

Supplementary material

Isak Roalkvam

10/27/2021

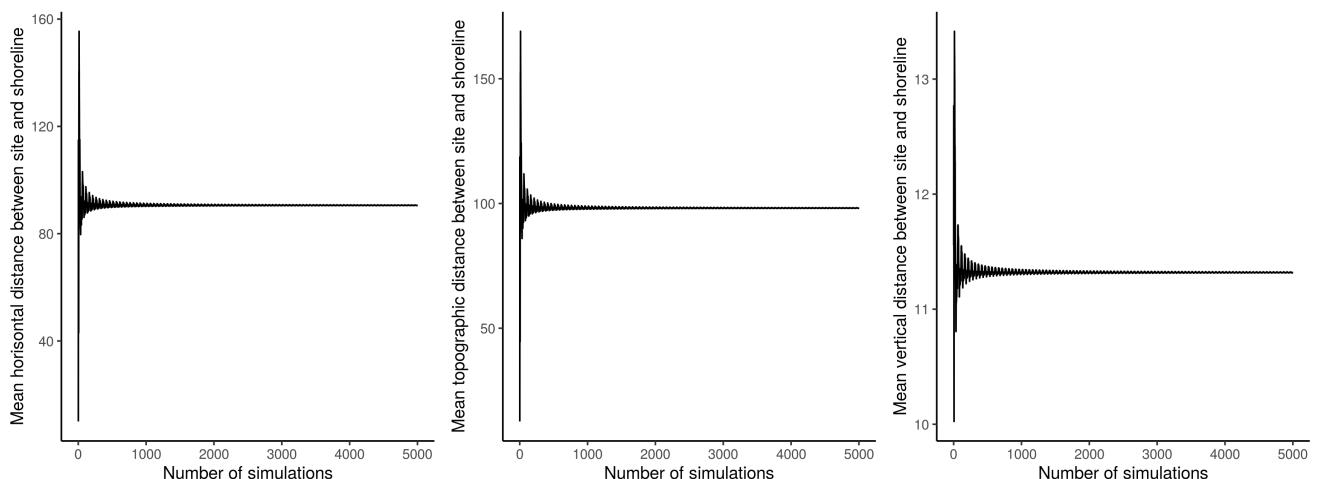
This document shows the simulation results for each individual site analysed in the study with some additional notes pertaining to edits to the DTM, treatment of ^{14}C -dates and other relevant information. The sites are presented in alphabetical order. All underlying and derived data are available in the online repository for the paper at <https://osf.io/7F9SU>

Stone Age sites for which no spatial data was readily available are Frebergsvik A–C (**mikkelsen1975?**), Nedre Holtan (**sjursjeike?**), Rughtvedt (**odgaard1994?**), Tangen (**glorstad2005?**), and Torsrød (**østmo1975?**). 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 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 a wide uncertainty range, and because it is located in an area of the landscape where the landscape results in quite large variability on the distance measures.

```
## Warning in include_graphics(here("analysis/figures/sample_size.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
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Test-run on Hovland 5 to inform number of simulation runs

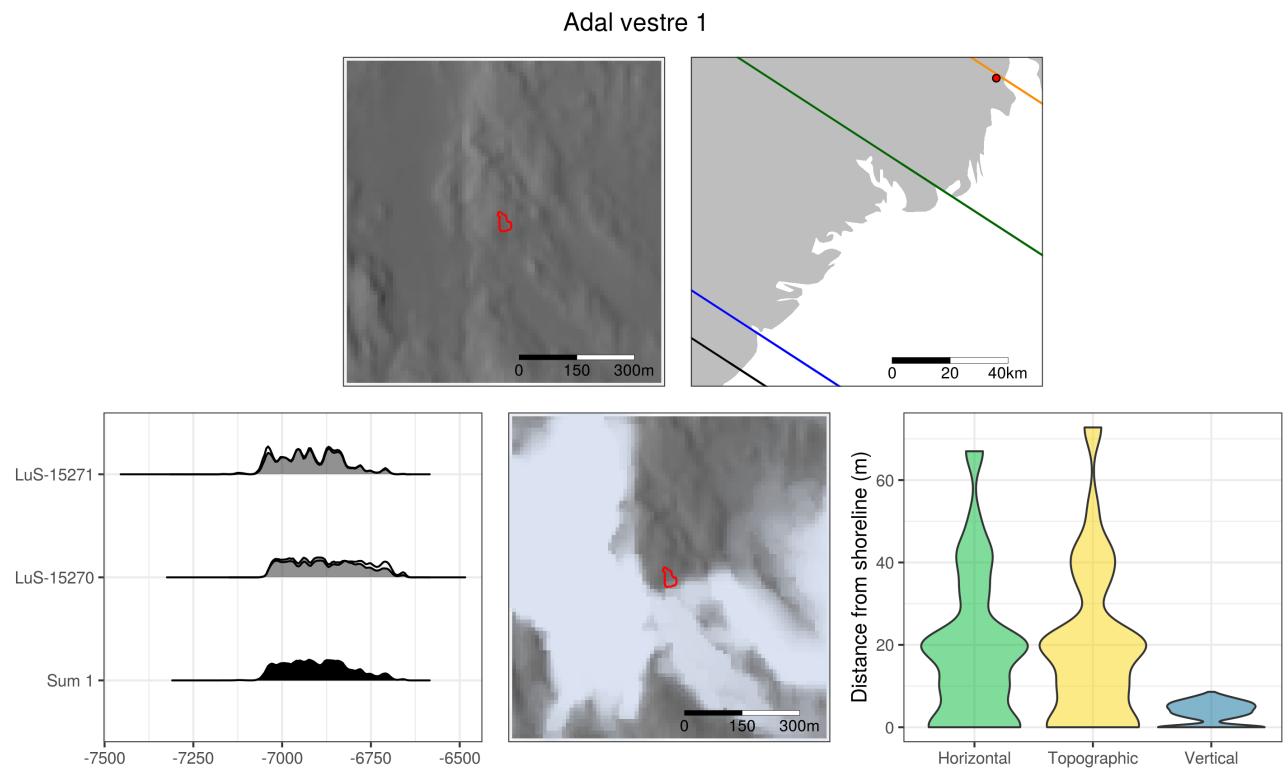


Below follows the presentation of the individual sites. The first plot on the first row for each site shows all calibrated radiocarbon dates from the Stone Age associated with the site (see analysis/data/raw_data/radiocarbon.csv for all dates, including those falling outside of the period). The fill 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/03script.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.

```
## Warning in include_graphics(here("analysis/figures/adalvestre1.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
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```



Adal vestre 1 is situated close to a field, but this does not appear to have resulted in any relevant changes to the terrain.

