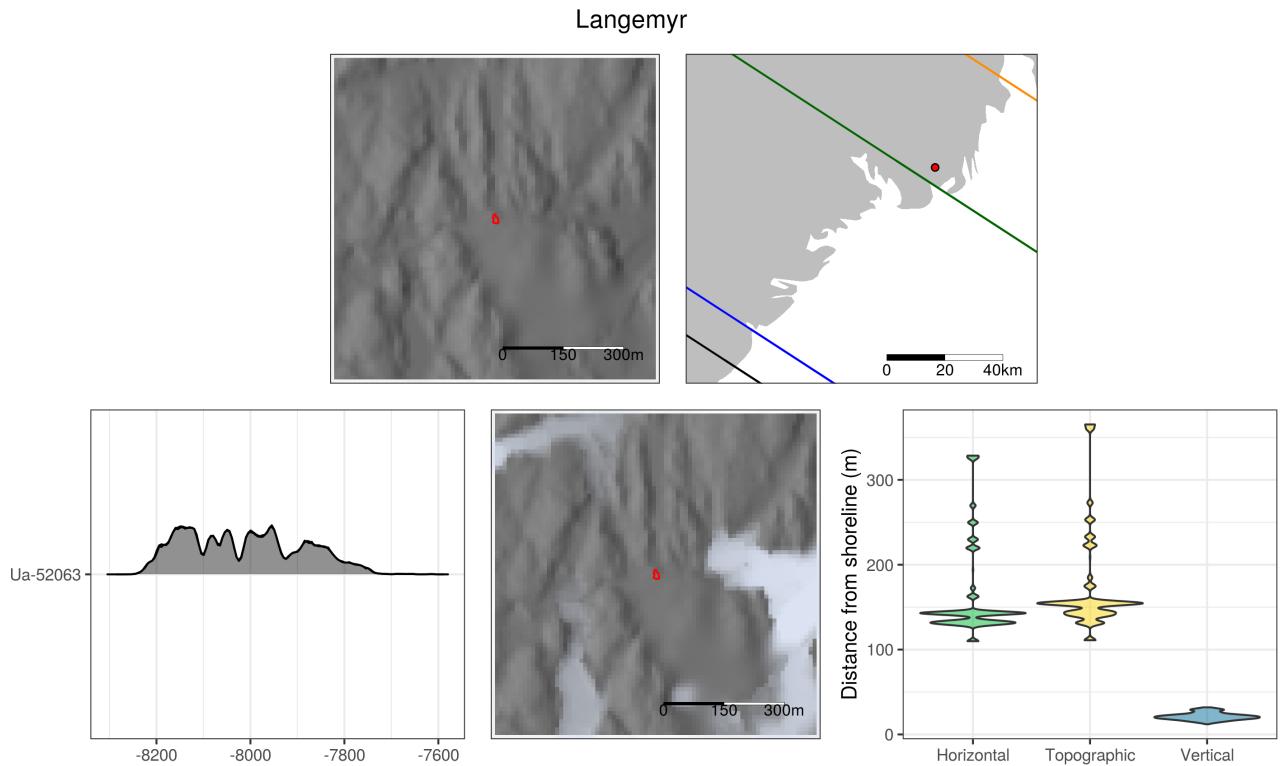
ID	^{14}C BP	Error	Material	Context
TRa-2244	5335	50	Birch/willow (Betula/Salix)	Cooking pit (ID 214)



Langangen Vestgård 7 is represented by a cooking pit found on one of two terraces scattered with lithics that was not known and not originally part of the excavation project (Reitan 2014e). The site was therefore only investigated to a limited degree. However, the material does typologically match the ^{14}C -date.

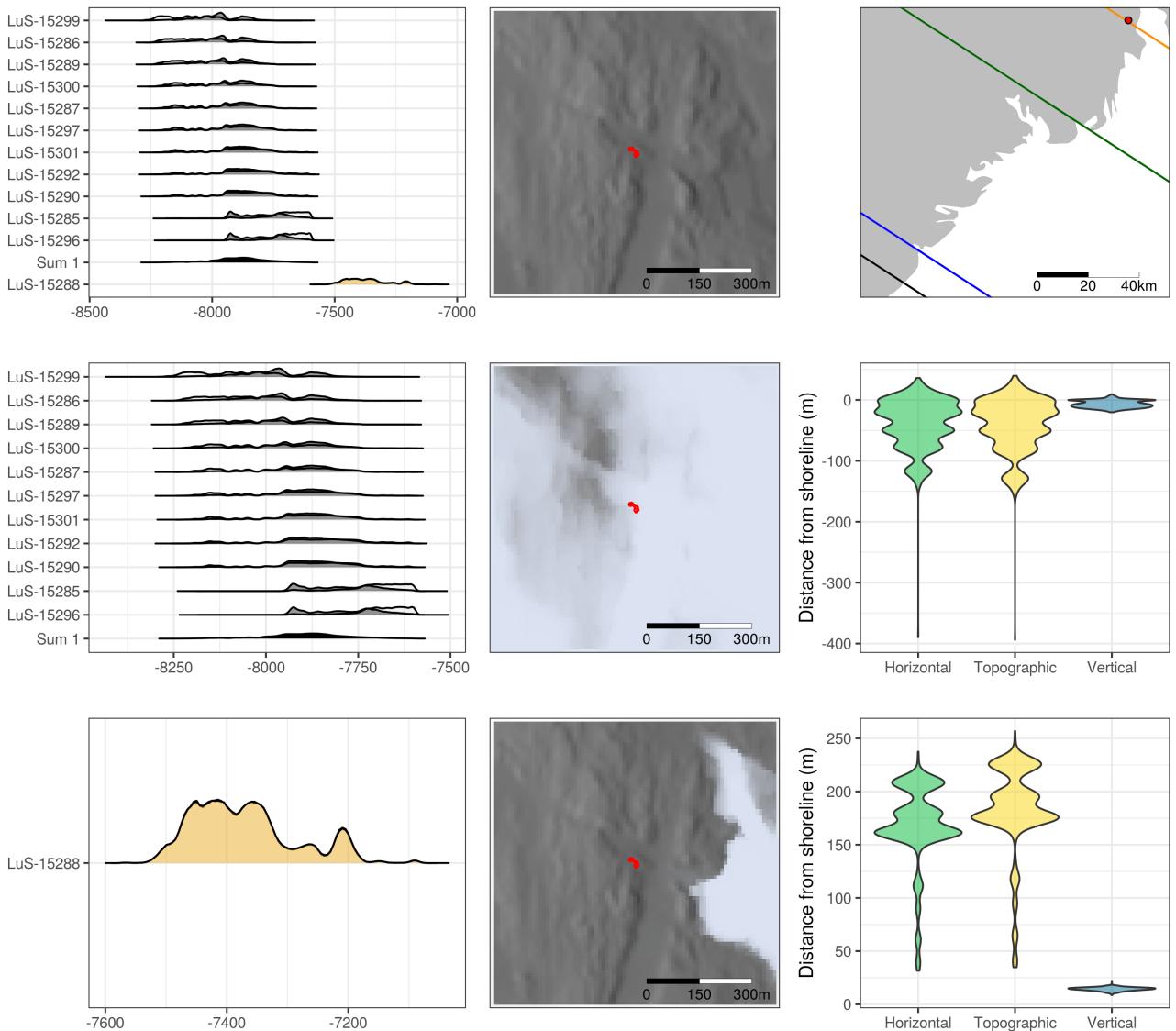
Table 39: Langemyr

ID	^{14}C BP	Error	Material	Context
Ua-52063	8853	43	Hazel (<i>Corylus</i>), nutshell	Quadrant (60x102y, layer 2)



Langemyr is typologically and radiometrically dated to the Middle Mesolithic (Koxvold 2018a). A construction area just south the site was removed. This is the same highway-project and raster editing that was done for some of the Hovland sites above.

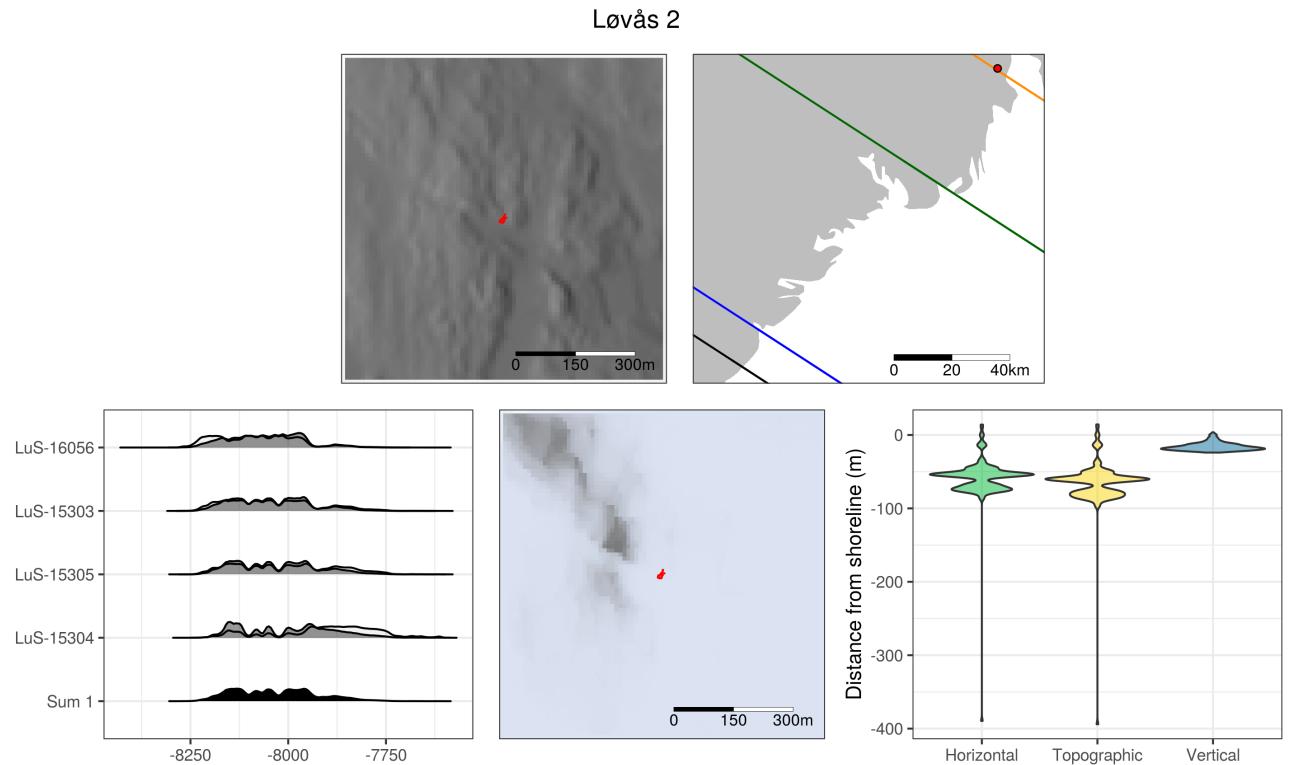
Løvås 1



The artefact inventory from Løvås 1 matches the radiocarbon dates (Reitan and Hårstad 2022). No editing of the raster appeared to be necessary. Interestingly only the Løvås sites were simulated to be situated beneath the sea-level. The typologically secure inventory combined with the many overlapping dates from various features does indicate that the issue is with the displacement curve and not the dating of the site (see also main text). Similar situation to that on Løvås 2 and 3 (below).

Table 40: Løvås 1

ID	¹⁴ C BP	Error	Material	Context
LuS-15299	8920	50	Hazel (<i>Corylus</i>), nutshell	Cultural layer (ID 50), sample (ID 100094)
LuS-15286	8880	45	Hazel (<i>Corylus</i>), nutshell	Cultural layer, dwelling structure? (ID 10693)
LuS-15289	8865	45	Hazel (<i>Corylus</i>), nutshell	Cultural layer, dwelling structure? (ID 10693)
LuS-15300	8840	45	Hazel (<i>Corylus</i>), nutshell	Cultural layer (ID 51), sample (ID 100097)
LuS-15287	8825	45	Hazel (<i>Corylus</i>), nutshell	Cultural layer, dwelling structure? (ID 10693)
LuS-15297	8815	45	Hazel (<i>Corylus</i>), nutshell	Fireplace (ID 26606)
LuS-15301	8805	45	Hazel (<i>Corylus</i>), nutshell	Cultural layer (ID 51), sample (ID 100108)
LuS-15292	8790	50	Pome fruit tree (Pomoideae)	Fireplace (ID 11838)
LuS-15290	8790	45	Pine (<i>Pinus</i>)	Fireplace (ID 11804)
LuS-15285	8690	45	Willow (<i>Salix</i>)	Fireplace (ID 8849)
LuS-15296	8675	45	Pine (<i>Pinus</i>)	Fireplace (ID 24085)
LuS-15288	8315	45	Willow (<i>Salix</i>)	Cultural layer, dwelling structure? (ID 10693)
LuS-15295	2220	35	Hazel (<i>Corylus</i>)	Fireplace (ID 24057)
LuS-15293	2205	40	Hazel (<i>Corylus</i>)	Fireplace (ID 21143)
LuS-15294	2190	40	Hazel (<i>Corylus</i>)	Fireplace (ID 21167)
LuS-15298	1570	35	Oak (<i>Quercus</i>)	Fireplace (ID 27064)
LuS-15291	875	35	Oak (<i>Quercus</i>)	Fireplace (ID 11818)
LuS-15302	500	35	Pine (<i>Pinus</i>)	Square (828x208y), sample (ID 100086)



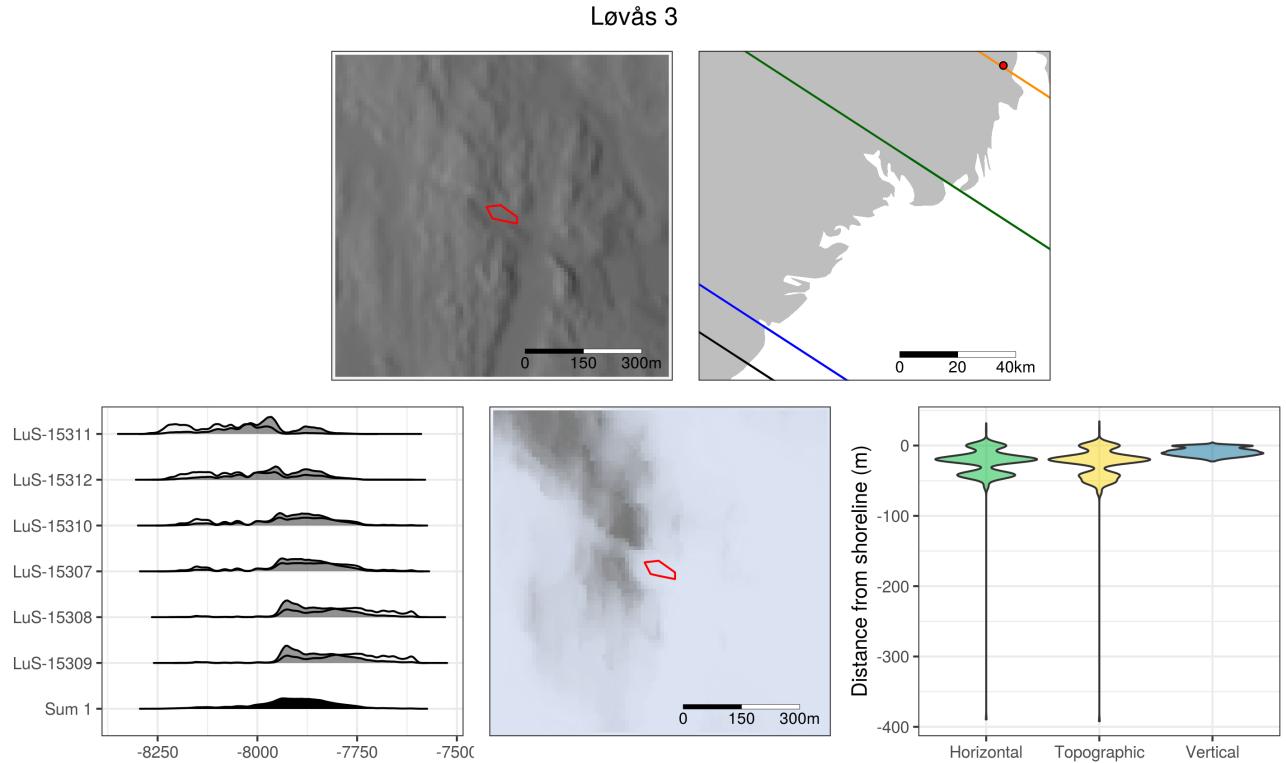
The artefact inventory from Løvås 2 matches the radiocarbon dates (Reitan and Hårstad 2022). Similar setting to that of Løvås 1 and 3 (above and below).