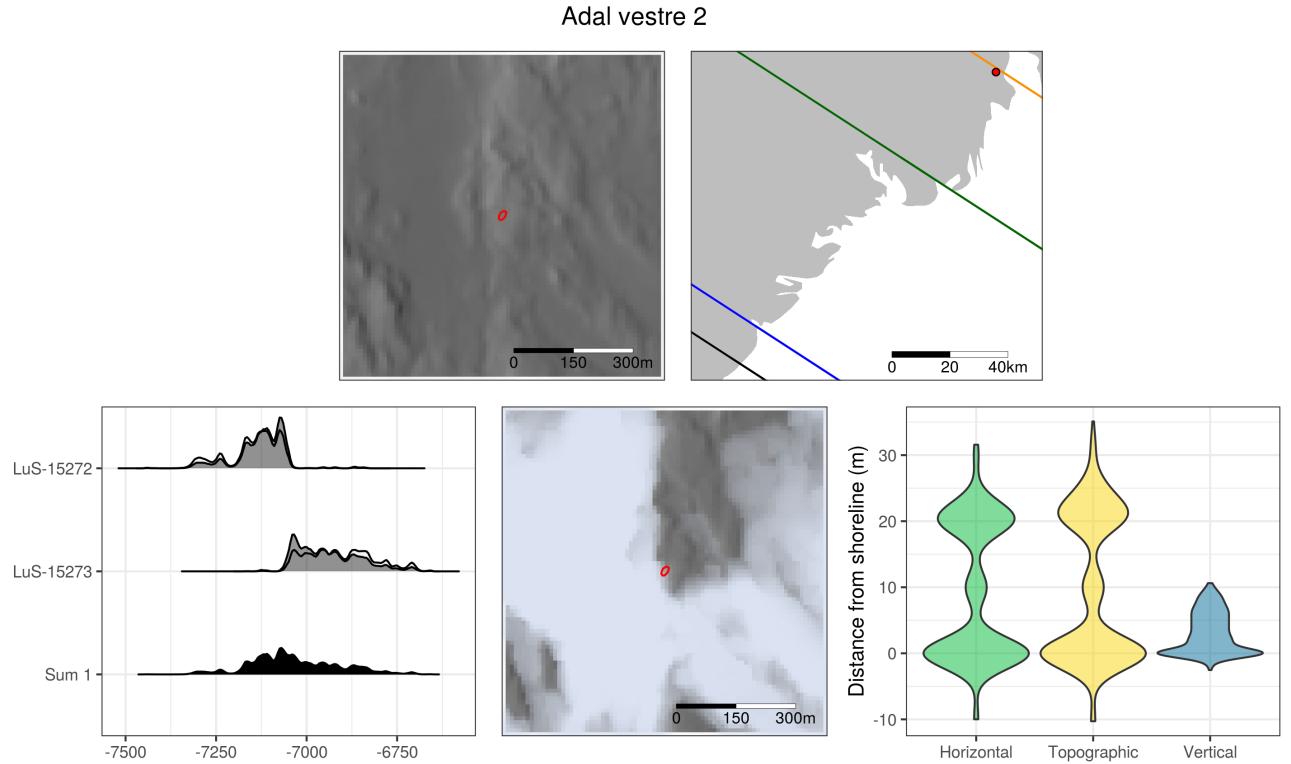
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## Warning in knitr:::include_graphics(here("analysis/figures/adalvestre2.png")): It
## is highly recommended to use relative paths for images. You had absolute paths:
## "/home/isak/phd/assessing.sealevel.dating/analysis/figures/adalvestre2.png"
```

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)

Table 2: Adal vestre 2

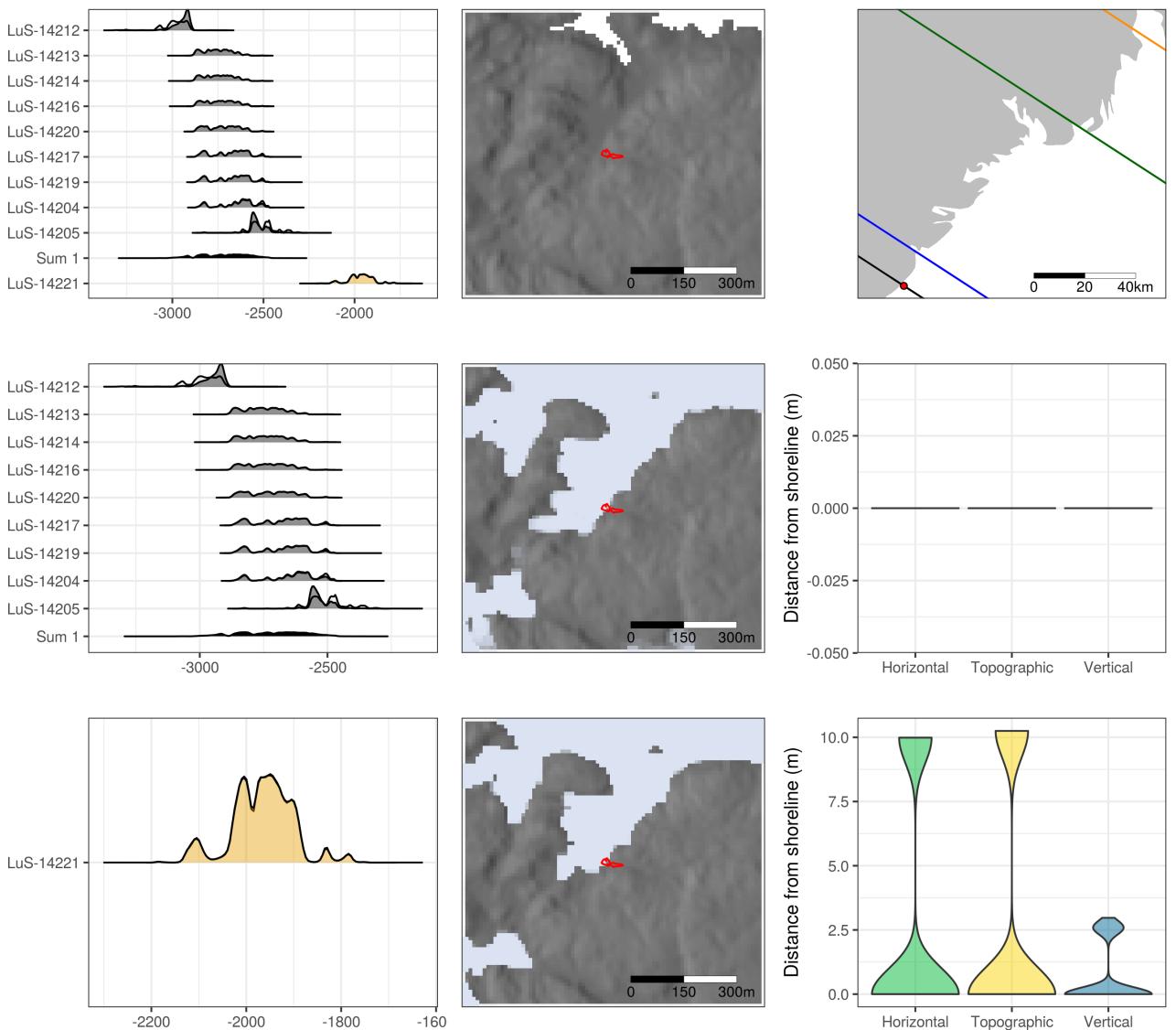
ID	^{14}C BP	Error	Material	Context
LuS-15272	8140	45	Hazel (Corylus), nutshell	Cooking pit/fireplace (ID 10036)
LuS-15273	8000	45	Hazel (Corylus), nutshell	Cooking pit/fireplace (ID 10051)



Adal vestre 2 has a similar location in the present day landscape to that of Adal vestre 1 (above).

```
## Warning in include_graphics(here("analysis/figures/alveberget8.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
## home/isak/phd/assessing.sealevel.dating/analysis/figures/alveberget8.png"
```

Alveberget 8



The artefact inventory at Alveberget 8 matches the radiocarbon dates ([mansrud2021?](#)). The site is located in an undisturbed area of the DTM.