Table 41: Løvås 2

ID	¹⁴ C BP	Error	Material	Context
LuS-16056	8910	50	Burnt bone, reindeer (<i>Rangiferus tarandus</i>)	Square (913x202ySW, layer 1), sample (ID 100059)
LuS-15303	8870	45	Hazel (<i>Corylus</i>), nutshell	Square (915x203yNW, layer 2), sample (ID 100072)
LuS-15305	8850	45	Hazel (<i>Corylus</i>), nutshell	Square (914x203ySW, layer 2), sample (ID 100074)
LuS-15304	8805	45	Hazel (<i>Corylus</i>), nutshell	Square (913x206yNW, layer 2), sample (ID 100073)
LuS-15692	2355	35	Hazel (<i>Corylus</i>), nutshell	Square (916x208yNW, layer 1)
LuS-15690	2330	35	Hazel (<i>Corylus</i>), nutshell	Square (912x207yNW, layer 1)
LuS-15688	2220	35	Hazel (<i>Corylus</i>), nutshell	Square (911x205ySW, layer 1)
LuS-15306	2210	35	Willow (<i>Salix</i>)	Square (912x204yNW, layer 2), sample (ID 100075)
LuS-15689	2190	35	Hazel (<i>Corylus</i>), nutshell	Square (914x205ySE, layer 1)
LuS-15691	200	25	Hazel (<i>Corylus</i>), nutshell	Square (911x203yNW, layer 1)

Table 42: Løvås 3

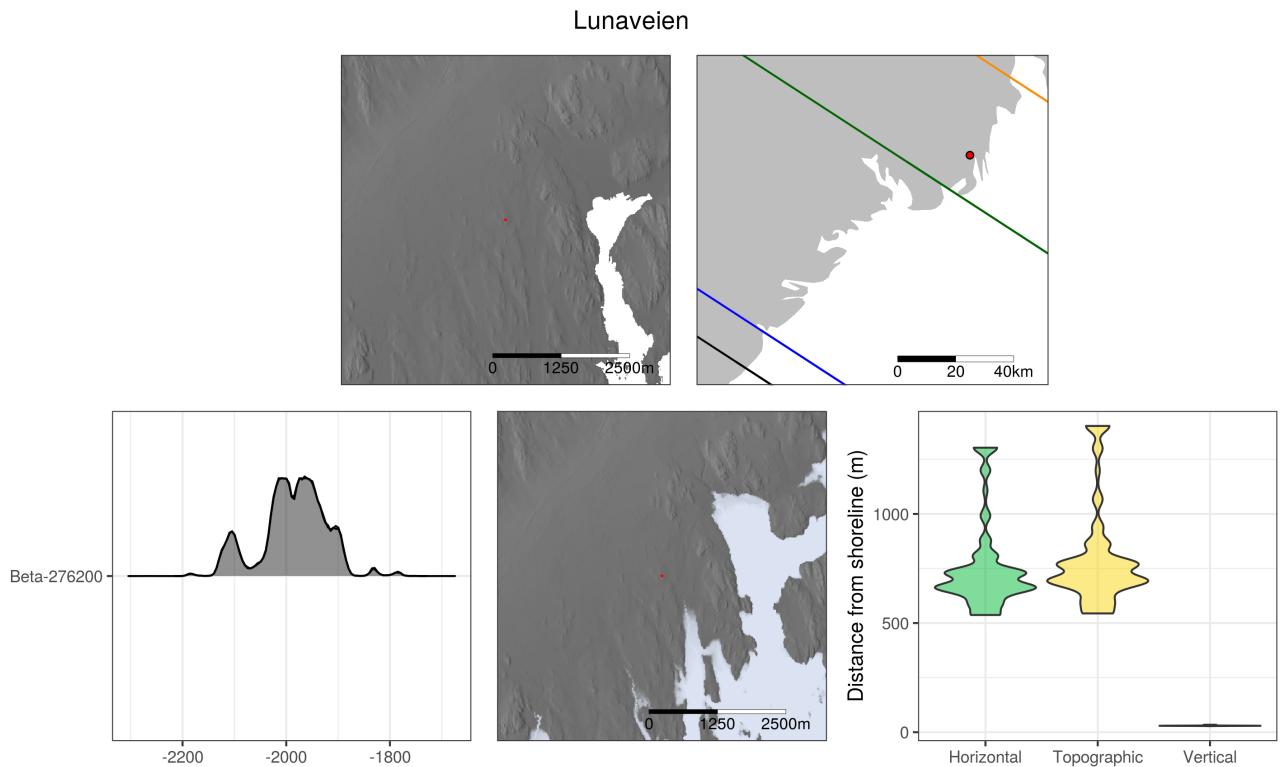
ID	¹⁴ C BP	Error	Material	Context
LuS-15311	8920	45	Hazel (<i>Corylus</i>), nutshell	Possible dwelling structure (ID 27142)
LuS-15312	8860	45	Hazel (<i>Corylus</i>), nutshell	Possible dwelling structure (ID 27142)
LuS-15310	8820	45	Hazel (<i>Corylus</i>), nutshell	Possible dwelling structure (ID 27142)
LuS-15307	8800	45	Pome fruit tree (Pomoideae)	Fireplace (ID 24176)
LuS-15308	8750	45	Aspen (<i>Populus</i>)	Fireplace (ID 24195)
LuS-15309	8745	45	Pome fruit tree (Pomoideae)	Fireplace (ID 24154)



The artefact inventory from Løvås 3 matches the radiocarbon dates (Reitan and Hårstad 2022). Similar setting to that of Løvås 1 and 2 (above).

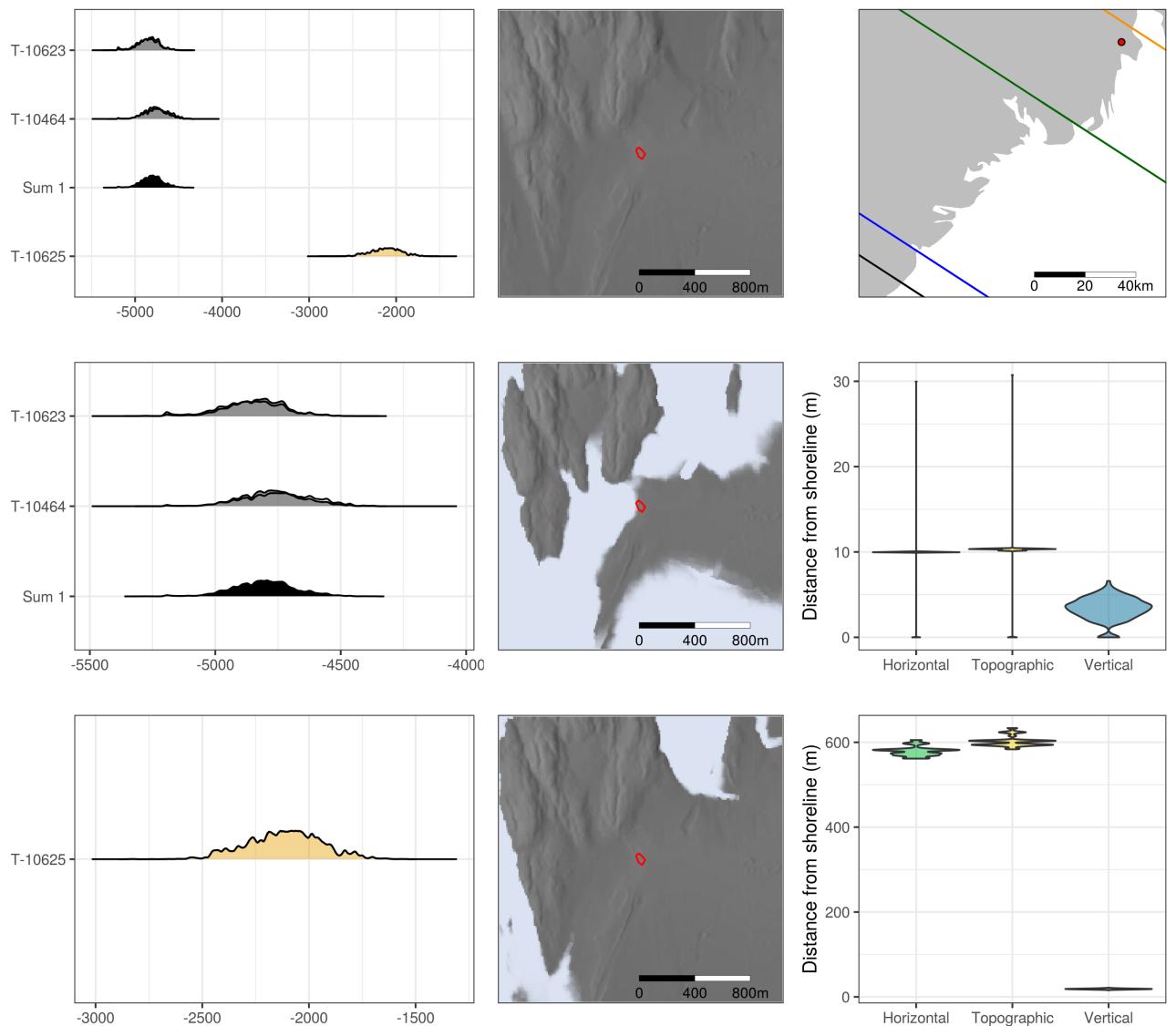
Table 43: Lunaveien

ID	^{14}C BP	Error	Material	Context
Beta-276197	1430	40	Birch (<i>Betula</i>)	Square (50x53y, layer 1)
Beta-276198	60	40	Pine (<i>Pinus</i>)	Square (50x50y, layer 1)
Beta-276199	1690	40	Birch (<i>Betula</i>)	Square (51x55y, layer 1)
Beta-276200	3620	40	Pine (<i>Pinus</i>)	Square (53x52y, layer 1)
Beta-278526	2350	40	Burnt bone	Square (50x50y, layer 2)
Beta-278527	2380	40	Burnt bone	Square (51x55y, layer 2)



Lunaveien is a grave cairn site, and the report states that it is unlikely that any of the finds relate to a settlement (Reitan 2010). The results have therefore been excluded from the aggregative analysis.

Nauen A



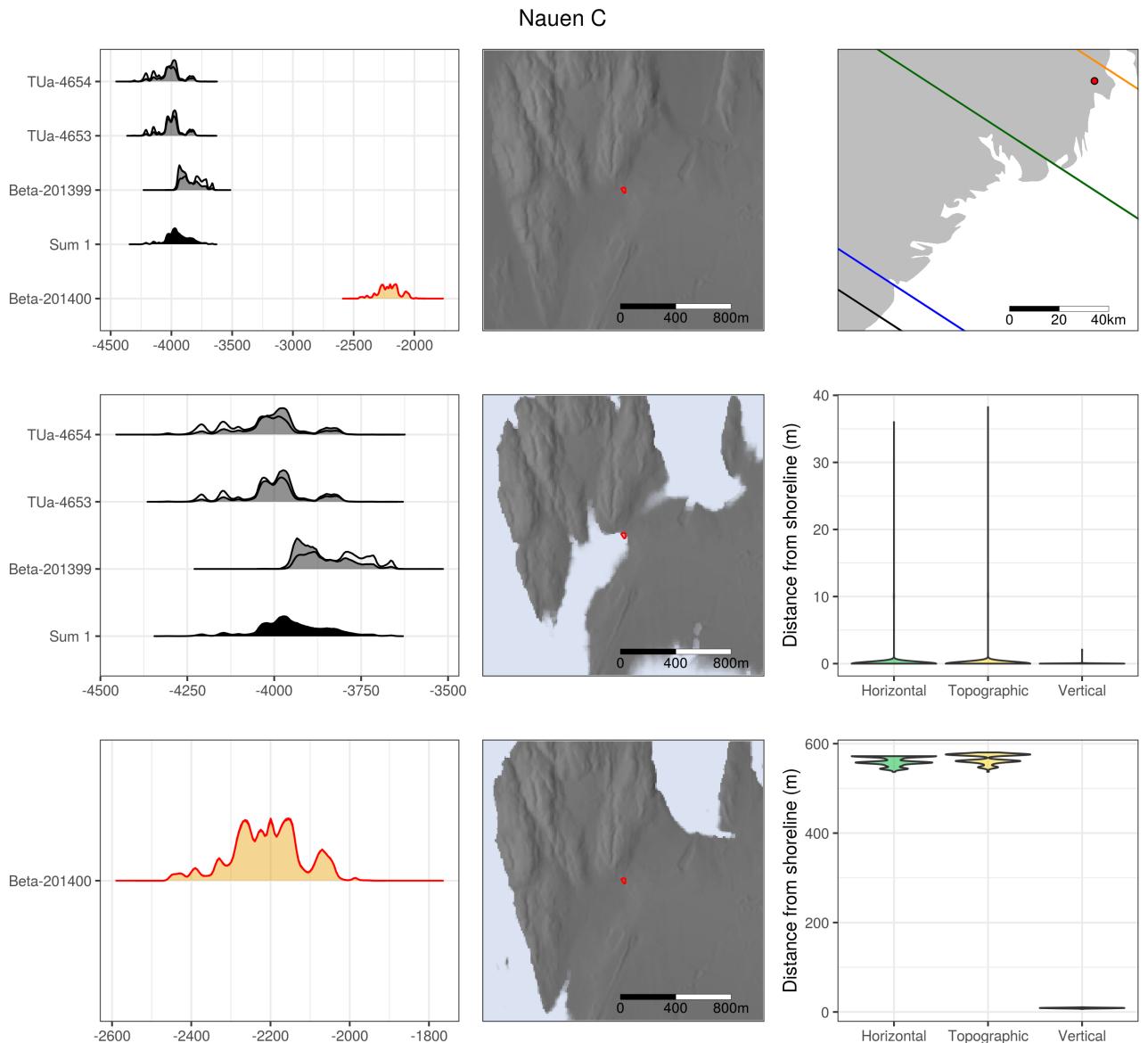
Typology of the lithic inventory on Nauen A points to a Late Mesolithic date (Persson 2008). The later date is seen as related to the establishment of a field for grazing or agriculture, which is also supported by younger dates that fall outside the analysis here. A section of the highway located a few hundred meters to the south was pre-emptively edited in the DTM. This does not appear to be relevant for the simulated sea-level.

Table 44: Nauen A

ID	^{14}C BP	Error	Material	Context
TUa-4651	3360	55	Charcoal, not specified	Undefined layer (ID 153)
Beta-204709	3020	50	Charcoal, not specified	Undefined layer (ID 156)
T-10907	1665	50	Charcoal, not specified	Unspecified
T-10463	1485	100	Charcoal, not specified	Unspecified
T-10908	1755	65	Charcoal, not specified	Unspecified
T-10622	2810	85	Charcoal, not specified	Unspecified
T-10623	5965	100	Charcoal, not specified	Unspecified
T-10624	3175	90	Charcoal, not specified	Unspecified
T-10464	5875	115	Charcoal, not specified	Unspecified
T-10625	3705	120	Charcoal, not specified	Unspecified
T-10626	875	100	Charcoal, not specified	Unspecified
T-10465	1005	155	Charcoal, not specified	Unspecified
T-10627	1000	90	Charcoal, not specified	Unspecified
T-10909	285	50	Charcoal, not specified	Unspecified
T-10628	1335	155	Charcoal, not specified	Unspecified
T-10629	1840	150	Charcoal, not specified	Unspecified
T-10466	635	150	Charcoal, not specified	Unspecified
T-10462	2925	80	Charcoal, not specified	Unspecified
T-10630	3595	110	Charcoal, not specified	Unspecified
T-10467	2235	80	Charcoal, not specified	Unspecified
T-10906	510	40	Charcoal, not specified	Grave (ID 2)
T-109061	490	40	Charcoal, not specified	Grave (ID 2)
T-11050	2760	70	Charcoal, not specified	Concentration, stone? (ID 47)
TUa-4652	2765	35	Charcoal, not specified	Transect (ID 630)

Table 45: Nauen C

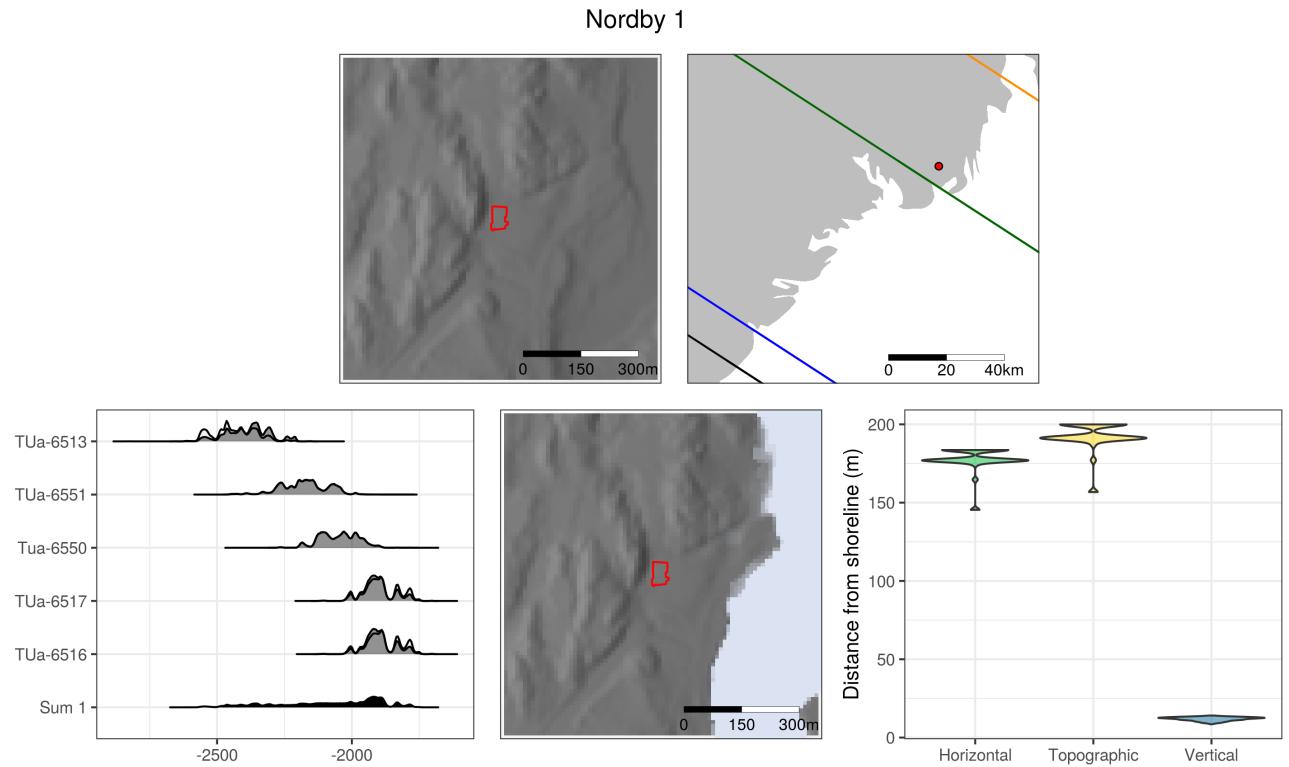
ID	^{14}C BP	Error	Material	Context
TUa-4653	5190	60	Charcoal, not specified	Unspecified
TUa-4654	5210	70	Charcoal, not specified	Possible tree throw (ID 2/4)
Beta-201399	5020	50	Charcoal, not specified	Possible tree throw (ID 2/4)
Beta-201400	3780	50	Charcoal, not specified	Possible tree throw (ID 2/4)
T-17050	3525	110	Charcoal, not specified	Possible tree throw (ID 2/4)
Beta-201401	2360	40	Charcoal, not specified	Undefined feature (ID 1)



The typological indicators of the lithic inventory from Nauen C match the earliest dates (Persson 2008). As with Nauen A, above, the DTM was edited pre-emptively and does not appear to have been necessary.