```
## Warning in include_graphics(here("analysis/figures/anvik.png")): It is highly
## recommended to use relative paths for images. You had absolute paths: "/home/
## isak/phd/assessing.sealevel.dating/analysis/figures/anvik.png"
```

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)

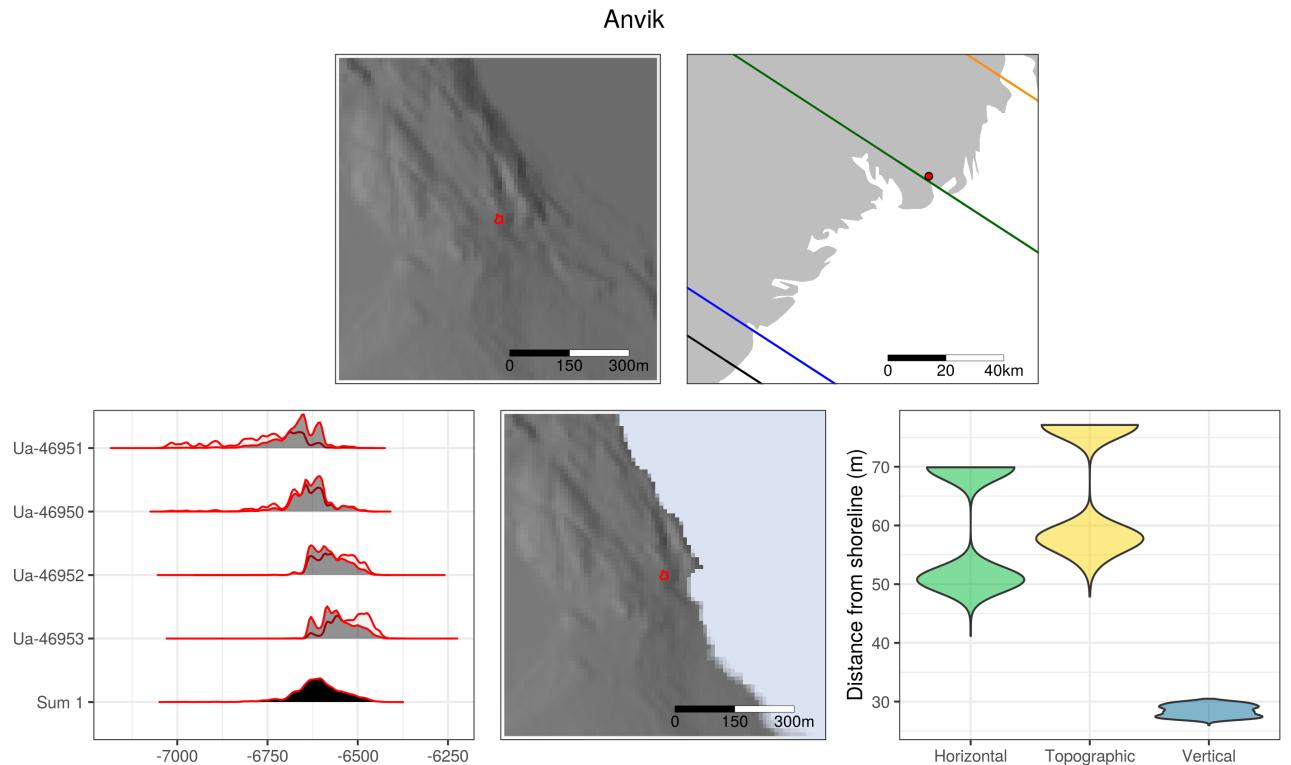
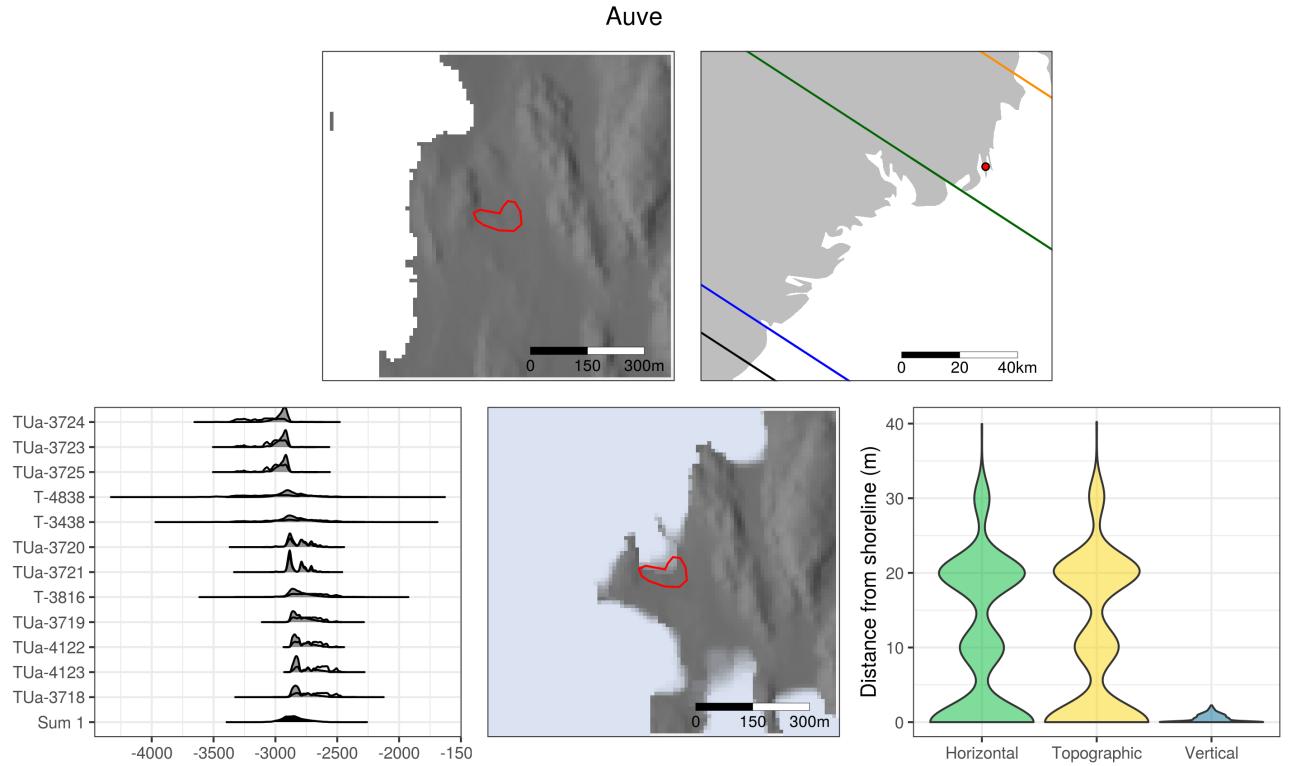


Table 4: Anvik

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 2014) 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).

```
## Warning in include_graphics(here("analysis/figures/auve.png")): It is highly
## recommended to use relative paths for images. You had absolute paths: "/home/
## isak/phd/assessing.sealevel.dating/analysis/figures/auve.png"
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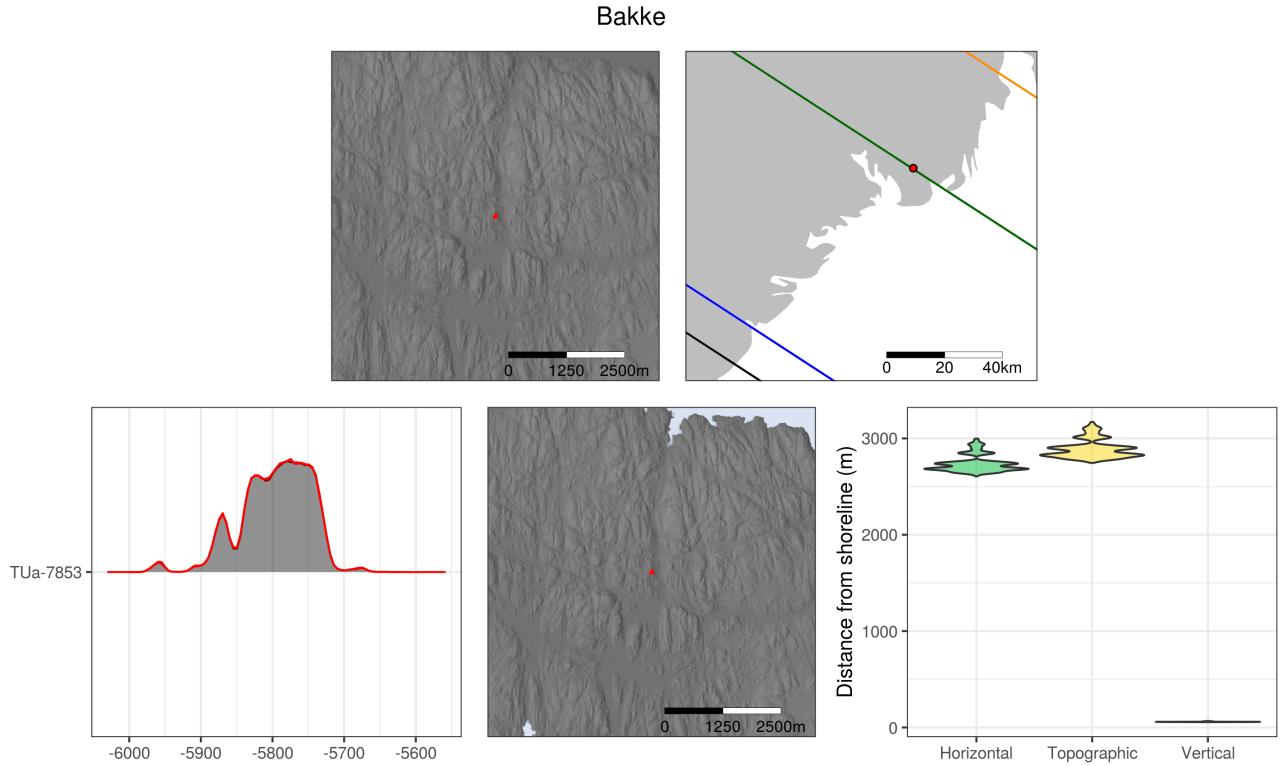