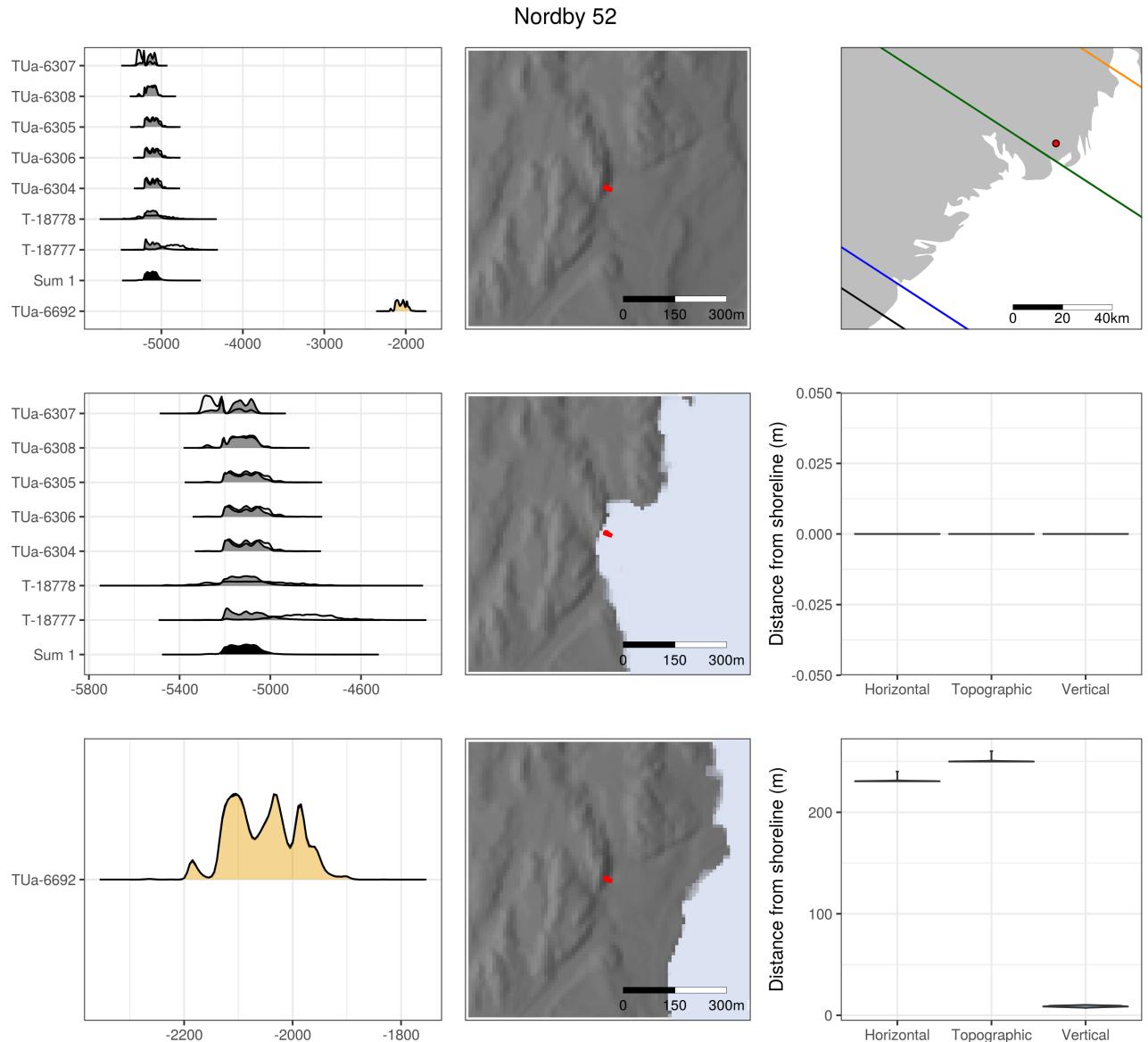
Table 46: Nordby 1

ID	^{14}C BP	Error	Material	Context
TUa-6513	3945	45	Hazel (<i>Corylus</i>), nutshell	Post hole, house 4 (ID 35188)
Tua-6550	3665	45	Oak (<i>Quercus</i>)	Post hole, house 4 (ID 35191)
TUa-6555	2025	30	Plant remains, unspecified	Post hole, house 3 (ID 35082)
TUA-6511	1805	35	Barley (<i>Hordeum vulgare</i>)	Post hole, house 3 (ID 35081)
TUA-6556	1595	45	Charcoal, unspecified	Post hole, house 3 (ID 35036)
TUA-6551	3760	50	Deciduous (Decid, indet.)	Post hole, house 2 (ID 35086)
TUA-6558	3385	45	Oak (<i>Quercus</i>)	Post hole, house 2 (ID 35091)
TUA-6557	3340	45	Oak (<i>Quercus</i>)	Post hole, house 2 (ID 35099)
Beta-238363	3250	40	Cereal, unspecified	Post hole, house 2 (ID 35115, 35028)
TUA-6517	3555	35	Barley (<i>Hordeum vulgare</i>)	Post hole, house 1 (ID 35047)
TUA-6518	3465	35	Barley (<i>Hordeum vulgare</i>)	Post hole, house 1 (ID 35063)
TUA-6516	3550	35	Barley (<i>Hordeum vulgare</i>)	Post hole, house 1 (ID 35056)
Beta-234329	750	40	Birch (<i>Betula</i>)	Post hole, house 1 (ID 35047)
Tua-4412	940	50	Oak (<i>Quercus</i>)	Undefined feature (ID 35074)
Tua-6301	3300	25	Birch/ash (<i>Betula/Fraxinus</i>)	Undefined feature (ID 35064)
T-18774	740	75	Birch/hazel (<i>Betula/Corylus</i>)	Undefined feature (ID 35054)
Tua-6302	2575	25	Birch/ash (<i>Betula/Fraxinus</i>)	Cooking pit (ID 35141)
T-18773	845	75	Pine (<i>Pinus</i>)	Cooking pit (ID 35013)
T-18772	1925	100	Birch/hazel (<i>Betula/Corylus</i>)	Fireplace (ID 35006)



Nordby 1 is dated to the Late Neolithic, Bronze Age and Early Iron Age (Gjerpe and Bakkemoen 2008a) with long-house 4 dated to the Late Neolithic. Lithics and pottery finds support the ^{14}C -dates. The site located on what is today a highway which was edited also for Nordby 52 (below), but is not relevant for the

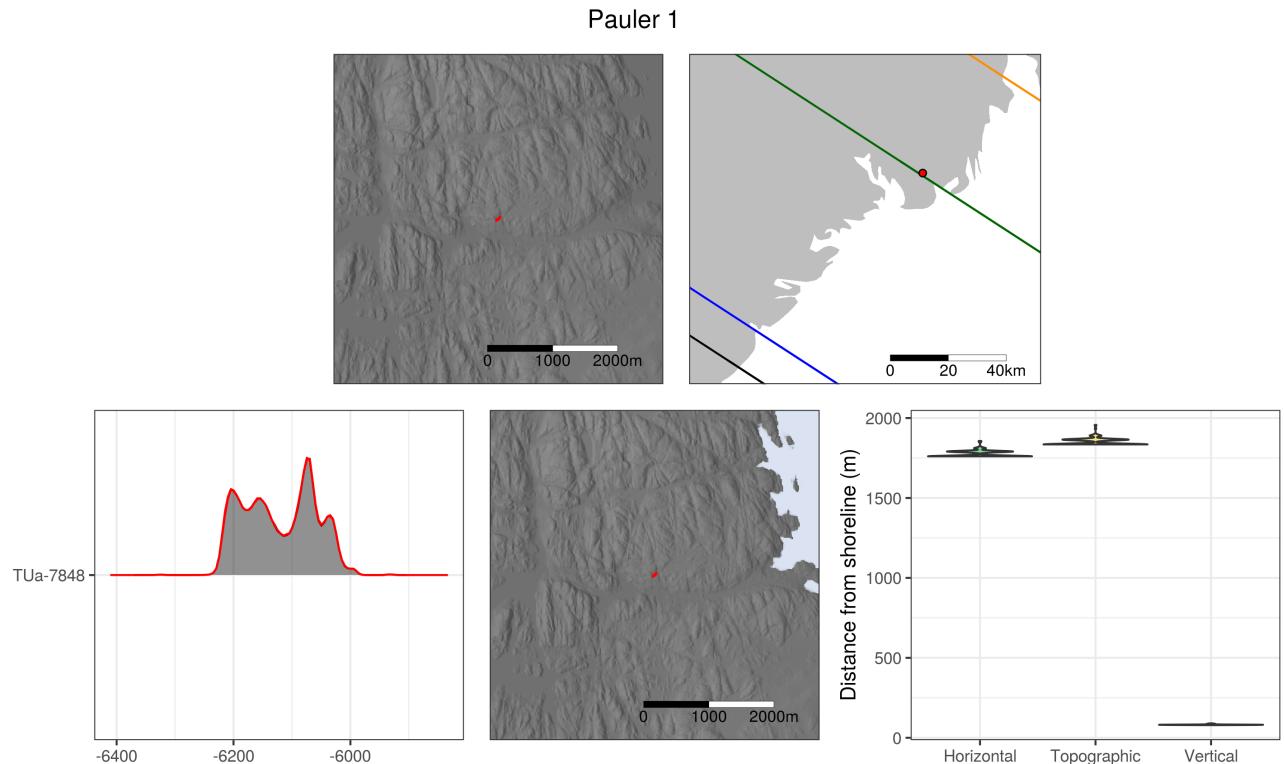
sea-level reconstruction for Nordby 1.



Nordby 52 is a rock-shelter that has been visited throughout prehistory (Gjerpe and Bukkemoen 2008b). The site has a clear typological date to both of the Stone Age periods defined by the ^{14}C -dates treated here. The site is located by where the highway runs today (see also Nordby 1 above). Edit appears to have been successful.

Table 47: Nordby 52

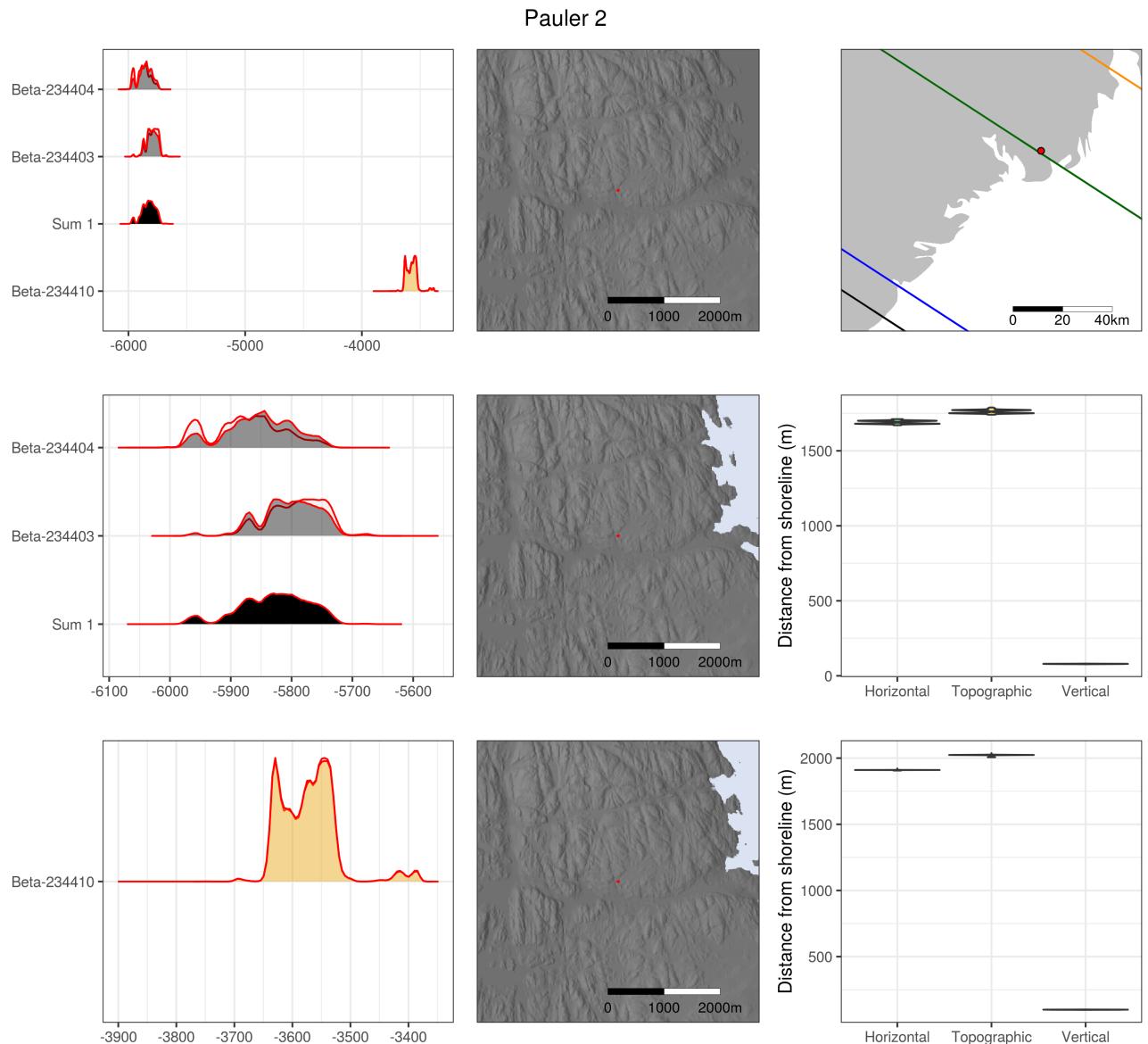
ID	^{14}C BP	Error	Material	Context
TUa-6308	6190	35	Charcoal, not specified	Fireplace? (ID 35136)
TUa-6307	6260	35	Charcoal, not specified	Fireplace? (ID 35185)
T-18777	5960	100	Charcoal, not specified	Fireplace (ID 35211)
TUa-6306	6140	40	Charcoal, not specified	Fireplace (ID 35212)
T-18778	6155	130	Charcoal, not specified	Cooking pit/fireplace (ID 35213)
TUa-6304	6140	35	Charcoal, not specified	Fireplace (ID 35215)
TUa-6305	6150	40	Charcoal, not specified	Fireplace? (ID 35216)
T-18775	2350	85	Charcoal, not specified	Fireplace (ID 35002)
T-18776	2490	105	Charcoal, not specified	Fireplace (ID 35125)
TUa-6303	610	25	Charcoal, not specified	Forge (ID 35217)
T-18779	505	75	Charcoal, not specified	Forge (ID 35217)
TUa-6694	3120	35	Burnt bone, harbour seal (<i>Phoca vitulina</i>)	Unspecified excavation unit
TUa-6692	3670	35	Burnt bone, mammal indet.	Unspecified excavation unit



Pauler 1 has a distinctly Early Mesolithic artefact inventory that is not related to the ^{14}C -dates (Schaller Åhrberg 2012).

Table 48: Pauder 1

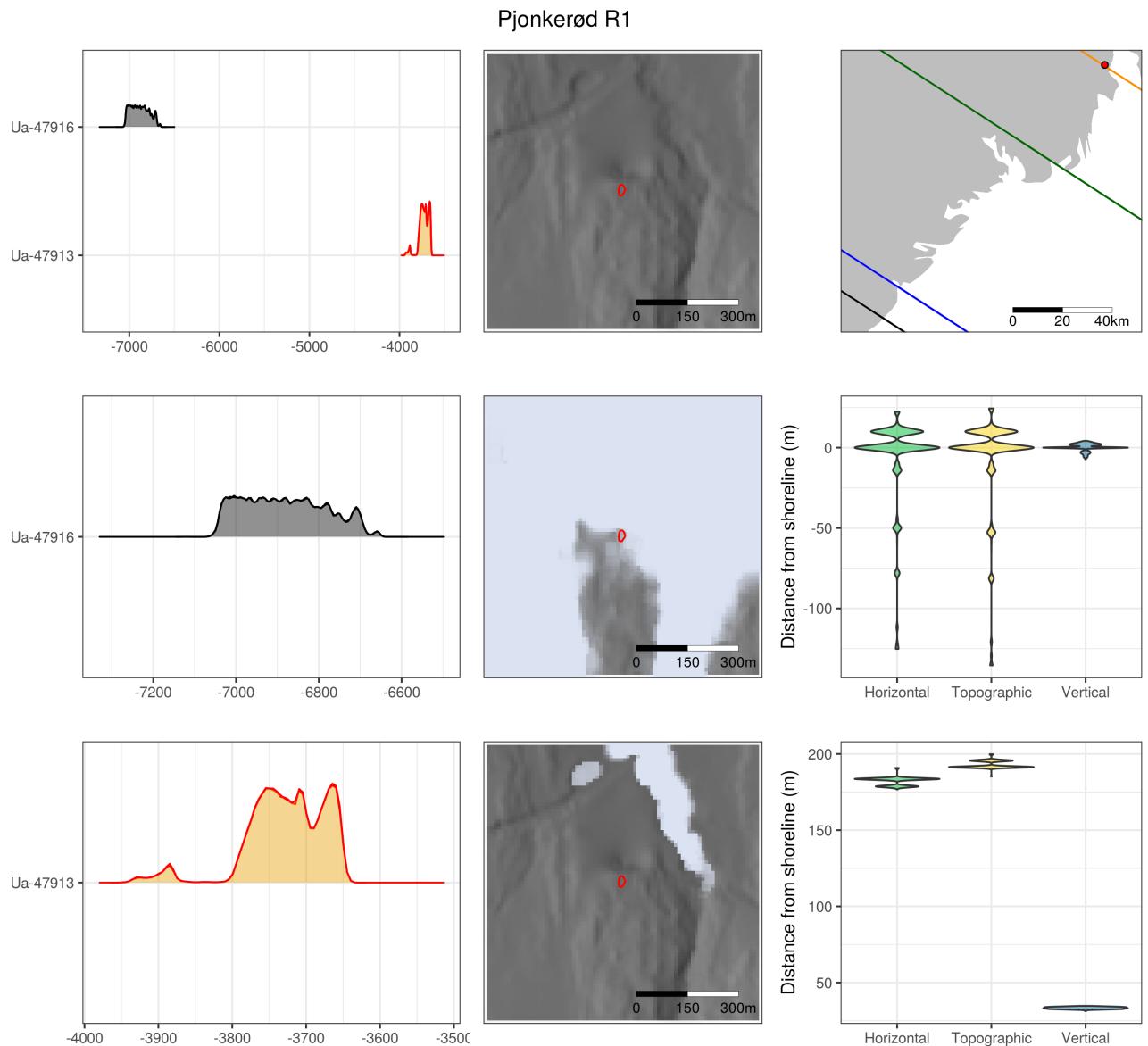
ID	^{14}C BP	Error	Material	Context
Beta-234411	3460	40	Pine (<i>Pinus</i>)	Fireplace (ID 1)
Beta-234412	910	40	Pine (<i>Pinus</i>)	Fireplace (ID 1)
Beta-234413	960	40	Birch (<i>Betula</i>)	Fireplace (ID 1)
Beta-234414	910	40	Deciduous (Decid, indet.)	Fireplace (ID 1)
TUa-7848	7245	45	Pine (<i>Pinus</i>)	Fireplace/Burnt root (ID 15)



As with Pauder 1 (above), Pauder 2 has a distinctly Early Mesolithic artefact inventory that is not related to the ^{14}C -dates (Nyland 2012a).

Table 49: Pauer 2

ID	^{14}C BP	Error	Material	Context
Beta-234403	6910	40	Hazel (<i>Corylus</i>), nutshell	Fireplace (ID 1)
Beta-234404	6990	40	Pine (<i>Pinus</i>)	Fireplace (ID 1)
Beta-234407	3260	40	Pine (<i>Pinus</i>)	Fireplace (ID 1)
Beta-234410	4800	40	Pine (<i>Pinus</i>)	Fireplace (ID 1)
Beta-234409	1440	40	Oak (<i>Quercus</i>)	Fireplace (ID 1)
Beta-234408	900	40	Birch (<i>Betula</i>)	Fireplace (ID 1)
Beta-234405	870	40	Birch (<i>Betula</i>)	Fireplace (ID 2)
Beta-234406	300	40	Pine (<i>Pinus</i>)	Fireplace (ID 2)



The lithic inventory from Pjonkerød R1 is consistent with the ^{14}C -date (Carrasco 2015). The site is situated

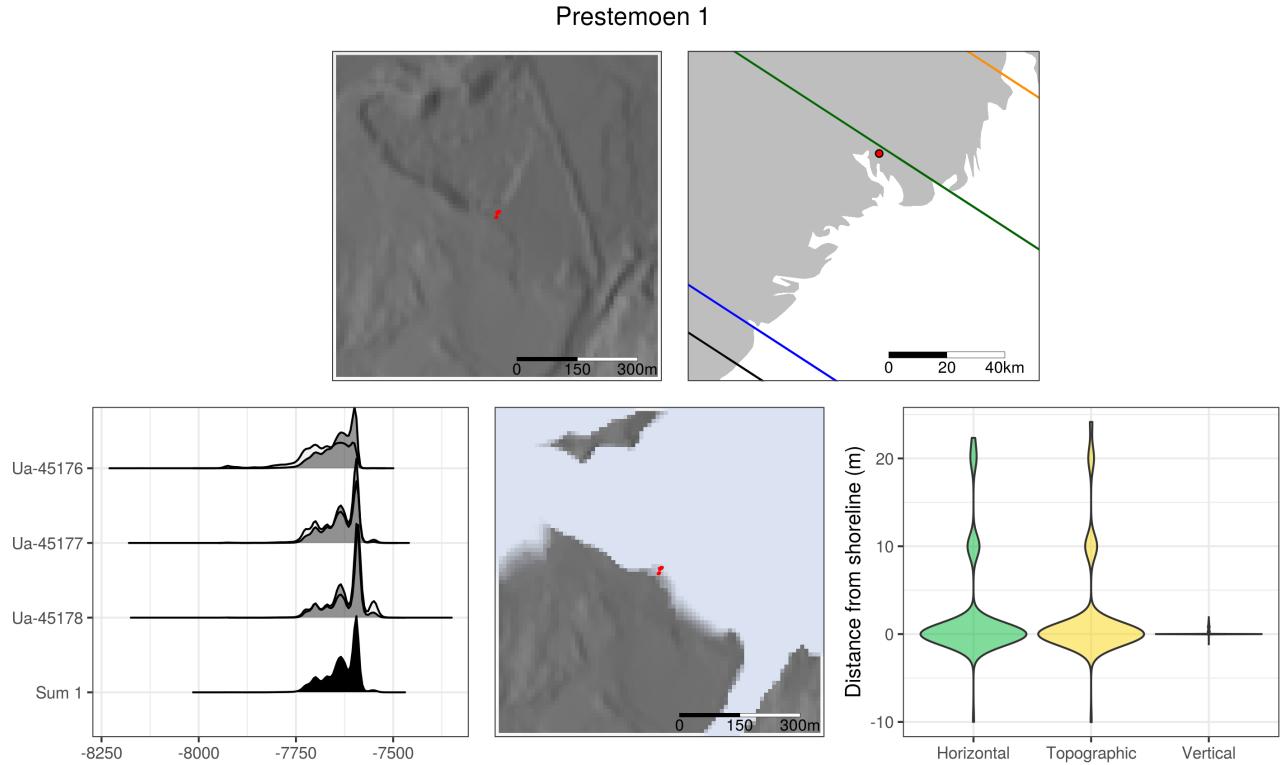
Table 50: Pjonkerød R1

ID	^{14}C BP	Error	Material	Context
Ua-47916	7970	44	Burnt bone	Quadrant 50x50x10 (112x51y NE, layer 2)
Ua-47914	3178	32	Pine (Pinus)	Undefined feature (ID 2001)
Ua-47915	3117	31	Pine (Pinus)	Cooking pit (ID 2002)
Ua-47917	1373	30	Oak (Quercus)	Cooking pit (ID 2007)
Ua-47913	4959	34	Pine (Pinus)	Undefined feature (ID 2001)

Table 51: Prestemoen 1

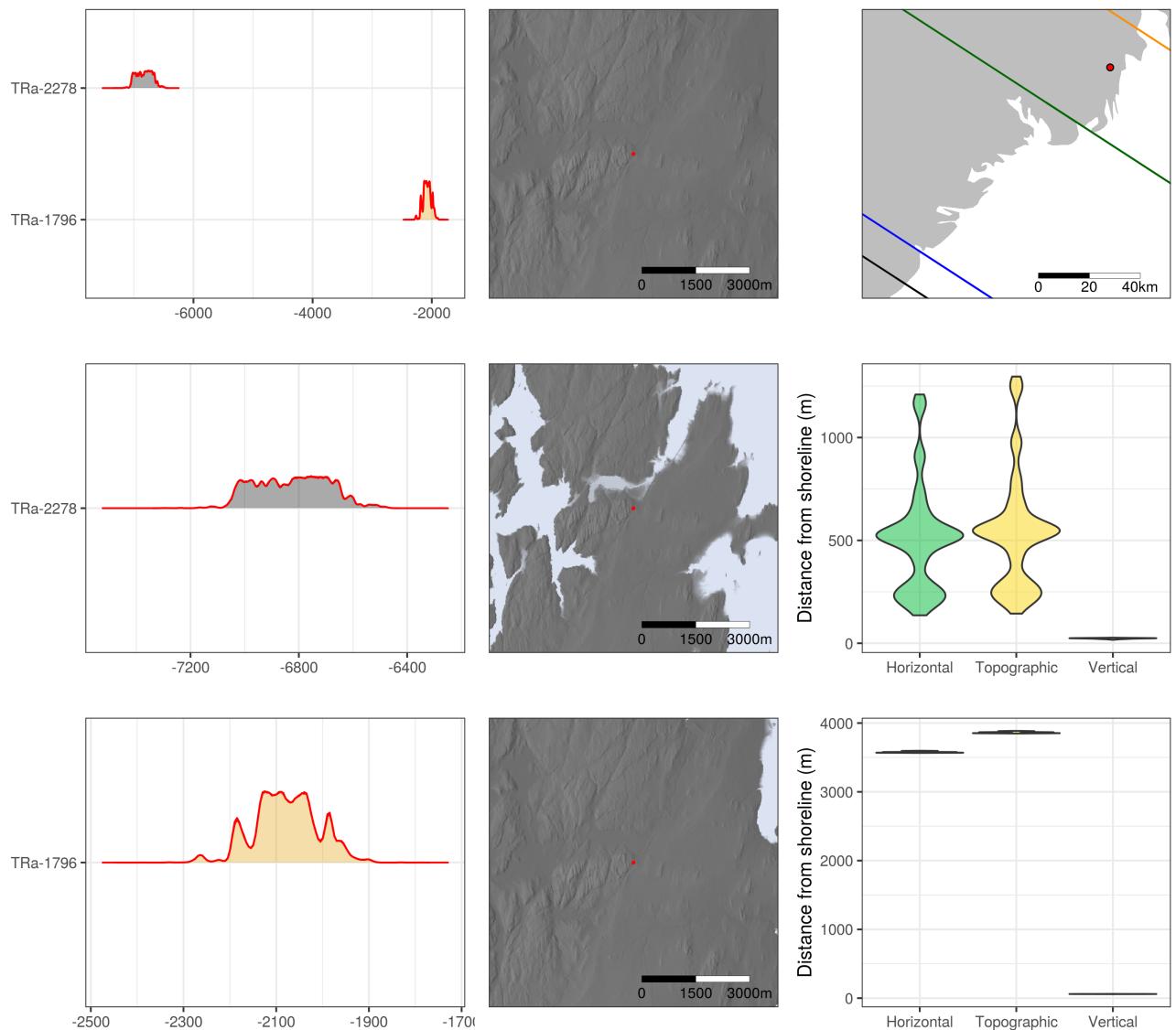
ID	^{14}C BP	Error	Material	Context
Ua-45176	8671	45	Hazel (Corylus), nutshell	Square (620x149y, layer 6)
Ua-45177	8620	45	Burnt bone	Square (620x149y, layer 6)
Ua-45178	8593	46	Hazel (Corylus), nutshell	Square (620x149y, layer 8)

by a large gravel pit today, which has been fairly successfully edited. However, as the few negative values in the results are likely to result from the interpolation process and the fact that this is a quite large area, as opposed to issues with the displacement curves or ^{14}C -dates, the negative values were forced to zero for the aggregative analysis.



Prestemoen 1 has a lithic inventory consistent with the ^{14}C -dates (Persson 2014a). The site is situated by a gravel pit that is clearly visible on the DTM to the north-east of the site. This was not edited as it has not impacted the simulated distance between site and sea. The landscape surrounding the site would, however, have been very different in the Mesolithic (Persson 2014a:Figure 10.20).

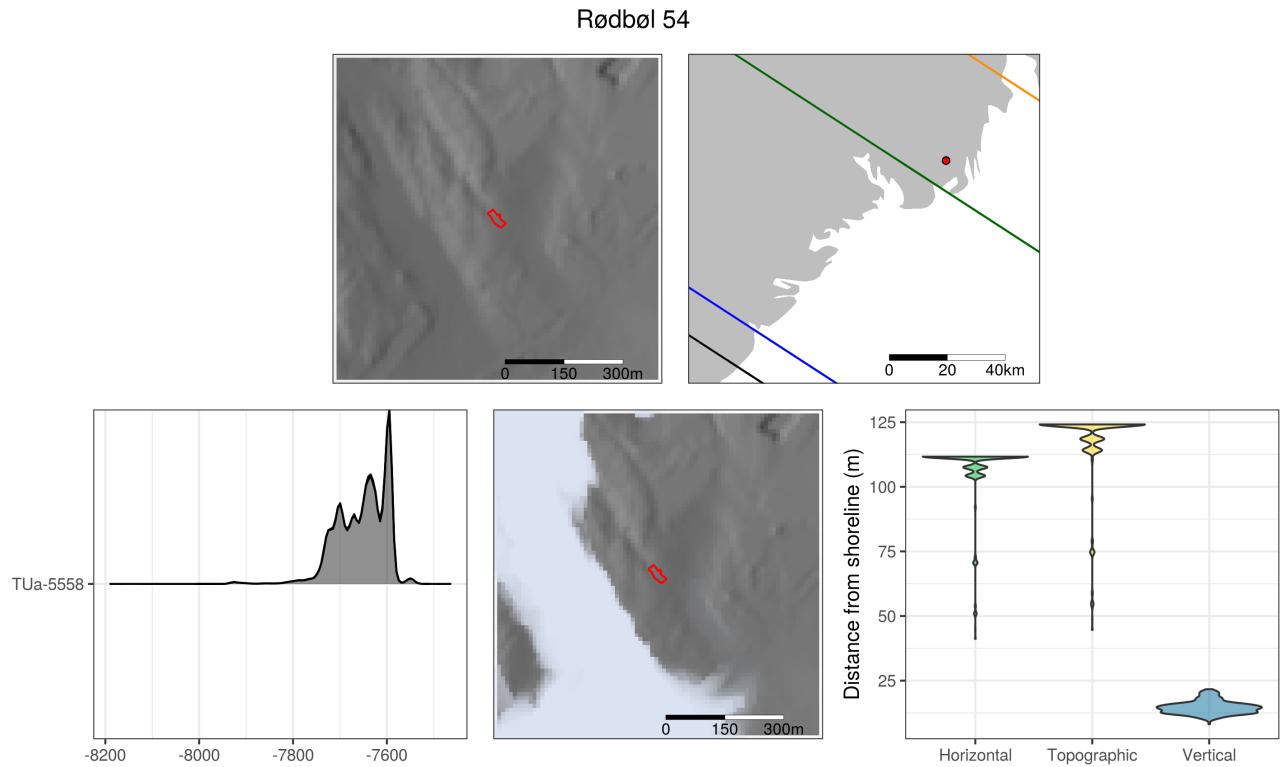
Ragnhildrød



The earliest ^{14}C -date, from an uncertain context, is argued to be younger and not match the typological indicators in the inventory from Ragnhildrød (Mjærum 2012:50, 71). The post-hole dated to the Late Neolithic/Bronze Age could be related to a single find of a pressure flaked object, but was not given much weight in the report (Mjærum 2012:76).

Table 52: Ragnhildrød

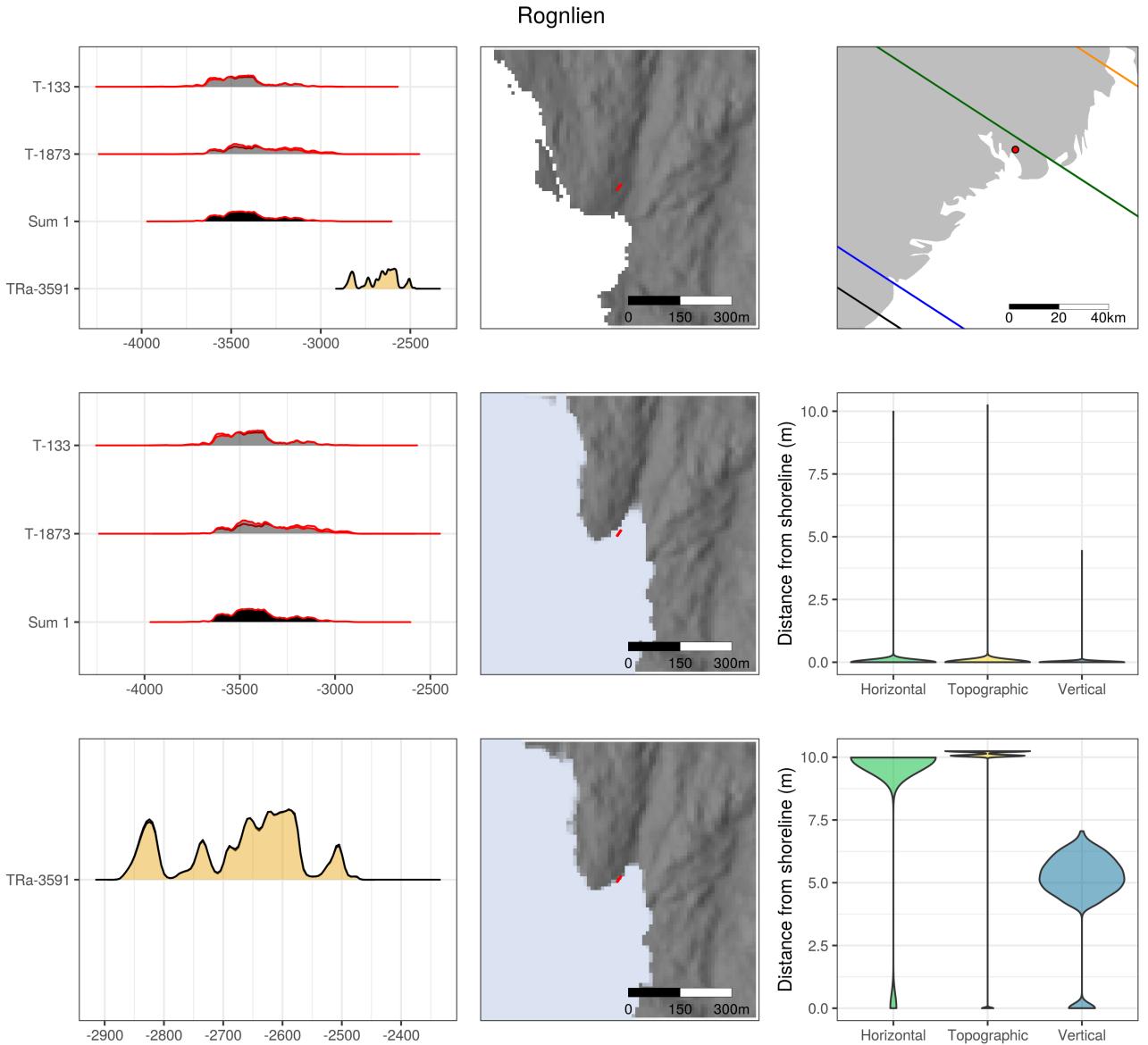
ID	^{14}C BP	Error	Material	Context
TRa-2278	7915	90	Oak (<i>Quercus</i>)	Layer, dwelling entry-way (ID 1351061)
TRa-1796	3690	45	Hazel (<i>Corylus</i>)	Post hole (ID 1350035)
UBA-17796	2926	22	Hazel (<i>Corylus</i>), nutshell	Post hole (ID 1350035)
TRa-1120	2325	40	Hazel (<i>Corylus</i>)	Cooking pit (ID 1350020)
TRa-1124	2285	35	Hazel (<i>Corylus</i>)	Cooking pit (ID 1351121)
UBA-17797	2275	28	Hazel (<i>Corylus</i>), nutshell	Cooking pit (ID 1351087)
TRa-1123	2225	55	Hazel (<i>Corylus</i>)	Fireplace (ID 1350026)
UBA-17800	2220	24	Hazel (<i>Corylus</i>)	Floor layer (ID 1351069)
TRa-1798	2195	40	Hazel (<i>Corylus</i>)	Cooking pit (ID 1351087)
TRa-1795	2190	30	Hazel (<i>Corylus</i>)	Cooking pit (ID 1350015)
TRa-1125	2185	45	Hazel (<i>Corylus</i>)	Outer wall ditch (ID 1351134)
UBA-17795	2170	43	Hazel (<i>Corylus</i>)	Cooking pit (ID 1350020)
TRa-1118	2140	40	Hazel (<i>Corylus</i>)	Cooking pit (ID 1350017)
TRa-1121	2130	40	Hazel (<i>Corylus</i>)	Fireplace (ID 1351071)
TRa-1799	1945	30	Hazel (<i>Corylus</i>)	Fireplace (ID 1351127)
TRa-1122	1660	45	Birch (<i>Betula</i>)	Fireplace (ID 1351057)
UBA-17799	1533	33	Hazel (<i>Corylus</i>)	Fireplace (ID 1351127)
TRa-1117	810	40	Beech (<i>Fagus</i>)	Fireplace (ID 1350004)



Lithic inventory match the ^{14}C -date from Rødbøl 54 (Mansrud 2008). The site is situated where the highway runs today, which required editing and which is deemed to have been successful.