The site limit for Auve was drawn manually based on the description in the publication of the site and the site geometry available in the database Askeladden. The site is located in and around an intersection of the road, parts of the area has been levelled and farmed, and an area to north-west of the 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, fig. 142), nothing was done to try to correct for these factors.

```
## Warning in knitr:::include_graphics(here("analysis/figures/bakke.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
## home/isak/phd/assessing.sealevel.dating/analysis/figures/bakke.png"
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Table 5: Auve

ID	¹⁴ C BP	Error	Material	Context
TUa-3716	1640	40	Pine/rowan/birch (Pinus/Sorbus/Betula)	Sand layer
TUa-3717	1215	70	Willow/pine/hazel (Salix/Pinus/Corylus)	Sand layer
TUa-3722	130	65	Pine/birch (Pinus/Betula)	Sand layer
TUa-3724	4420	80	Pine/birch (Pinus/Betula)	Square (ID AE21)
T-3437	3570	160	Pine (Pinus)	Excavation unit, unknown
TUa-3723	4365	55	Willow/pine (Salix/Pinus)	Square (ID AC22)
TUa-3719	4150	55	Willow/deciduous/pine (Salix/Decid. indet./Pinus)	Square (ID R9)
T-4838	4330	190	Elm/willow/linden/pine (Ulmus/Salix/Tilia/Pinus)	Excavation unit, unknown
T-3438	4240	160	Pine (Pinus)	Excavation unit, unknown
TUa-3721	4240	45	Willow/hazel/pine/birch (Salix/Corylus/Pinus/Betula)	Square (ID W14)
TUa-3720	4230	60	Deciduous (Decid, indet.)	Square (ID W12)
T-3816	4150	110	Pine/aspen (Pinus/Populus)	Excavation unit, unknown
TUa-3725	4355	55	Birch/pine (Betula/Pinus)	Square (ID AC22)
TUa-4122	4130	40	Deciduous/pine (Decid, indet./Pinus)	Square (ID S11)
TUa-3718	4095	70	Willow/pine/birch (Salix/Pinus/Betula)	Square (ID Q11)
TUa-4123	4090	45	Birch/willow/pine (Betula/Salix/Pinus)	Square (ID Z17)
T-3436	3570	160	Pine (Pinus)	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 ([nyland2012b?](#)).

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## Warning in knitr::include_graphics(here("analysis/figures/brunstad24.png")): It
## is highly recommended to use relative paths for images. You had absolute paths:
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Table 6: Bakke

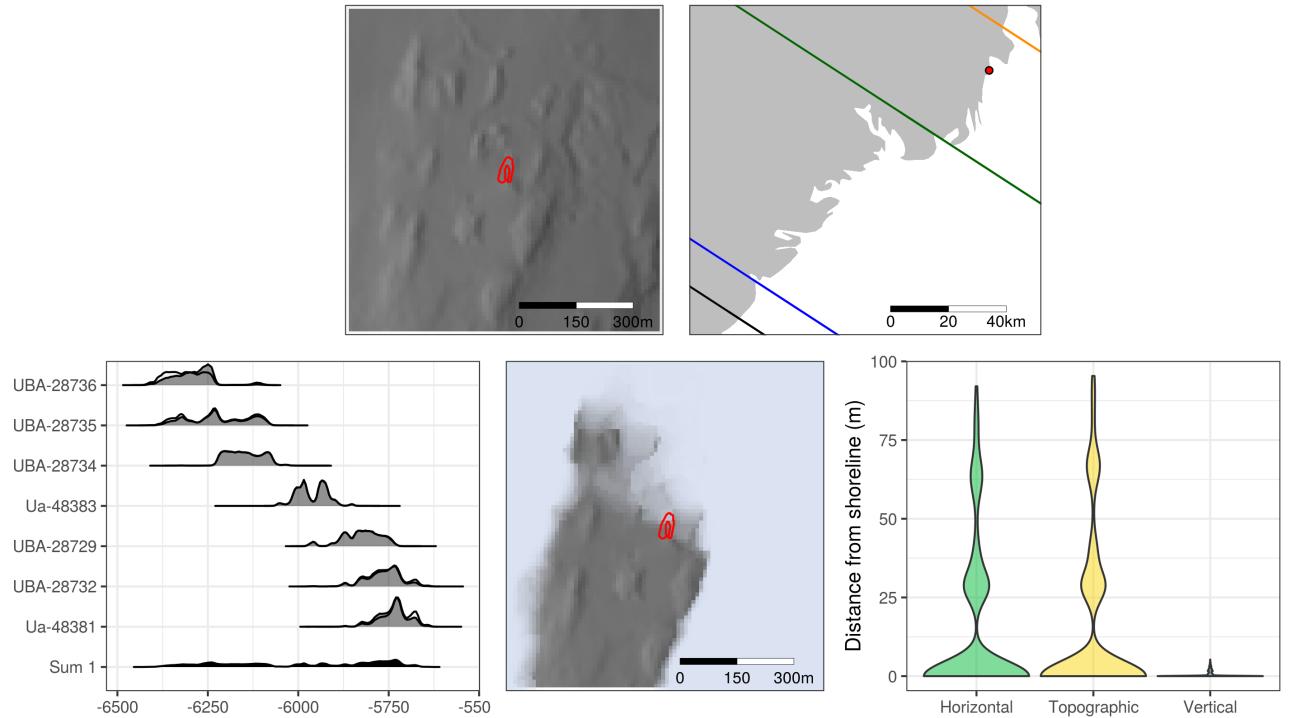
ID	^{14}C BP	Error	Material	Context
TUa-7852	2115	30	Birch (Betula)	Fireplace (ID 2)
TUa-7853	6915	40	Birch (Betula)	Fireplace (ID 2)

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)

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## "/home/isak/phd/assessing.sealevel.dating/analysis/figures/brunstad24.png"
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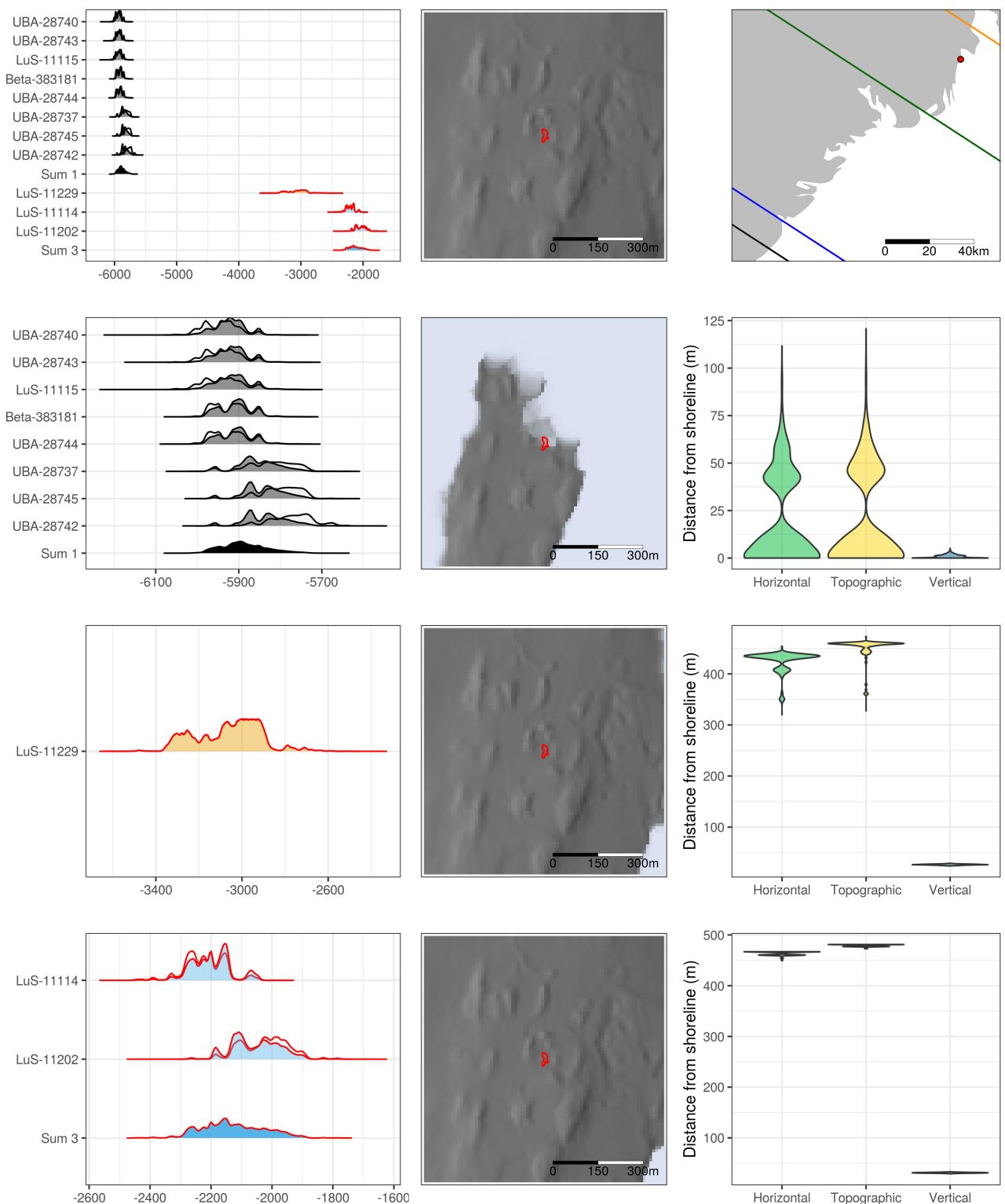
Brunstad 24



Typological indicators in the lithic inventory from Brunstad 24 matches the ^{14}C -dates (**danielsen2018?**). 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.