Table 53: Rødbøl 54

ID	^{14}C BP	Error	Material	Context
TUa-5558	8630	45	Hazel (<i>Corylus</i>), nutshell	Fireplace (ID 20013)
TUa-6053	1770	30	Birch (<i>Betula</i>)	Fireplace (ID 20019)
T-18456	1715	55	Birch (<i>Betula</i>)	Cooking pit (ID 20057)
T-18454	1610	70	Birch/hazel (<i>Betula/Corylus</i>)	Cooking pit (ID 20005)



The first archaeological finds from Rognlien were done in the 1880s and, following some smaller investigations, was excavated by Ingstad (1970) in 1957. The site limit has been manually defined based on the description given in the publication and the spatial geometry of the site as defined in the database Askeladden (Norwegian Directorate for Cultural Heritage 2018). The manually defined limit could be slightly off, but should match the elevation of the site given in the publication (Ingstad 1970:26). The ^{14}C -dates from the original excavation

Table 54: Rognlien

ID	^{14}C BP	Error	Material	Context
T-133	4700	120	Charcoal, unspecified	Unspecified excavation unit
T-1873	4600	130	Charcoal, unspecified	Unspecified excavation unit
TRA-3591	4090	35	Burnt bone, elk (<i>Alces alces</i>)	Unspecified excavation unit

was not seen as contemporaneous with the lithic material on the site. Burnt elk bone from the original excavation was therefore recently subjected to radiocarbon dating and is believed to match the occupation of the site (pers.comm. Steinar Solheim, also provided in Stokke 2017:24). Given the 0m distance that the older dates give here, however, there does not appear to be grounds on which to reject the older dates based on sea-level change.

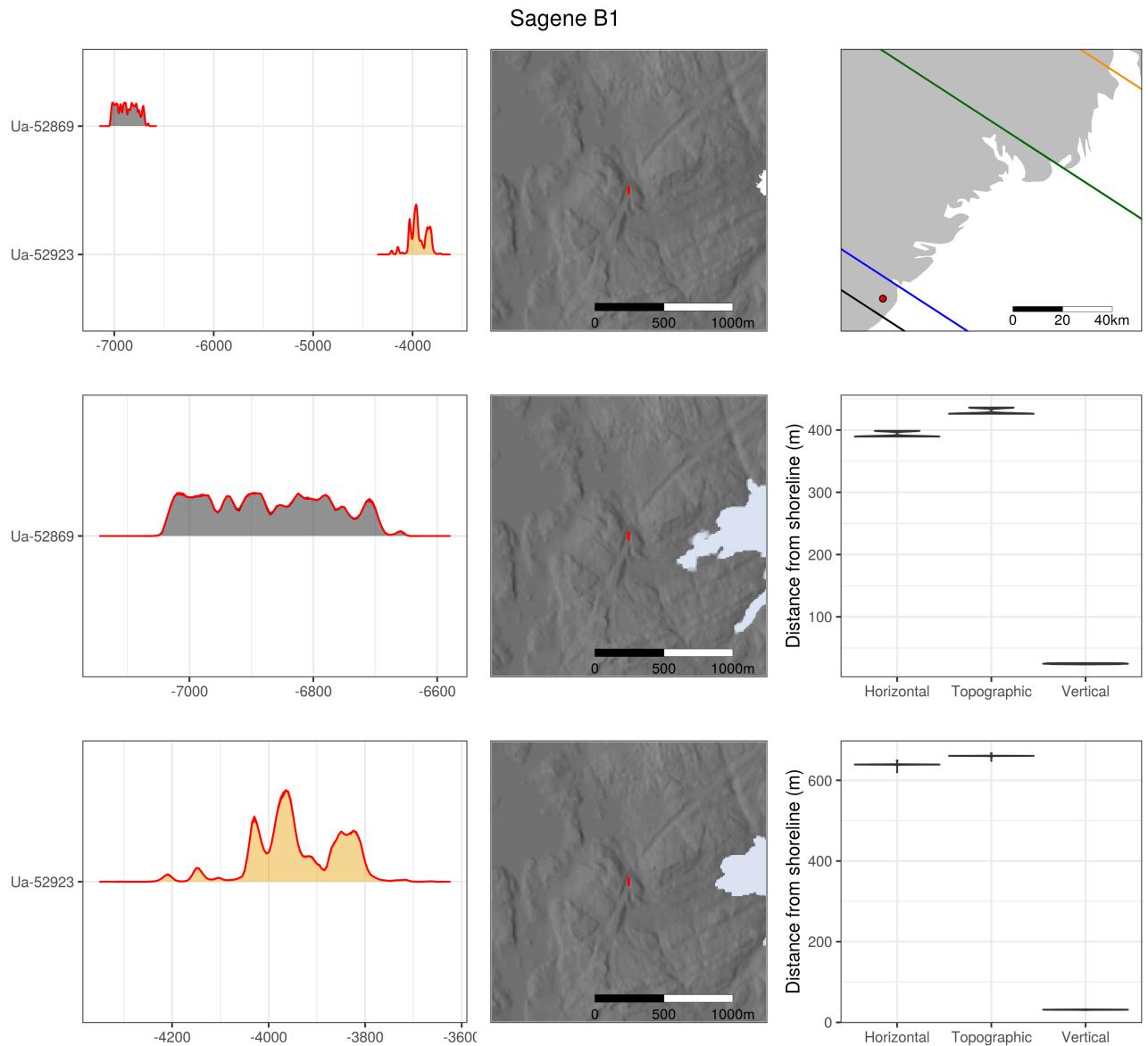


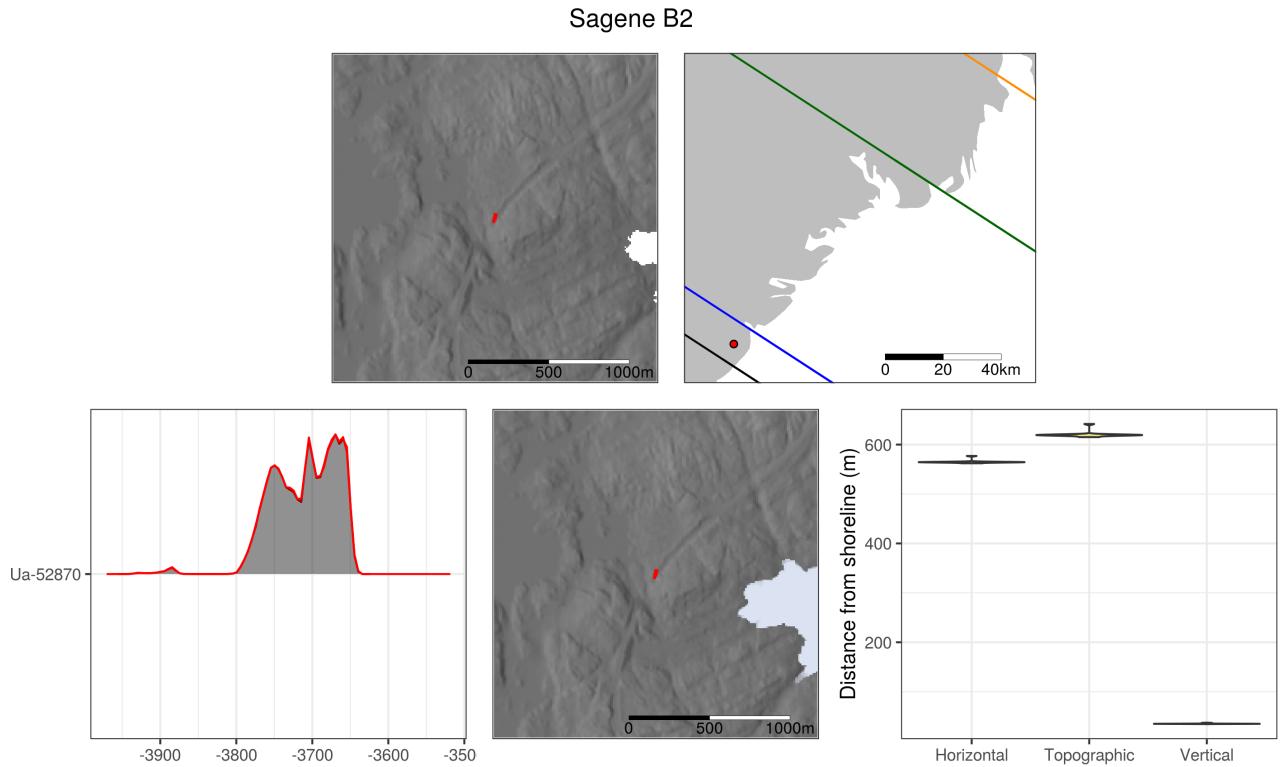
Table 55: Sagene B1

ID	^{14}C BP	Error	Material	Context
Ua-52869	7954	32	Pine (<i>Pinus</i>),	Post-hole (ID 456141)
Ua-52923	5150	58	Deciduous (Decid, indet.)	Post-hole (ID 456149)
Ua-52868	3352	27	Pine (<i>Pinus</i>)	Post-hole (ID 456132)
Ua-52866	2254	43	Ash (<i>Fraxinus</i>)	Fireplace (ID 454792)
Ua-52867	1766	47	Coniferous (Conif. indet.), cone seed scale	Floor layer (ID 451586)

Table 56: Sagene B2

ID	^{14}C BP	Error	Material	Context
Ua-52870	4946	29	Deciduous (Decid, indet.)	Tree throw (ID 503080)
Beta-411673	2640	30	Pine (<i>Pinus</i>)	Cooking pit (ID 500001)
Beta-411674	2460	30	Birch (<i>Betula</i>)	Cooking pit (ID 500001)
Ua-52924	1305	51	Coniferous (Conif. indet.), cone	Tree throw (ID 503080)

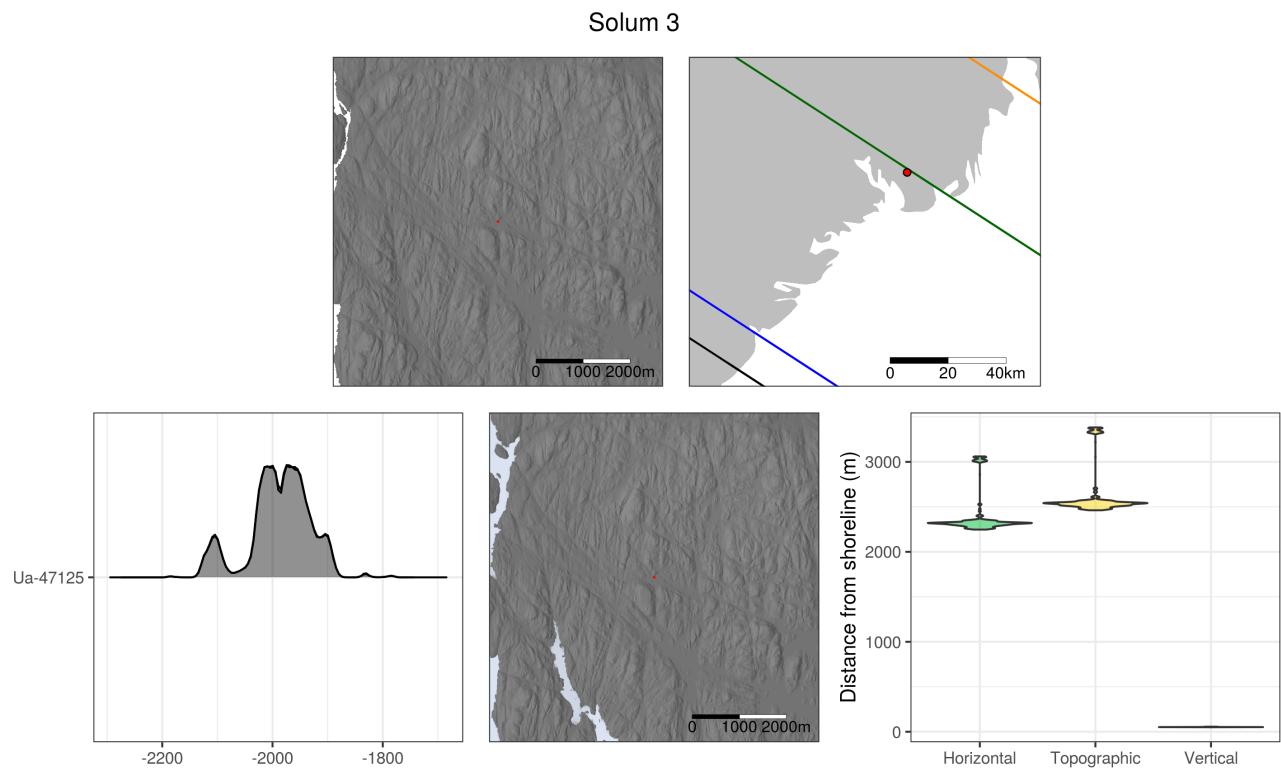
^{14}C -dates from Sagene B1 do not match the Early Mesolithic inventory of the site (Viken 2018c). The wide discrepancy of the dates from the post-holes also led Viken (2018c) to suggest that these features might actually be non-anthropogenic and that they could instead be related to trees that have grown on the site.



The ^{14}C -dates from Sagene B2 do not match the clearly Early Mesolithic inventory of the site (Darmark 2018b).

Table 57: Solum 3

ID	^{14}C BP	Error	Material	Context
Ua-45179	3039	31	Hazel (<i>Corylus</i>)	Undefined feature/wooden construction (ID 350)
Ua-47125	3622	34	Burnt bone (1.4g)	Undefined feature/wooden construction (ID 350)



Solum 3 is a Late Neolithic and Early Bronze Age site, with ^{14}C -dates matching the lithic inventory (Fossum 2014b).

Table 58: Stokke/Polland 1

ID	^{14}C BP	Error	Material	Context
Ua-48259	5353	101	Hazel (<i>Corylus</i>)	Cooking pit (ID 22029)
Ua-48260	192	30	Spruce (<i>Picea</i>)	Charcoal clamp (ID 18176/22964)
Ua-48261	88	31	Spruce (<i>Picea</i>)	Cooking pit (ID 10537)
Ua-48264	4911	39	Elm (<i>Ulmus</i>)	Cooking pit (ID 18358)
Ua-48263	1514	30	Birch (<i>Betula</i>)	Undefined feature (ID 21259)
Ua-48262	4583	38	Willow (<i>Salix</i>)	Cooking pit (ID 22994)
Ua-48265	4667	39	Hazel (<i>Corylus</i>)	Undefined feature (ID 21238)
Ua-48266	1549	30	Birch (<i>Betula</i>)	Undefined feature (ID 15546)
Beta-359783	2960	30	Hazel (<i>Corylus</i>), nutshell	Tree throw (ID 1568)

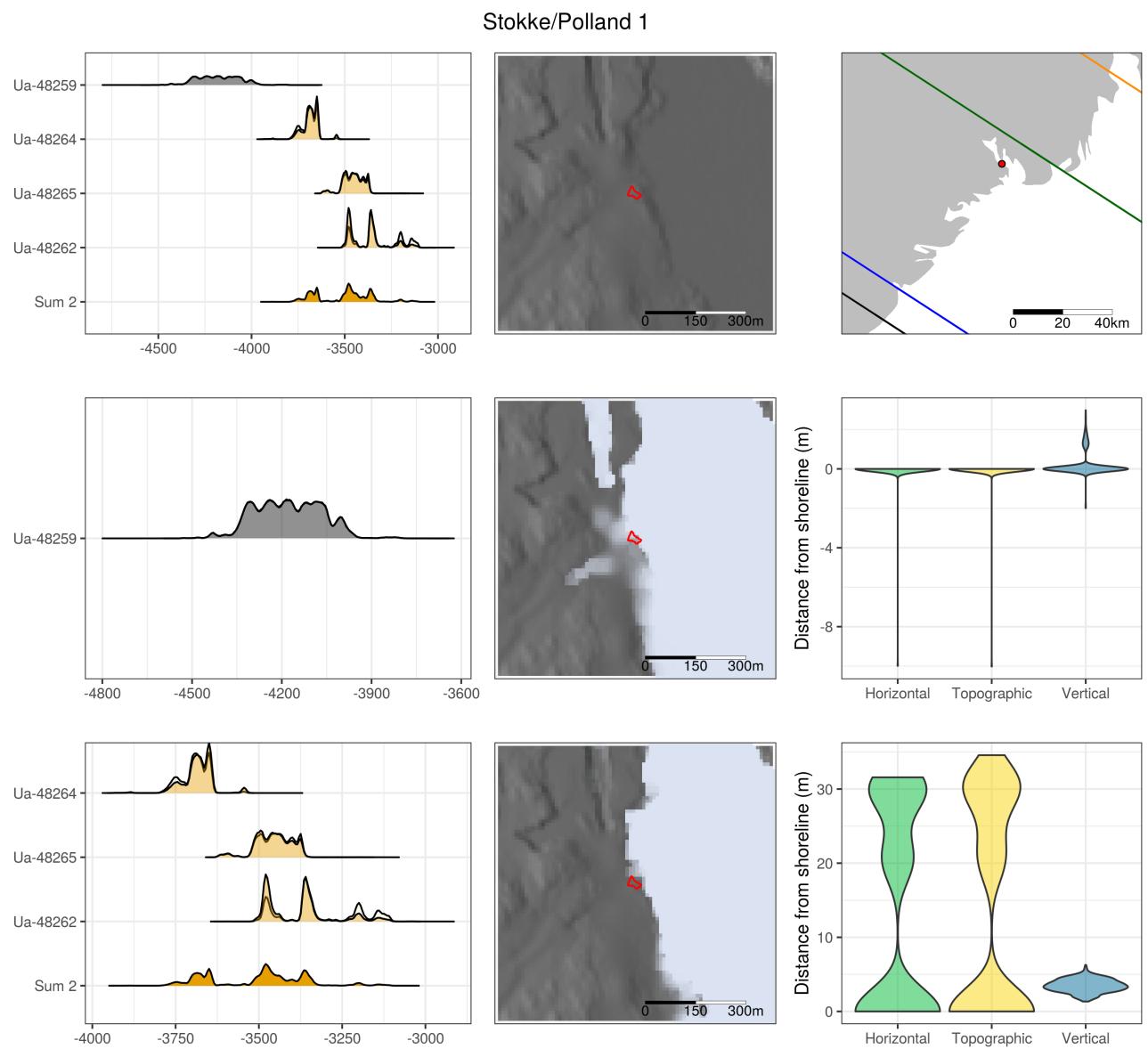
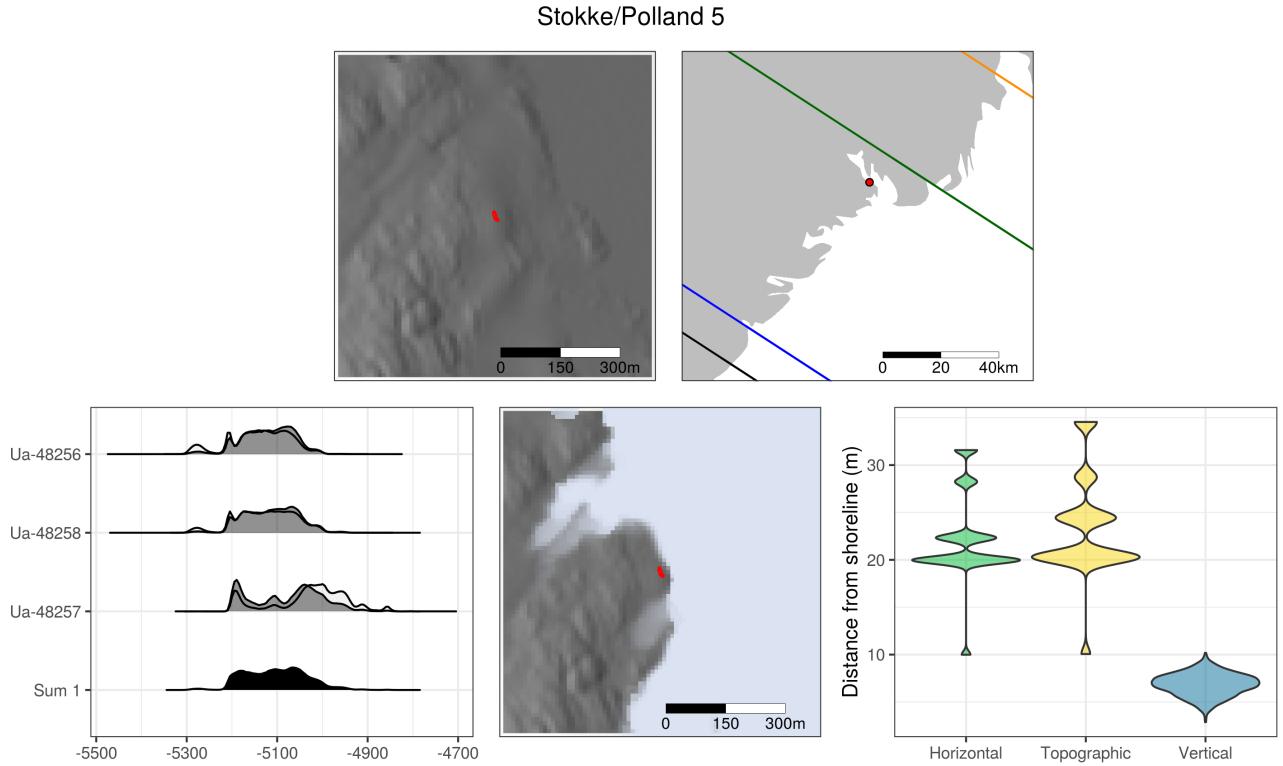


Table 59: Stokke/Polland 5

ID	^{14}C BP	Error	Material	Context
Ua-48256	6196	40	Alder (<i>Alnus</i>)	Cooking pit (ID 20345)
Ua-48257	6098	40	Pomoideae (<i>Malinae</i>)	Cooking pit (ID 20289)
Ua-48258	6177	42	Hazel (<i>Corylus</i>)	Cooking pit (ID 20270)

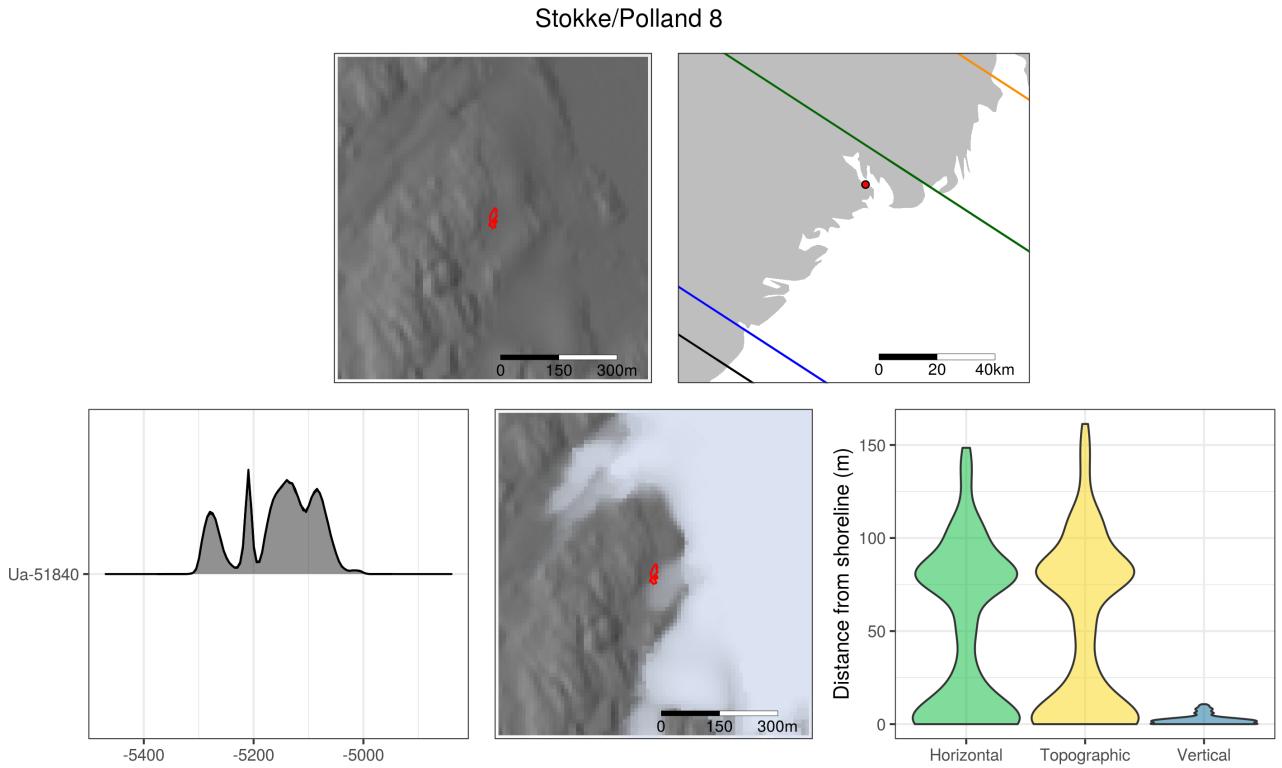
The artefact inventory from Stokke/Polland 1, containing both lithics and ceramics, indicates visits in the Late Mesolithic as well as the Early Neolithic (Koxvold 2017b). Date groups were therefore manually separated, even though they overlap at 99.7% probability. The site is located right by the highway to the east, which was edited for the other Stokke/Polland sites, but this does not appear relevant for the reconstruction of the sea-level at Stokke/Polland 1, which would have reached the site from the west.



The ^{14}C -dates matches the lithic inventory from Stokke/Polland 5 (Mansrud 2017). The site is located where the highway runs today. This appears to have been successfully edited. The excavated area is more extensive (field A-C in the report) than what is used as the site limit here, but the relation between the different areas is not clear. Field A, used as the site limit here, holds all the dated features.

Table 60: Stokke/Polland 8

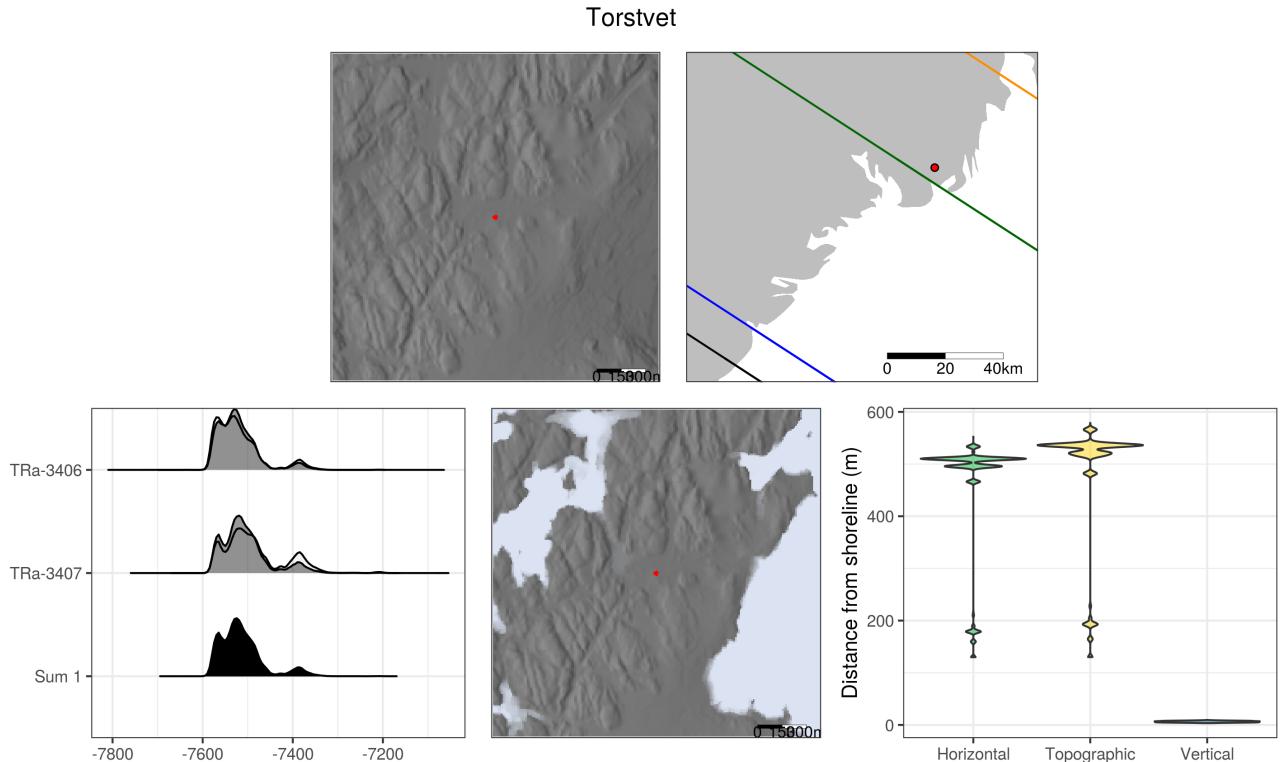
ID	^{14}C BP	Error	Material	Context
Ua-51840	6215	35	Birch (Betula)	Cooking pit/fireplace (ID 24210)



Stokke/Polland 8 have corresponding lithic inventory and ^{14}C -date (Fossum 2017c). The site is situated just east of where the highway runs today. This appears to have been successfully edited (cf. Fossum 2017c:Figure 28.3).

Table 61: Torstvet

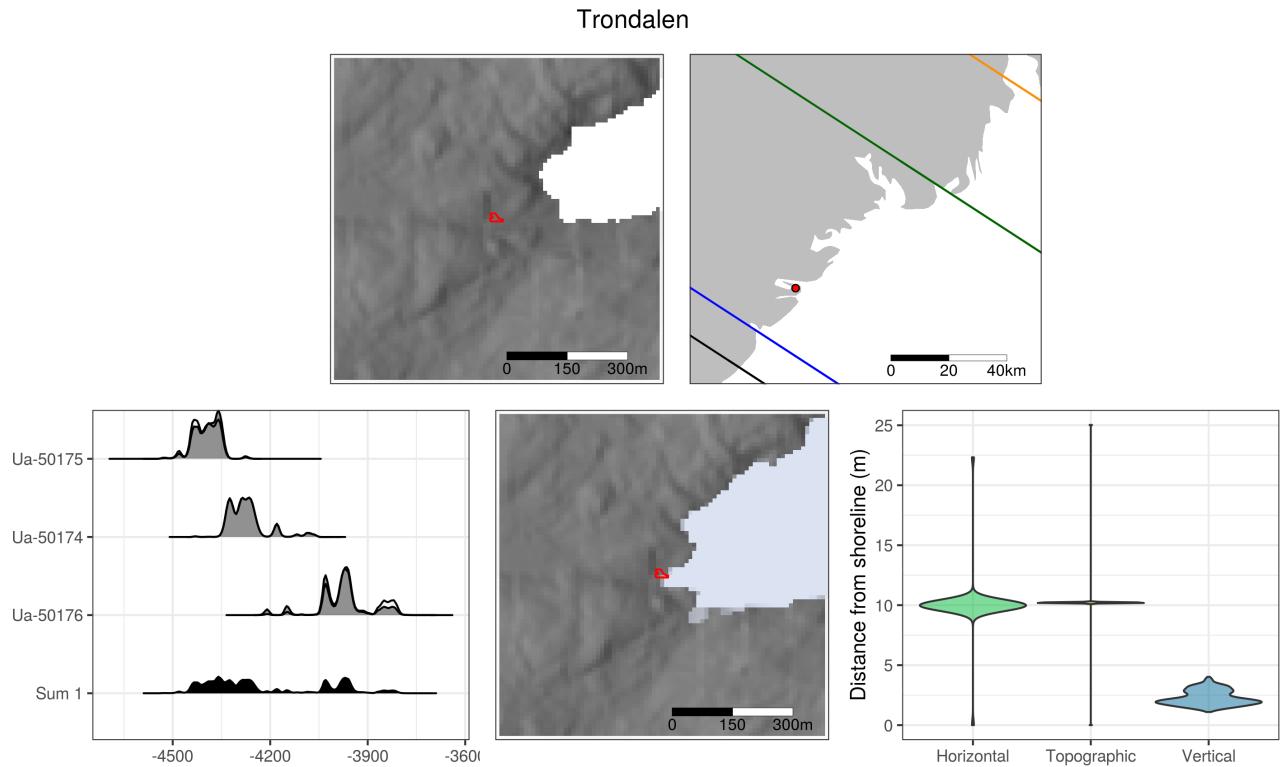
ID	^{14}C BP	Error	Material	Context
TRa-3406	8460	55	Hazel (<i>Corylus</i>), nutshell	Square (61x101y, layer 2)
TRa-3407	8425	55	Hazel (<i>Corylus</i>), nutshell	Square (61x102y, layer 2)
Ua-45677	2218	34	Birch (<i>Betula</i>)	Fireplace (ID 1)
TRa-3405	3090	30	Birch/willow (<i>Betula/Salix</i>)	Fireplace (ID 1)



Typology of lithics match the ^{14}C -dates from Torstvet (Mansrud 2013b). The site is located where the highway runs today. This appears to have been successfully edited, although there is a possibility that this has led to the sea-level being simulated slightly further away from the site than what would otherwise have been the case. However, as with the Hovland sites above, this appears to rather follow from the general topography of the landscape characterised by a low relief which makes the reconstruction more uncertain.

Table 62: Trondalen

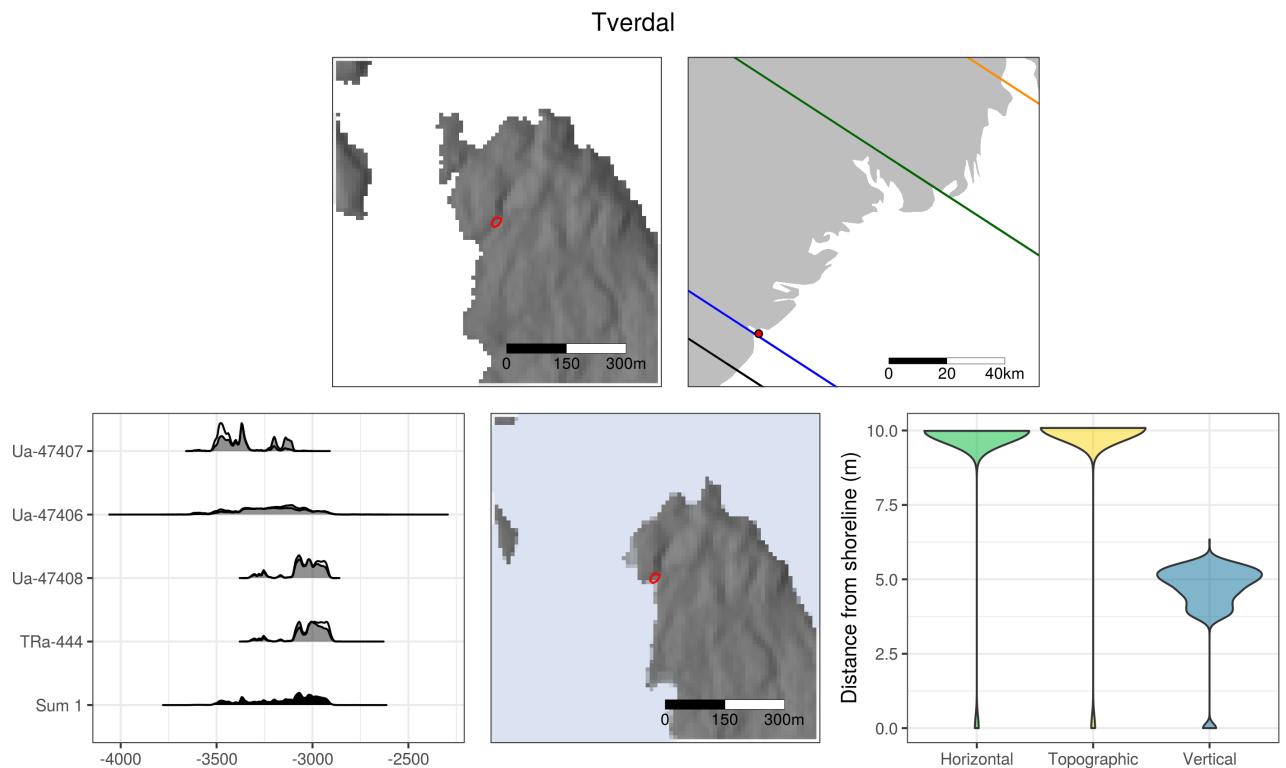
ID	^{14}C BP	Error	Material	Context
Ua-50174	5425	42	Hazel (<i>Corylus</i>)	Fireplace (ID 2)
Ua-50175	5557	43	Alder (<i>Alnus</i>)	Fireplace (ID 3)
Ua-50176	5156	44	Willow (<i>Salix</i>)	Cooking pit (ID 7)



^{14}C -dates match the typological indicators in the artefact assemblage at Trondalen (Mansrud 2018). No disturbances required editing in the DTM.