```
## Warning in knitr::include_graphics(here("analysis/figures/brunstad25.png")): It
## is highly recommended to use relative paths for images. You had absolute paths:
## "/home/isak/phd/assessing.sealevel.dating/analysis/figures/brunstad25.png"
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Brunstad 25



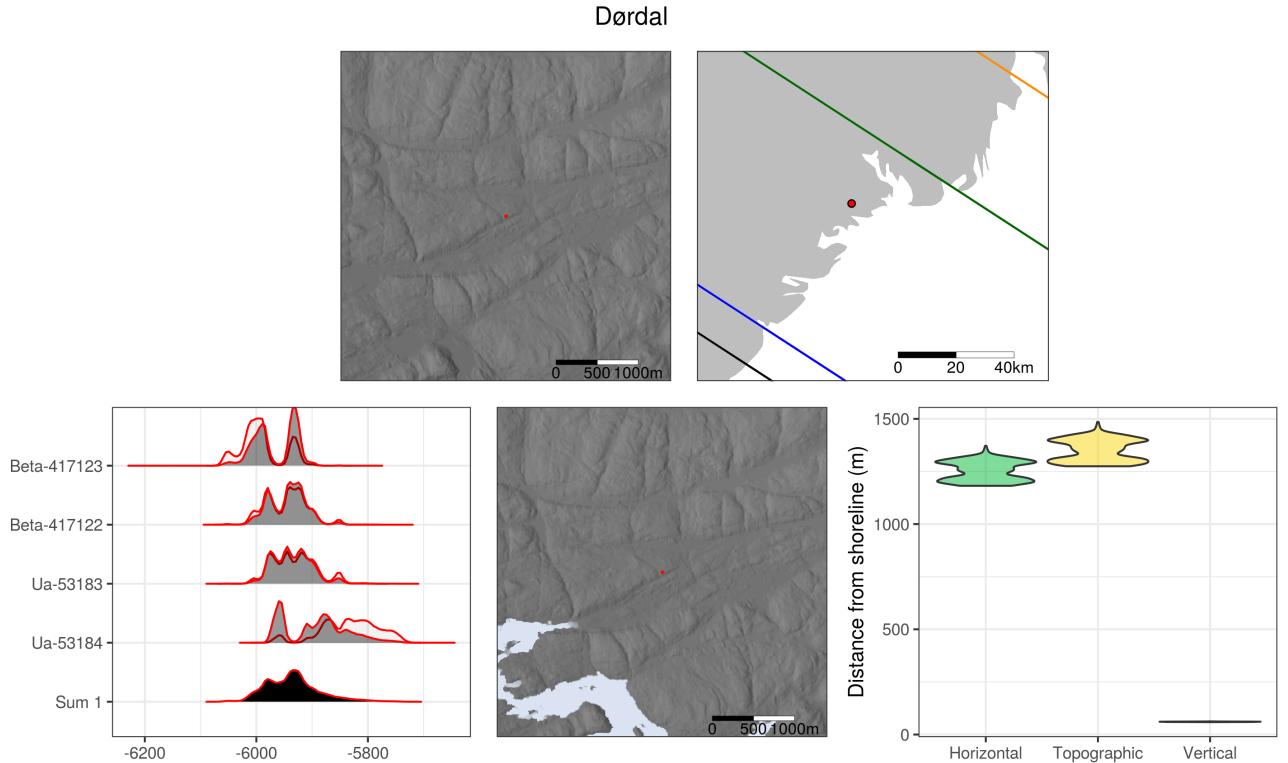
As with Brunstad 24 (above), the artefact inventory from Brunstad 25 matches the radiocarbon dates (Reitan and Solberg 2018), and the building structure covering the southern part of the site had impacted the DTM

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.

```
## Warning in include_graphics(here("analysis/figures/dordal.png")): It is highly
## recommended to use relative paths for images. You had absolute paths: "/home/
## isak/phd/assessing.sealevel.dating/analysis/figures/dordal.png"
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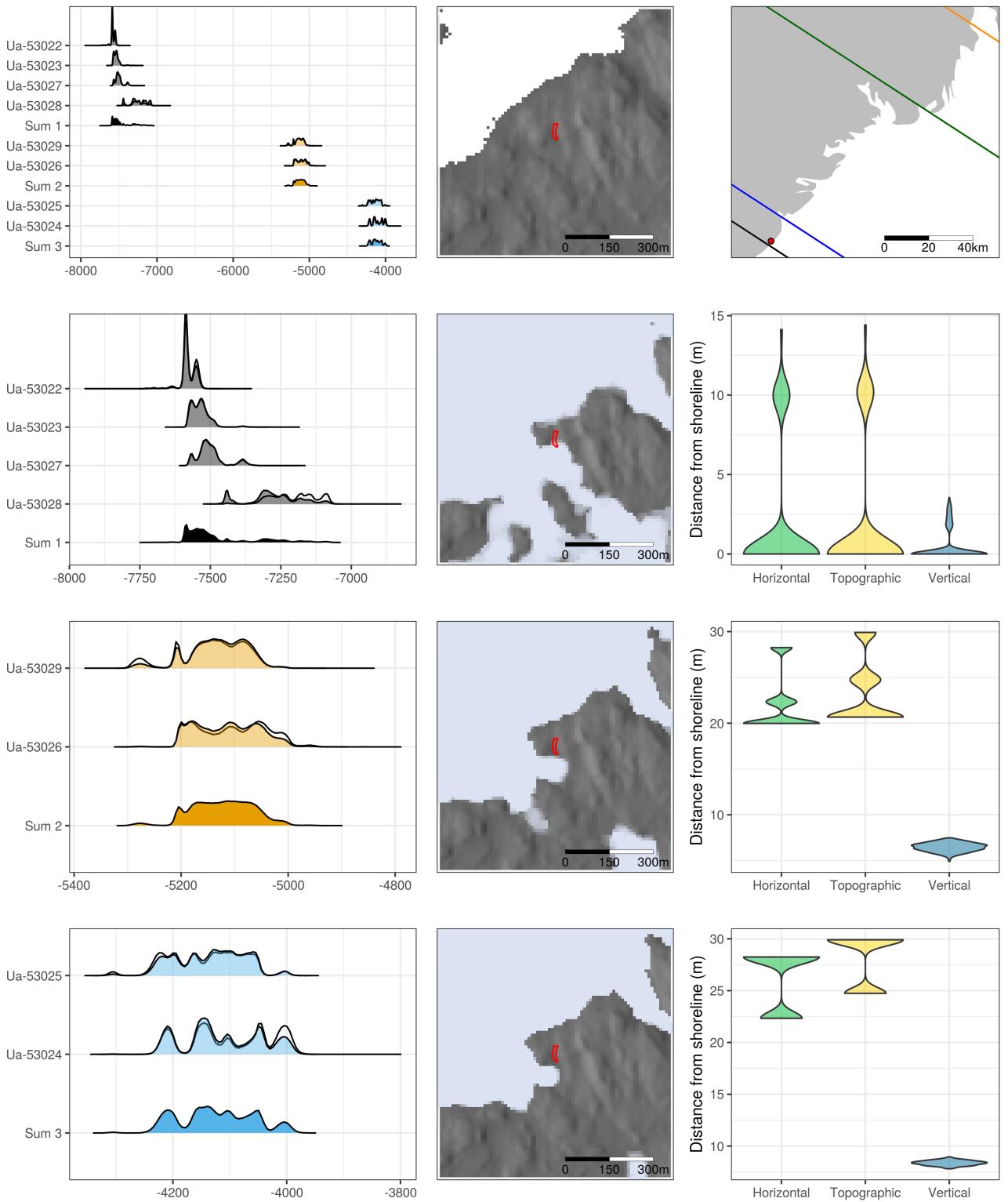
The ^{14}C -dates from two fireplaces at Dørdal are not related to the lithic inventory, where there are no typological indicators pointing the Late Mesolithic. The report suggest that the results might reflect a contamination through a natural process of some sort (Solheim, Koxvold, and Havstein 2017).

Table 9: Dørerdal

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)