Table 63: Tverdal

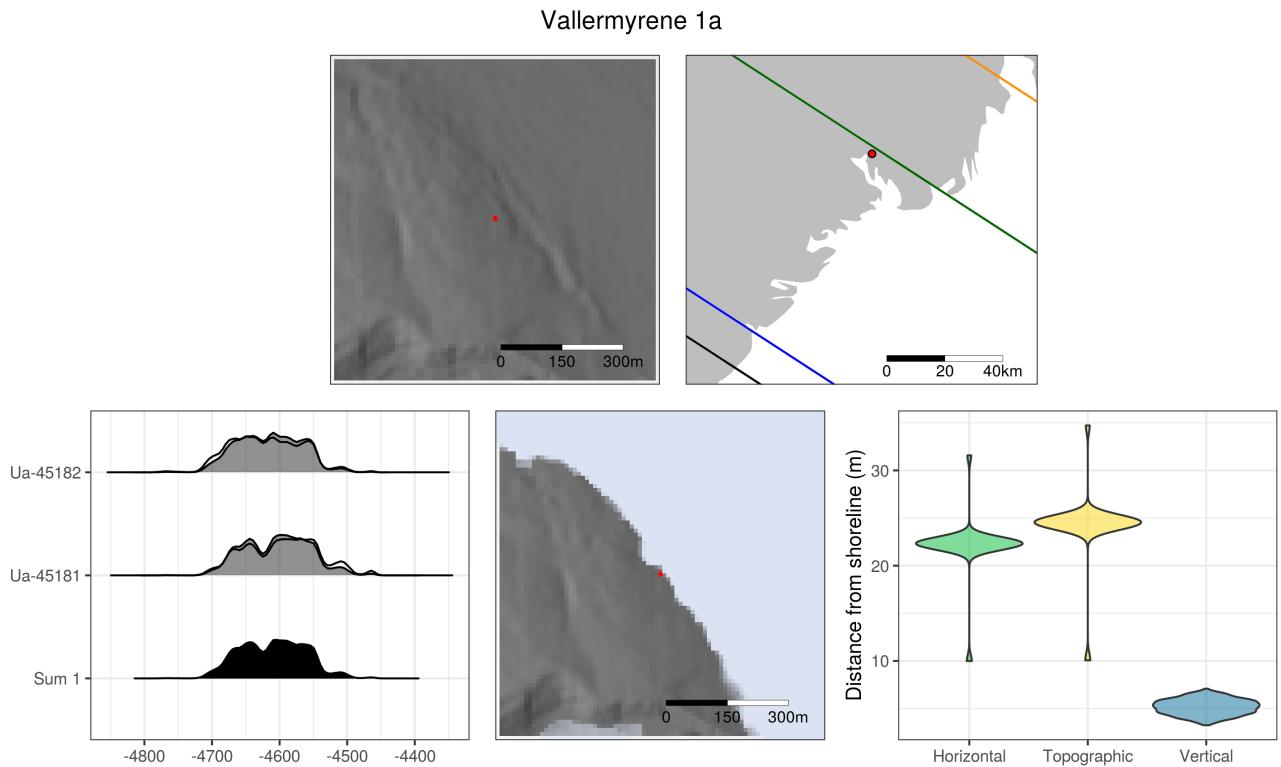
ID	^{14}C BP	Error	Material	Context
TRa-443	2480	35	Yew (<i>Taxus</i>)	Cultural layer, quadrant (16x10ySE)
TRa-444	4370	45	Birch (<i>Betula</i>)	Cultural layer, quadrant (14x10yNW)
TRa-445	2535	30	Birch (<i>Betula</i>)	Cultural layer, quadrant (16x10yNW)
TRa-446	2475	40	Yew (<i>Taxus</i>)	Cultural layer, quadrant (16x10ySW)
Ua-47406	4536	131	Dog (<i>Canis familiaris</i>)	Cultural layer, quadrant (16x10y)
Ua-47407	4622	48	Boar (<i>Sus scrofa</i>)	Cultural layer, quadrant (16x10y)
Ua-47408	4401	36	Mammal (<i>Mammalia</i>)	Cultural layer, quadrant (16x10y)



Tverdal is an unpublished site. Preliminary analysis indicates that radiocarbon dates and typological indicators match. The area surrounding the site appears relatively undisturbed by modern activity.

Table 64: Vallermyrene 1a

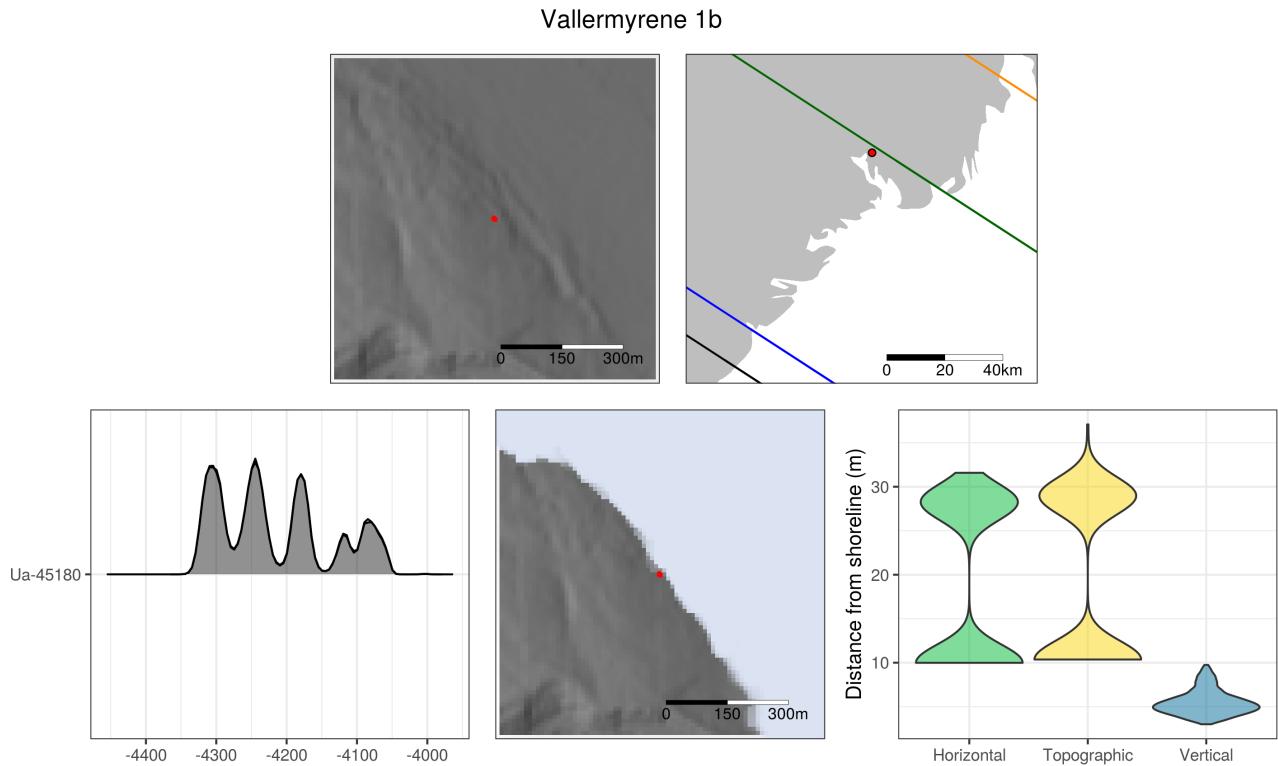
ID	^{14}C BP	Error	Material	Context
Ua-45182	5770	35	Pine (<i>Pinus</i>)	Fireplace (ID 322)
Ua-45181	5748	35	Pine (<i>Pinus</i>)	Cooking pit/fireplace (ID 301)



Vallermyrene 1 was divided into 1a and 1b based on elevation difference, typology and ^{14}C -dates (Reitan 2014f). Vallermyrene 1a is the oldest of the two. Although situated not that far from the railway, the area immediately surrounding the site has not been disturbed in a way that appears to impact the reconstruction of the past sea-level.

Table 65: Vallermyrene 1b

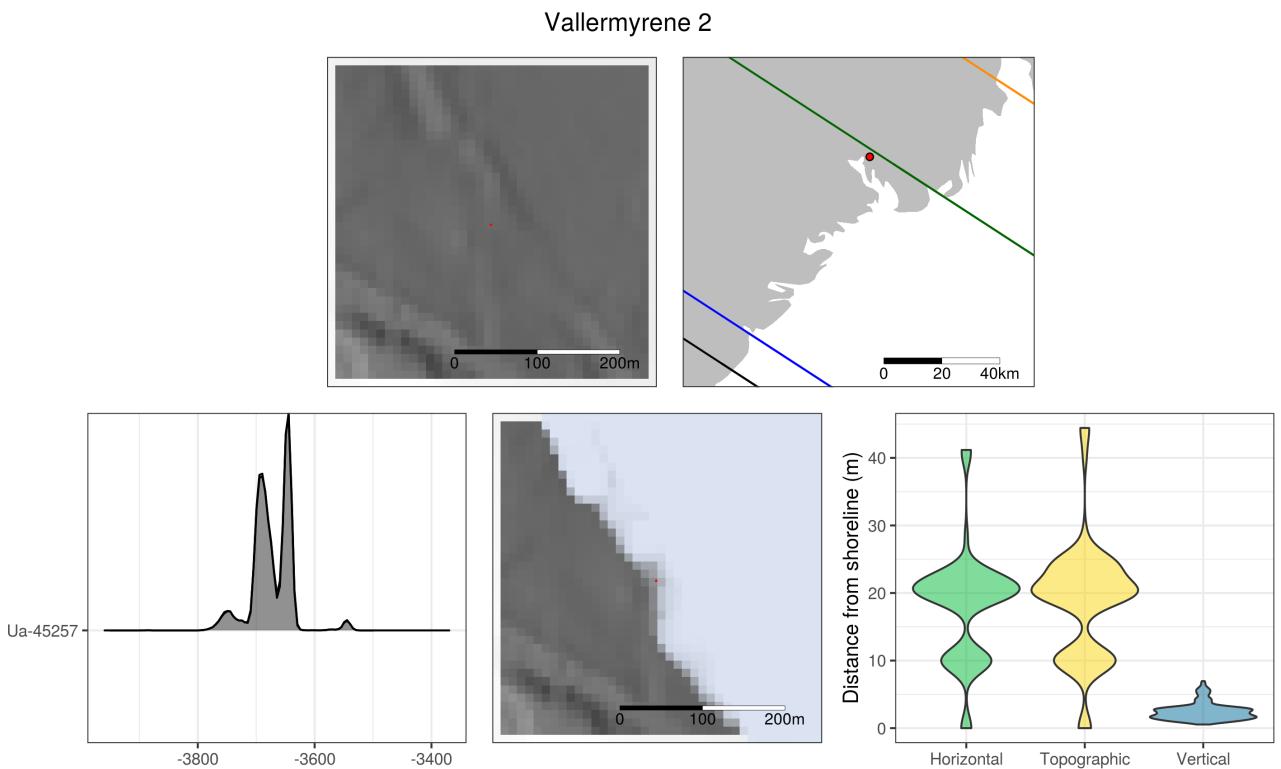
ID	^{14}C BP	Error	Material	Context
Ua-45180	5373	34	Birch (Betula)	Cooking pit/fireplace (ID 391)



Vallermyrene 1b is younger than Vallermyrene 1a (above), as indicated both by the radiocarbon date, typology and elevation (Reitan 2014f). The DTM did not require editing.

Table 66: Vallermyrene 2

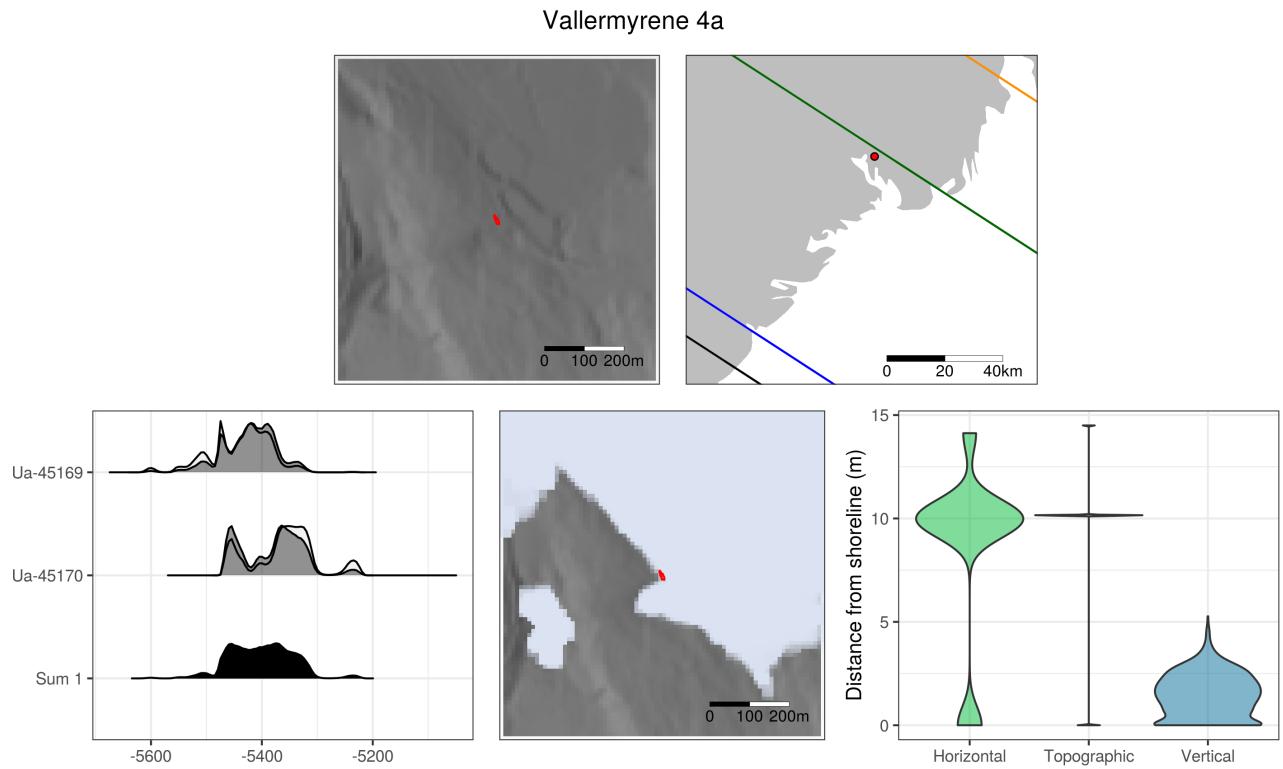
ID	^{14}C BP	Error	Material	Context
Ua-45257	4890	32	Hazel (<i>Corylus</i>)	Fireplace (ID 1017)
Ua-45253	3047	32	Birch (<i>Betula</i>)	Cooking pit? (ID 4026)
Ua-45258	2821	30	Willow (<i>Salix</i>)	Post hole? (ID 4455)
Ua-45251	2243	32	Willow (<i>Salix</i>)	Cooking pit (ID 350)
Ua-45256	2181	30	Birch (<i>Betula</i>)	Post hole (ID 2889)
Ua-45255	2156	30	Birch (<i>Betula</i>)	Cultivation layer (Profile in trench)
Beta-324757	2120	30	Hazel (<i>Corylus</i>)	Cultivation layer (611x554y)
Ua-45259	2009	30	Birch (<i>Betula</i>)	Cultivation layer (Profile)
Ua-45260	1942	30	Birch (<i>Betula</i>)	Post hole (ID 4210)
Ua-45249	1846	31	Birch (<i>Betula</i>)	Cooking pit (ID 545)
Ua-45248	1803	31	Birch (<i>Betula</i>)	Cooking pit (ID 437)
Ua-45252	1654	30	Birch/hazel/rowan (<i>Betula/Corylus/Sorbus</i>)	Undefined feature (ID 3351)
Ua-45254	1593	30	Pine (<i>Pinus</i>)	Post hole (ID 4468)
Ua-45250	1560	32	Birch (<i>Betula</i>)	Cooking pit/fireplace (ID 1043)



Vallermyrene 2 was a large site situated in a field (Reitan 2014g). The site has ^{14}C -dates and artefacts dating occupations at the site to multiple phases throughout prehistory, including the Bronze Age and phases up until the Viking Age. The Stone Age activity on the site was evidenced by 359 lithics and a fireplace dated to the Early Neolithic. Given its uncertain extent, the site limit used here is defined by the fireplace.

Table 67: Vallermyrene 4a

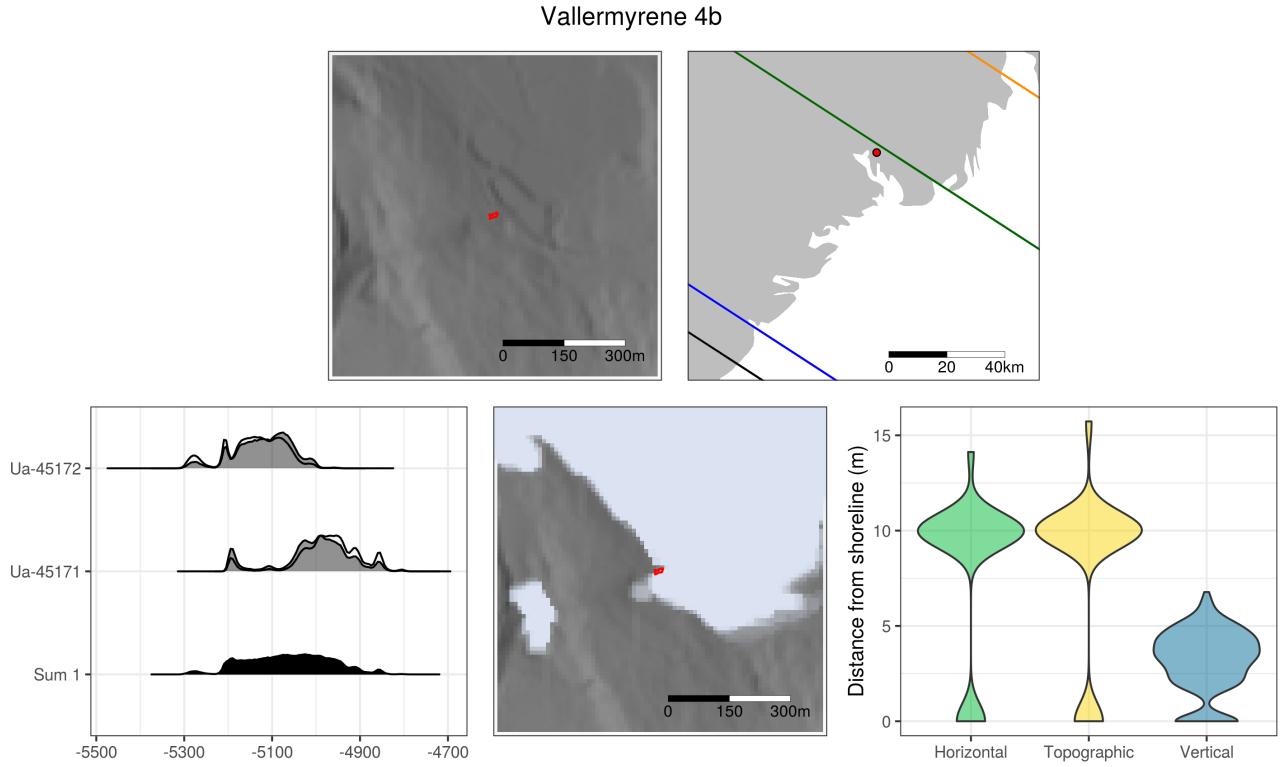
ID	^{14}C BP	Error	Material	Context
Ua-45169	6489	50	Burnt bone, mammal (0.5g)	Quadrant (894x242yNE, layer 1)
Ua-45170	6381	37	Burnt bone, mammal (1g)	Quadrant (892x243yNW, layer 3)



Vallermyrene 4 was, as with Vallermyrene 1 (above), divided into Vallermyrene 4a and 4b based on radiocarbon dates and differences in elevation (Eigeland and Fossum 2014). Typologically the sites are identical, and match the ^{14}C -dates. Vallermyrene 4a is the older of the two and was less disturbed by modern activity before the excavation. The railway runs just east and north-east of the site and had to be removed. In addition, what appears to be a gravel pit was located to the south-west. Both railway and gravel pit appear to have been adequately edited in the employed DTM.