```
## Warning in include_graphics(here("analysis/figures/dybdalshei1.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
## home/isak/phd/assessing.sealevel.dating/analysis/figures/dybdalshei1.png"
```

Dybdalshei 1



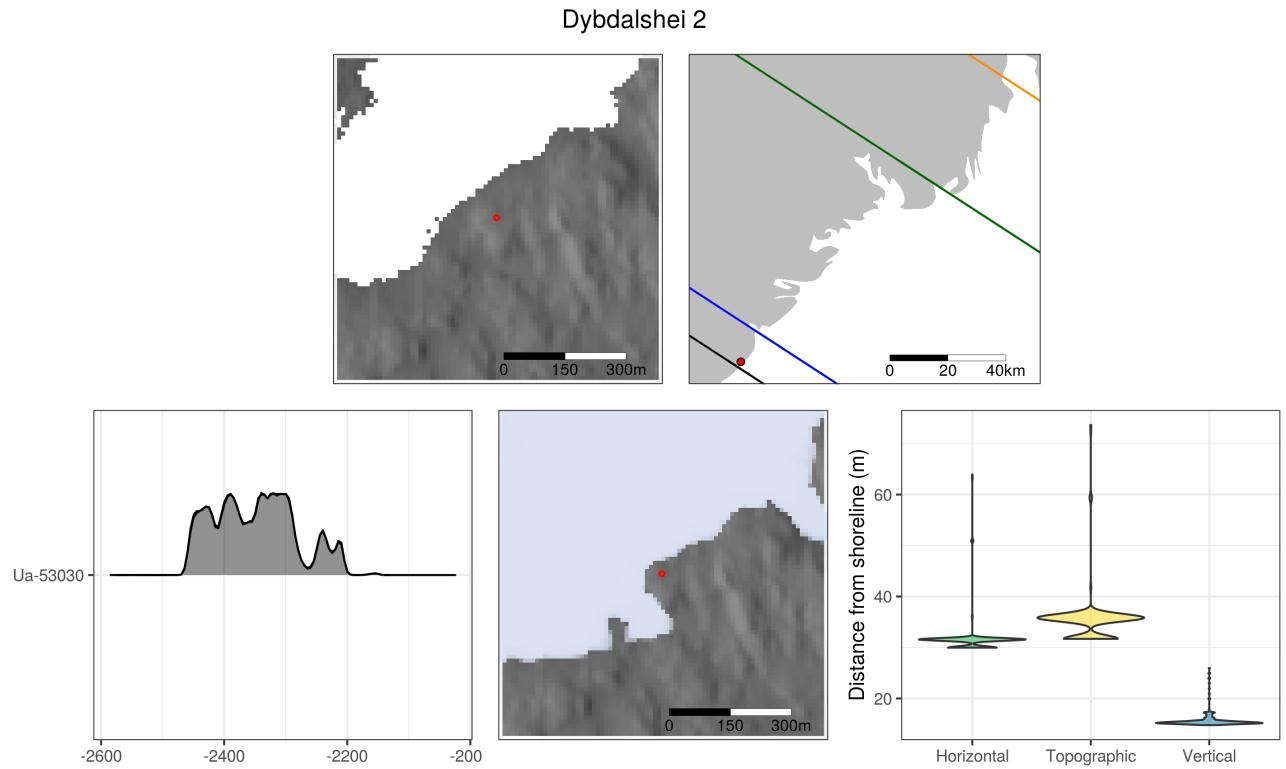
Dybdalshei 1 was subject to a very limited excavation (Granum and Schülke 2018), and the lack of data might therefore lead one to question whether or not the site actually represent a settlement area. Furthermore,

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)

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.

```
## Warning in include_graphics(here("analysis/figures/dybdalshei2.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
## home/isak/phd/assessing.sealevel.dating/analysis/figures/dybdalshei2.png"
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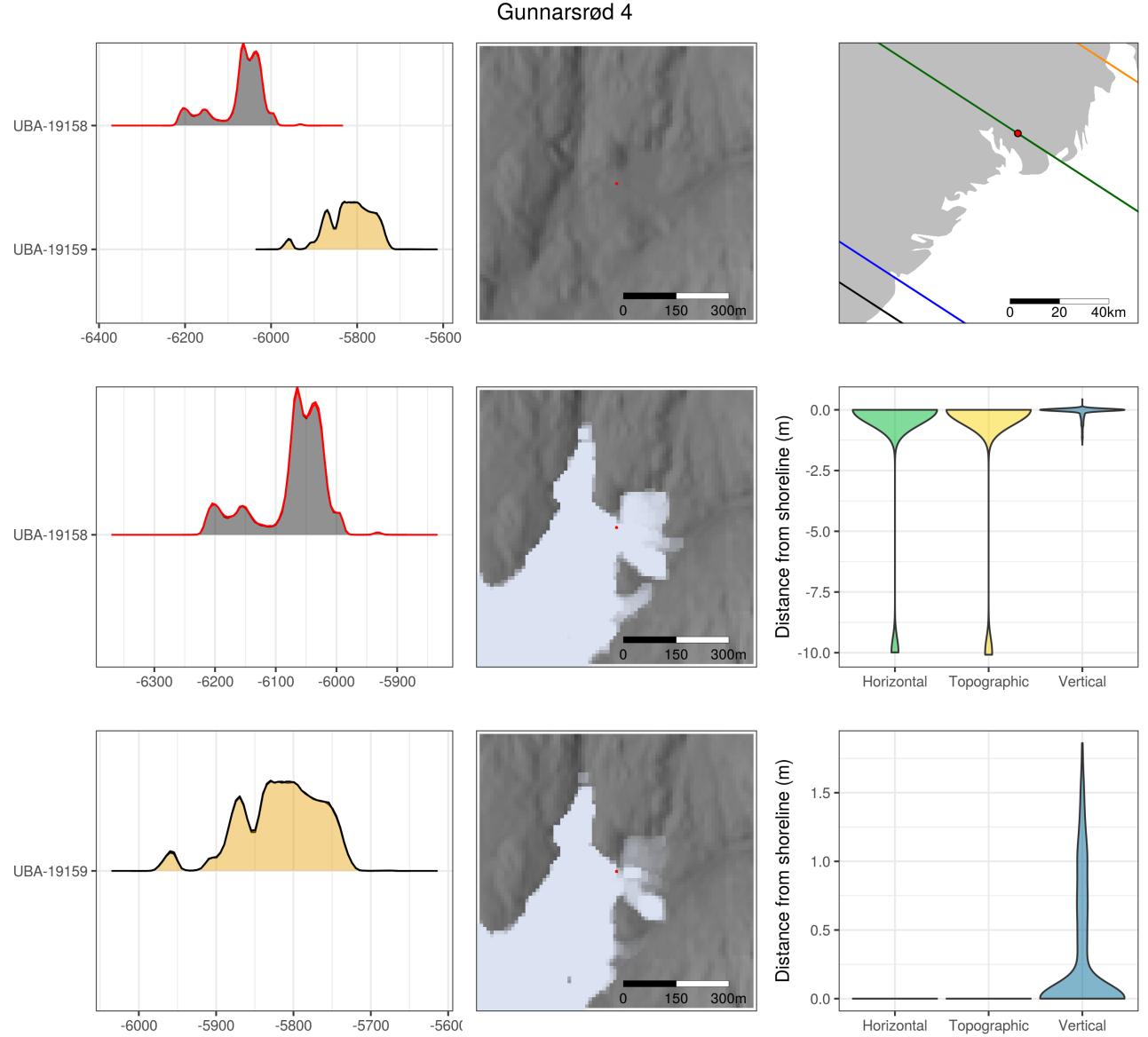
The situation on Dybdalshei 2 is similar to that on Dybdalshei 1 (above, Granum and Schülke 2018), but with only a single date from a single feature and no lithics, the site is not included in subsequent analysis.

```
## Warning in include_graphics(here("analysis/figures/gunnarsrod4.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
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Table 11: Dybdalshei 2

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

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## home/isak/phd/assessing.sealevel.dating/analysis/figures/gunnarsrod4.png"
```



The rock-shelter site Gunnarsrød 4 (Reitan 2014b), 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 2014b, fig. 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 2014b).

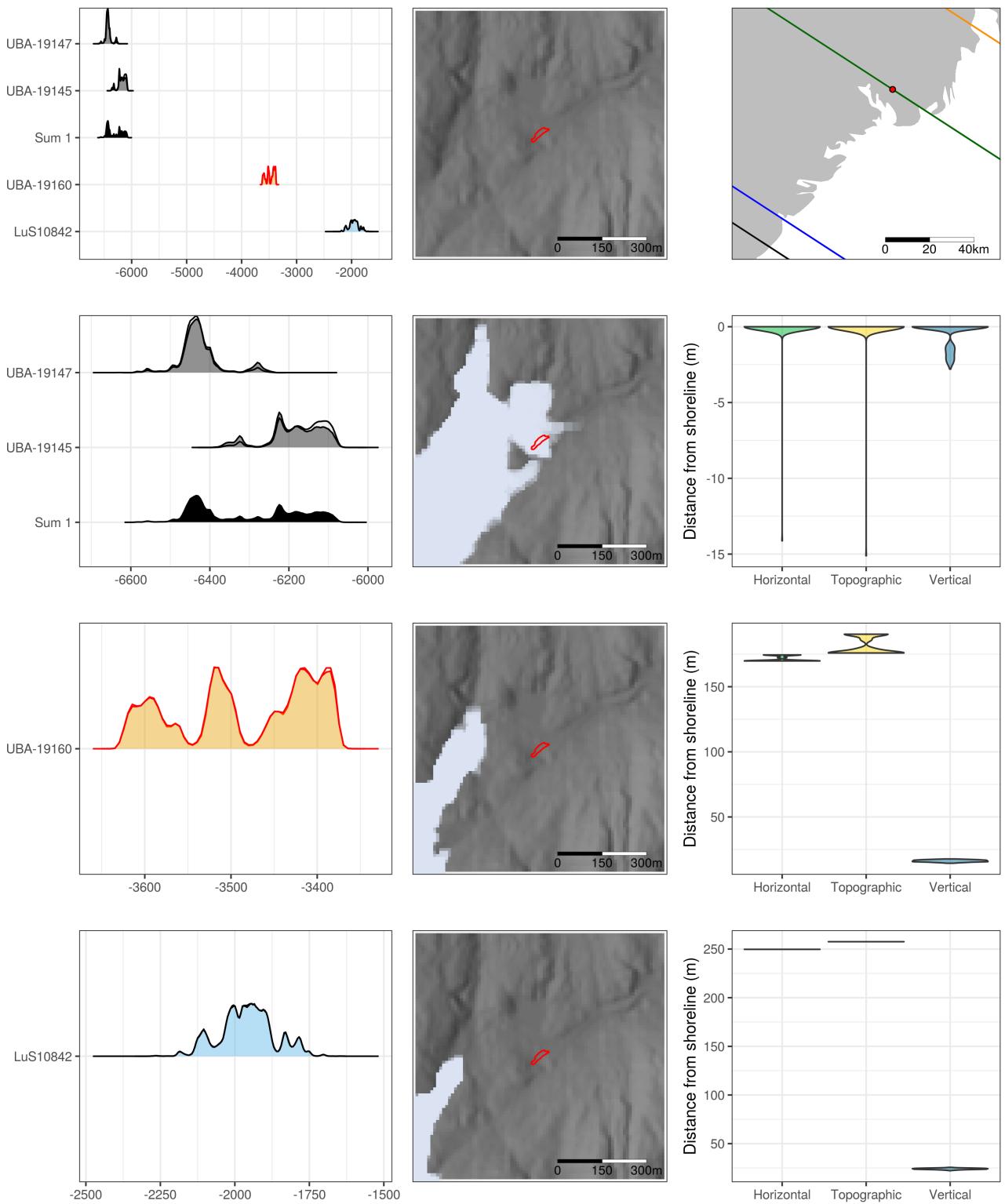
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## Warning in include_graphics(here("analysis/figures/gunnarsrod5.png")): It is
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Table 12: Gunnarsrød 4

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)

```
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## home/isak/phd/assessing.sealevel.dating/analysis/figures/gunnarsrod5.png"
```

Gunnarsrød 5



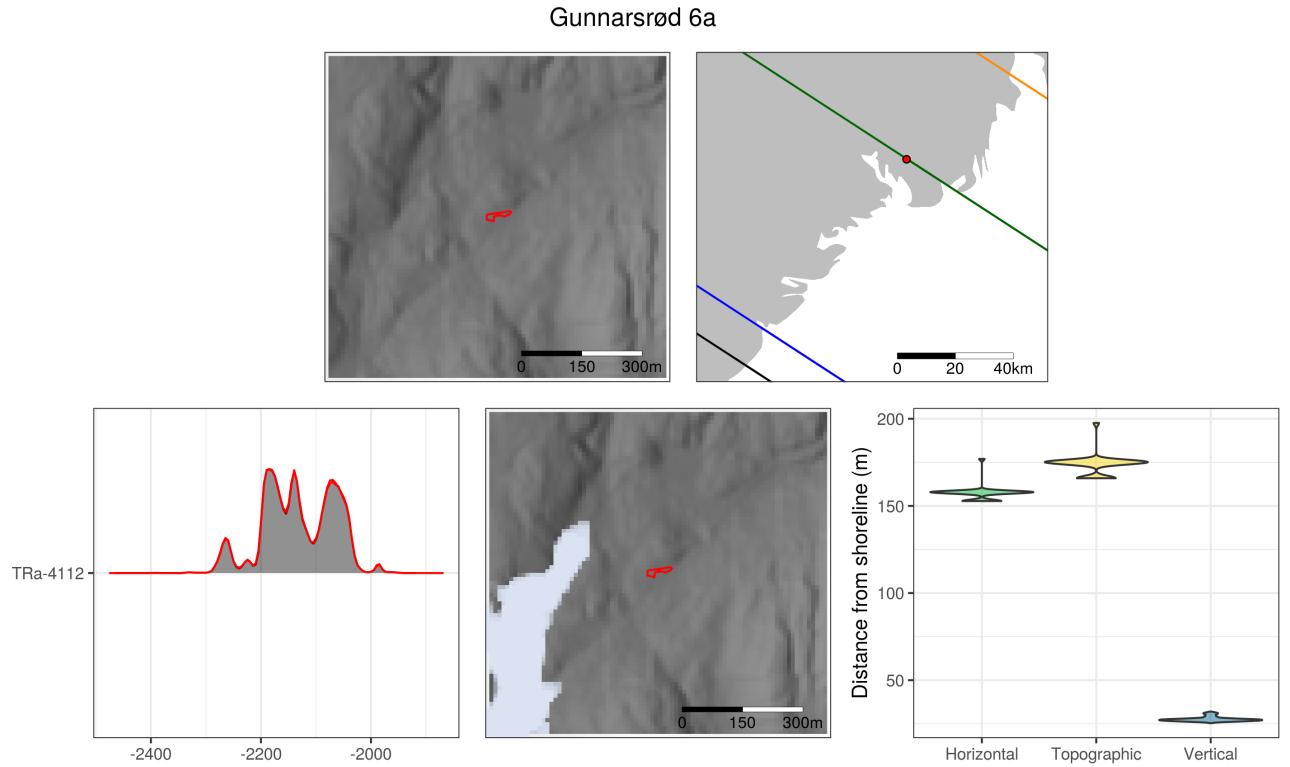
The location of Gunnarsrød 5 is today situated at the exit of a railway tunnel. The construction of the tunnel entrance has lead to a removal of parts of what used to be a hill on which the site was situated (Reitan