Table 68: Vallermyrene 4b

ID	^{14}C BP	Error	Material	Context
Ua-45172	6197	40	Pine (Pinus)	Refuse/storage pit (ID 896)
Ua-45171	6067	41	Pine (Pinus)	Refuse/storage pit (ID 896)



Vallermyrene 4b is slightly younger than Vallermyrene 4a (above). Typology and radiocarbon dates match (Eigeland and Fossum 2014). The DTM was edited to remove the railway track running by the site and a gravel pit.

0.4 Model comparison and selection

In the figure below a series of standard models have been fit to the simulation results older than 2500 BCE (presented with negative values set to zero in Figure 7A in the main text). The models were fit by means of maximum likelihood estimation. Before fitting all models, the values have been adjusted by adding a constant of 0.001 to avoid zero values for the logistic, log normal, power law and gamma distributions. The models have only been fit to the positive values. This was done both when removing the negative values and when forcing these to zero, before adjusting by 0.001. As the difference between these two solutions was negligible and as the assumption here is that the negative values in actuality reflect a distance of zero (see also main text), the result of employing the latter approach is reported on here. The performance of the models were then compared by means of the Akaike information criterion (AIC) and the Bayesian (or Schwarz) information criterion (BIC). The AIC and BIC evaluate the degree to which the models fit to the data, while penalising for the number of model parameters to avoid over-fitting (e.g Burnham and Anderson 2002; for applications in archaeology see e.g. Eve and Crema 2014; Timpson et al. 2021). As lower values point to a better model, it is evident from the results that the gamma distribution is the best candidate. The

approach taken here could have benefited from a more sophisticated treatment of the zero-values, which is related to the fact that these are likely to be a mix of both exact zeros, the case when there is an actual intersection between sea and site, and, although probably to a far lesser extent, zeroes that result from the case when the distance between site and sea is below the detection limit due to the employed methods and the resolution of the spatial data (see e.g. Dunn and Smyth 2005; Helsel 2005). In conclusion, however, the gamma represents a reasonable first approximation.

Simulation results > 2500 BCE

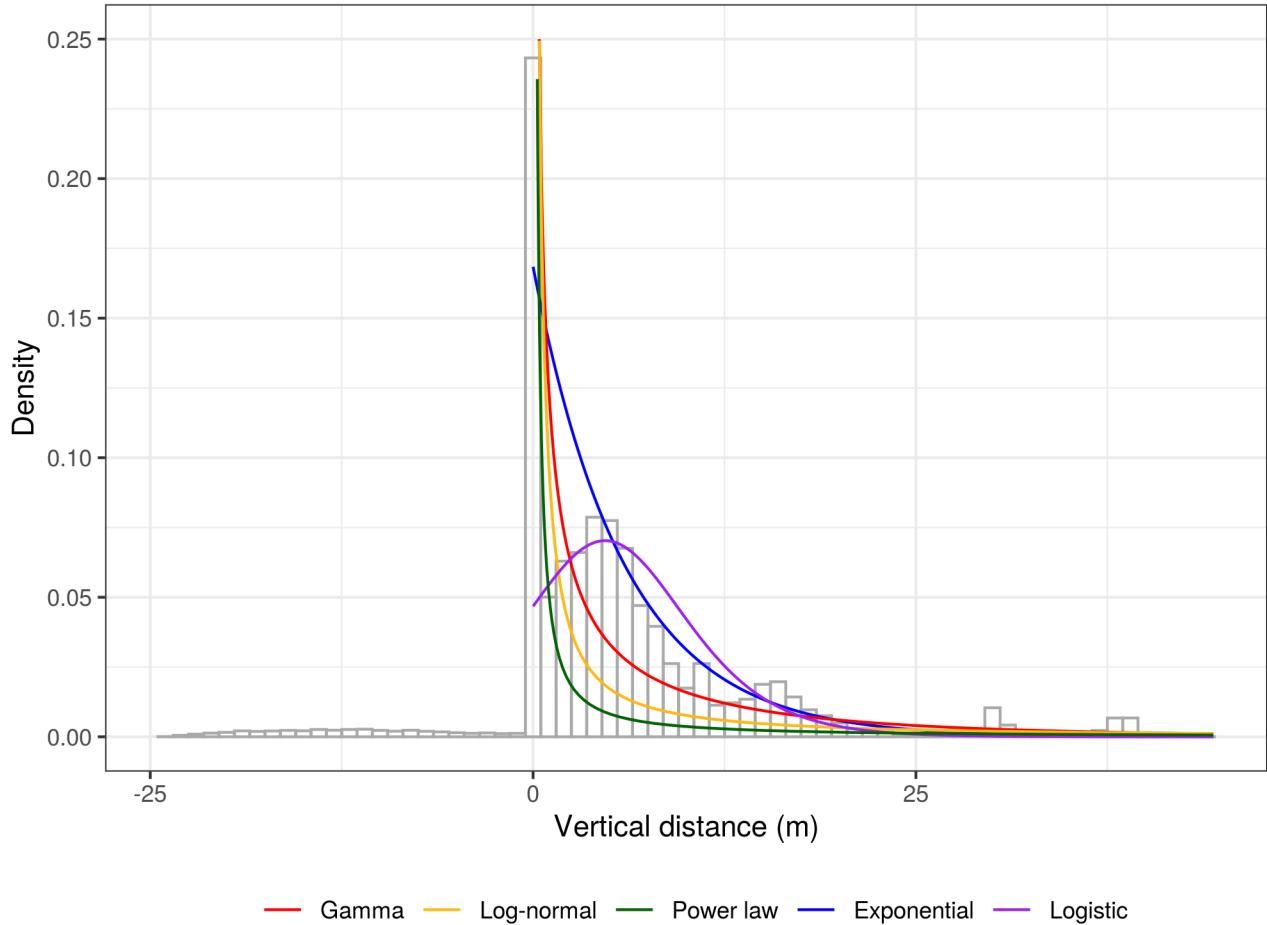


Table 69: Model comparison using AIC and BIC. The models are listed in the order of performance.

Model	Parameters	AIC	BIC	Log-liklihood
Gamma	Shape (α) = 0.286 Scale (σ) = 0.048	230247	230229	-115112
Log-normal	Mean of the logarithm (μ) = -0.647 SD of the logarithm (σ) = 3.926	268082	268064	-134030
Power law	Exponent (k) = 1.16	274052	274043	-137021
Exponential	Rate (λ) = 0.168	348484	348475	-174237
Logistic	Location (μ) = 4.698 Scale (σ) = 3.558	415322	415304	-207650

0.5 Numerical result of re-dating

Table 70: The result of shoreline dating previously shoreline dated sites using the method proposed here. The range of the 95% HDR is rounded to the nearest 10 years to reduce spurious precision.

	Site	Reported elevation	Reported date	95% HDR	Reference
1	Alveberget 6	17–23	5600–4500 BCE	5390 BCE–480 CE	Stokke 2021
2	Anvik	77–80	8550–8250 BCE	8840–5280 BCE	Eymundsson 2014
3	Austein 1	105–110	9500–8200 BCE	9070–8720 BCE	Matsumoto 2004
4	Bakke	98–98	8850–8800 BCE	9020–8460 BCE	Nyland & Amundsen 2012
5	Brunstad 26	46–50	5800–5600 BCE	5950–3290 BCE	Danielsen et al. 2018
6	Danebuåsen	70–75	8500–8300 BCE	8530–5240 BCE	Koxvold 2018b
7	Dørdal	100–101	8600–8400 BCE	9100–8620 BCE	Solheim et al. 2017
8	Dybdalshei 4	25–25	6900–5900 BCE	7720 BCE–420 CE	Granum & Schülke 2018
9	Gunnarsrød 10	43–44	5800–5600 BCE	5940–2580 BCE	Reitan & Fossum 2014
10	Gunnarsrød 3	35–36	5000–5000 BCE	5180–1640 BCE	Reitan 2014j
11	Gunnarsrød 6a	45–46	6400–6000 BCE	6280–2880 BCE	Carrasco et al. 2014
12	Gunnarsrød 6b	46–46.5	6400–6000 BCE	6480–2970 BCE	Carrasco et al. 2014
13	Gunnarsrød 7	55–59	7800–7300 BCE	8060–4670 BCE	Fossum 2014a
14	Gunnarsrød 8	52–54	7300–7000 BCE	7750–4260 BCE	Fossum 2014e
15	Hegna øst 3	37–39	5700–5600 BCE	5430–1780 BCE	Koxvold & Solheim 2017b
16	Hegna øst 4	34–36	5300–5100 BCE	5200–1360 BCE	Koxvold et al. 2016
17	Hegna øst 5	44–49	7500–7000 BCE	6850–3070 BCE	Havstein 2017b
18	Hegna øst 6	55–58	7900–7500 BCE	7990–4640 BCE	Havstein 2017a
19	Hegna øst 7	40–42	6600–6200 BCE	5720–2190 BCE	Koxvold et al. 2017
20	Hegna vest 4	54–57	7900–7600 BCE	7930–4600 BCE	Eigeland & Fossum 2017b
21	Hesthag C3	35–40	8000–8000 BCE	8910 BCE–370 CE	Reitan 2017
22	Hesthag C6	38–41	8000–8000 BCE	9040 BCE–370 CE	Reitan 2017
23	Hovland 2	65–70	8300–7900 BCE	8530–5020 BCE	Koxvold 2013a
24	Hydal 3	76–78	8300–8100 BCE	8810–7290 BCE	Koxvold 2017f
25	Hydal 4	80–80	8300–8100 BCE	8870–7570 BCE	Koxvold 2017a
26	Hydal 5	76–77	8500–8200 BCE	8800–7140 BCE	Koxvold 2016
27	Hydal 6	79–79	8500–8300 BCE	8860–7440 BCE	Koxvold 2017i
28	Hydal 7	73–74	8300–8100 BCE	8720–5210 BCE	Koxvold 2017g
29	Hydal 8	70–73	8300–8000 BCE	8670–5220 BCE	Koxvold 2017h
30	Kjørholt	59–63	8000–7700 BCE	8260–4990 BCE	Koxvold 2020b
31	Krøgenes D10	18–20	5000–4000 BCE	5250 BCE–480 CE	Stokke & Reitan 2018b
32	Krøgenes D3	38–42	9300–8250 BCE	9320 BCE–350 CE	Viken 2017d
33	Krøgenes D5	13–14	2800–2400 BCE	3090 BCE–480 CE	Reitan & Solberg 2018b
34	Krøgenes D6	40–40	9300–8300 BCE	9320 BCE–350 CE	Viken 2017b
35	Krøgenes D7	17–18	4200–3600 BCE	4830 BCE–480 CE	Stokke & Reitan 2018b
36	Krøgenes D8	39–39	9250–8300 BCE	9290 BCE–360 CE	Viken 2017a
37	Krøgenesåsen 1	34–35	8850–8500 BCE	8960 BCE–390 CE	Nielsen 2017
38	Krøgenesåsen 2	36–38	8850–8500 BCE	9210 BCE–460 CE	Nielsen 2017
39	Kvastad A3	56–58	8300–8000 BCE	8920–5230 BCE	Stokke & Bjørkli 2016
40	Kvastad A4	52–61	8500–8300 BCE	8910–5230 BCE	Darmark et al. 2018
41	Kvastad A5-6	46–49	8400–8300 BCE	8680 BCE–310 CE	Viken 2018d
42	Kvastad A7	54–54	8700–8300 BCE	8890–7590 BCE	Darmark 2015
43	Kvastad A8	50–55	8600–8500 BCE	8880–5210 BCE	Darmark 2017
44	Kvastad A9	54–55	8700–8300 BCE	8900–5210 BCE	Darmark 2018a
45	Lågerød	64–68	7400–7000 BCE	7610–5390 BCE	Eymundsson 2012
46	Langangen Vestgård 2	40–41	5600–5600 BCE	5580–2170 BCE	Eggen 2014c
47	Langangen Vestgård 4	39–41	4300–4300 BCE	5530–2210 BCE	Reitan 2014h
48	Marisberg	30–30	8000–7500 BCE	8350 BCE–370 CE	Mansrud & Carrasco 2018b
49	Melau	100–100	9500–8200 BCE	9030–8520 BCE	Matsumoto 2004
50	Nauen B	33–34	4000–4000 BCE	4940–960 BCE	Persson 2008
51	Nedre Hobekk 1	78–80	8500–8200 BCE	8850–7230 BCE	Eigeland 2014b
52	Nedre Hobekk 2	95–97	8800–8500 BCE	9020–8370 BCE	Eigeland 2014a
53	Nedre Hobekk 3	72–75	8200–8000 BCE	8730–5080 BCE	Fossum 2014d
54	Nordby 1 (Bommestad-Sky)	65–66	7900–7500 BCE	8450–5000 BCE	Olsen 2013b
55	Nordby 2 (Bommestad-Sky)	65–70	7900–7500 BCE	8520–4990 BCE	Koxvold 2013b
56	Nordby 3 (Bommestad-Sky)	49–49	6700–6300 BCE	7200–3210 BCE	Mansrud 2013c

57	Olsmyren	70–72	7300–7050 BCE	7550–5450 BCE	Hårstad 2021
58	Øytangen	32–34	6500–5500 BCE	8010 BCE–420 CE	Berge & Loftsgarden 2012
59	Pauler 1	127–130	9200–9150 BCE	9280–8850 BCE	Schaller Åhrberg 2012
60	Pauler 2	124–124	9150–9100 BCE	9230–8830 BCE	Nyland 2012a
61	Pauler 3	114–114	9000–8950 BCE	9110–8790 BCE	Amundsen 2012a
62	Pauler 4	108–111	8950–8900 BCE	9070–8700 BCE	Nyland 2012b
63	Pauler 5	110.5–110.5	8975–8925 BCE	9080–8740 BCE	Amundsen 2012b
64	Pauler 6	98–98	8850–8800 BCE	9020–8420 BCE	Jaksland 2012a
65	Pauler 7	95–95	8800–8750 BCE	9010–8390 BCE	Jaksland 2012b
66	Pjonkerød R2	62–62	7200–6700 BCE	7080–4990 BCE	Carrasco 2015
67	Pjonkerød R3	62–65	7200–7000 BCE	7120–5070 BCE	Carrasco 2015
68	Prestemoen 2	34–39	4900–4900 BCE	5260–1640 BCE	Persson 2014b
69	Råen 1	65–65	7100–6900 BCE	7160–5270 BCE	Hårstad 2021b
70	Roverud 1	59–62	7500–7400 BCE	8230–5030 BCE	Koxvold 2020a
71	Roverud 2	56–59	7500–7400 BCE	8050–4850 BCE	Koxvold 2020a
72	Sagene B1	48–55	8800–8700 BCE	9200–7530 BCE	Viken 2018
73	Sagene B2	55–58	9200–8800 BCE	9340–7960 BCE	Darmark 2018b
74	Sagene B4	53–55	9000–8800 BCE	9090–7590 BCE	Darmark 2018c
75	Sagene B5	45–47	8800–8700 BCE	8950–5080 BCE	Viken 2017c
76	Sagene B6	48–52	8900–8700 BCE	8940–5180 BCE	Darmark 2018c
77	Skeid	94–95	8500–8300 BCE	9020–8300 BCE	Nielsen & Solheim 2017
78	Skutvikåsen 3	54–55	7230–7150 BCE	7860–4580 BCE	Ekstrand 2013
79	Skutvikåsen 4	59–59	7540–7540 BCE	8160–4920 BCE	Ekstrand 2013
80	Skutvikåsen 5	30–31	4400–4300 BCE	4750–780 BCE	Ekstrand 2013
81	Sky 1	108–108	8950–8900 BCE	9070–8680 BCE	Amundsen 2012c
82	Solum 1	94–95	8800–8400 BCE	9010–8330 BCE	Fossum 2014c
83	Stokke/Polland 3	36–39	6100–5400 BCE	5380–1880 BCE	Fossum 2017c
84	Stokke/Polland 4	33–34	5000–5000 BCE	5080–1330 BCE	Mansrud & Carrasco 2018a
85	Stokke/Polland 7	33–35	4900–4500 BCE	5120–1260 BCE	Koxvold & Solheim 2017a
86	Stokke/Polland 9	29–31	4200–4000 BCE	4730 BCE–90 CE	Fossum 2017e
87	Sundsaasen 1	62–66	7900–7700 BCE	8420–4990 BCE	Eggen 2014b
88	Sundsaasen 2	27–31	3800–3600 BCE	4540–830 BCE	Melvold & Persson 2014
89	Tangvall nedre 1	23–24	3550–3550 BCE	3700 BCE–200 CE	Stokke 2017
90	Tangvall nedre 2	23–25	3550–3550 BCE	3810 BCE–180 CE	Stokke 2017
91	Tinderholt 1	97–100	8600–8300 BCE	9040–8460 BCE	Koxvold 2017e
92	Tinderholt 2	104–107	8700–8400 BCE	9080–8680 BCE	Koxvold 2017d
93	Tinderholt 3	106–109	8700–8500 BCE	9100–8690 BCE	Koxvold 2017c
94	Vallermyrene 3	23–25	3200–3000 BCE	3740 BCE–210 CE	Reitan 2014i
95	Viulsrød 1	71–74	7500–7200 BCE	7610–5470 BCE	Reitan & Hårstad 2021b
96	Viulsrød 2	67–69	7100–6900 BCE	7310–5440 BCE	Reitan & Hårstad 2021b

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