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)
LuS10842	3600	60	Soot extracted from pottery sherd	Pit with pottery (ID 1519)
UBA-19146	168	29	Birch (<i>Betula</i>)	Disturbance (ID 1085)

2014c). 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 2014c, fig. 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.

```
## Warning in include_graphics(here("analysis/figures/gunnarsrod6a.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
## home/isak/phd/assessing.sealevel.dating/analysis/figures/gunnarsrod6a.png"
```



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).

```
## Warning in include_graphics(here("analysis/figures/gunnarsrod6b.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
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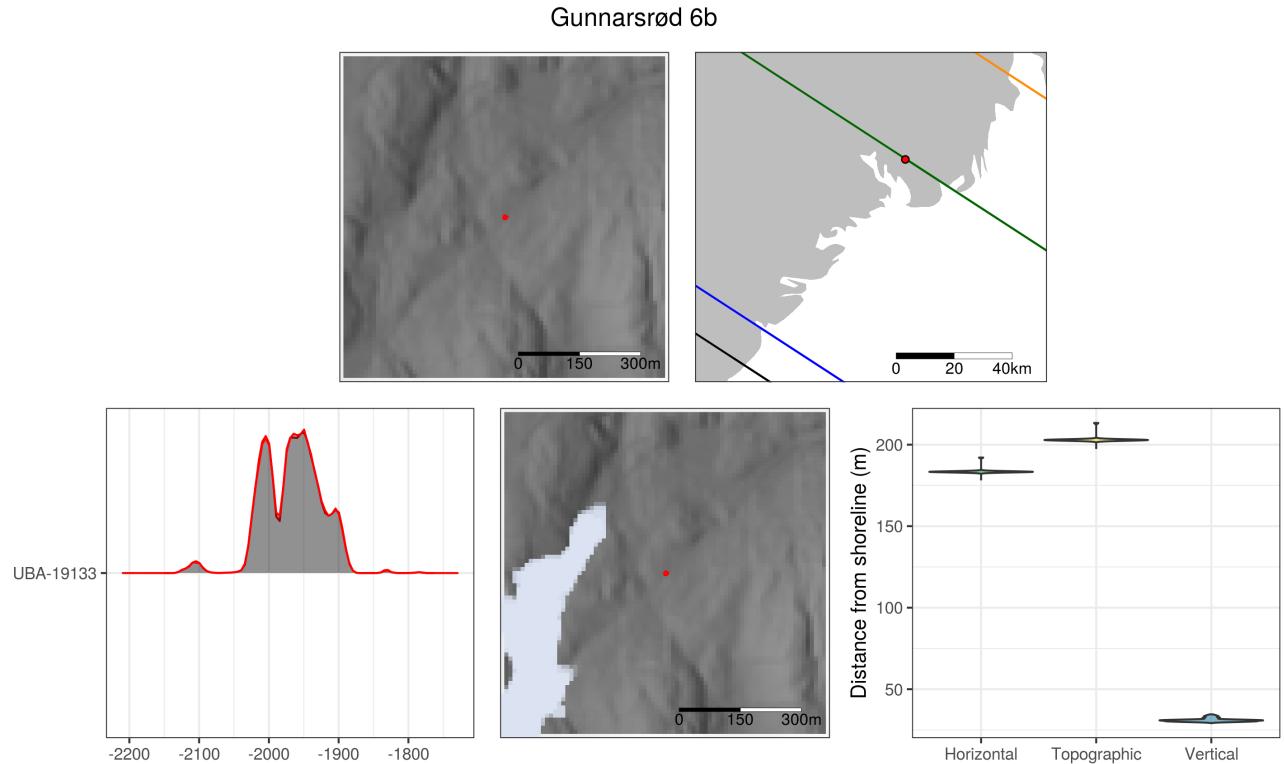
Table 14: Gunnarsrød 6a

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)

```
## home/isak/phd/assessing.sealevel.dating/analysis/figures/gunnarsrod6b.png"
```

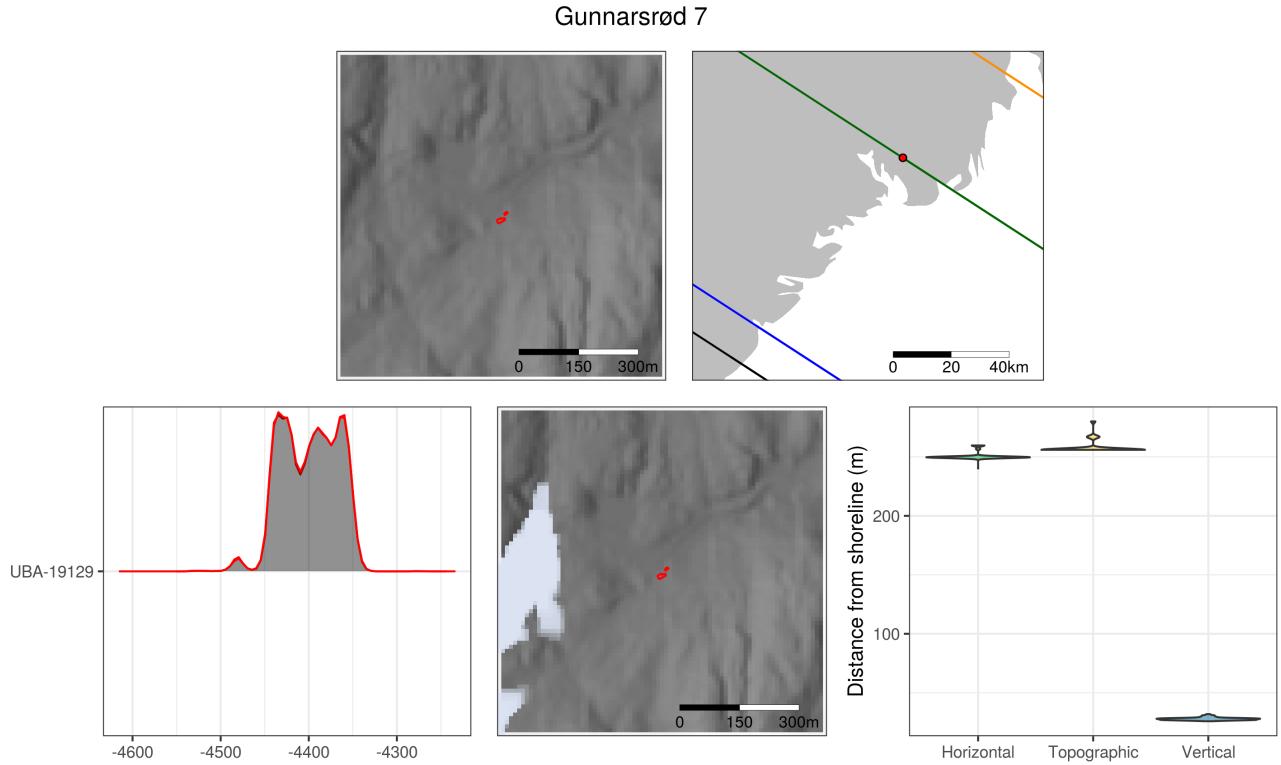


As with Gunnarsrød 6a above, the ^{14}C -date to the Neolithic from Gunnarsrød 6b is not related to the Mesolithic inventory on the site (Carrasco et al. 2014).

```
## Warning in include_graphics(here("analysis/figures/gunnarsrod7.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
## home/isak/phd/assessing.sealevel.dating/analysis/figures/gunnarsrod7.png"
```

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)

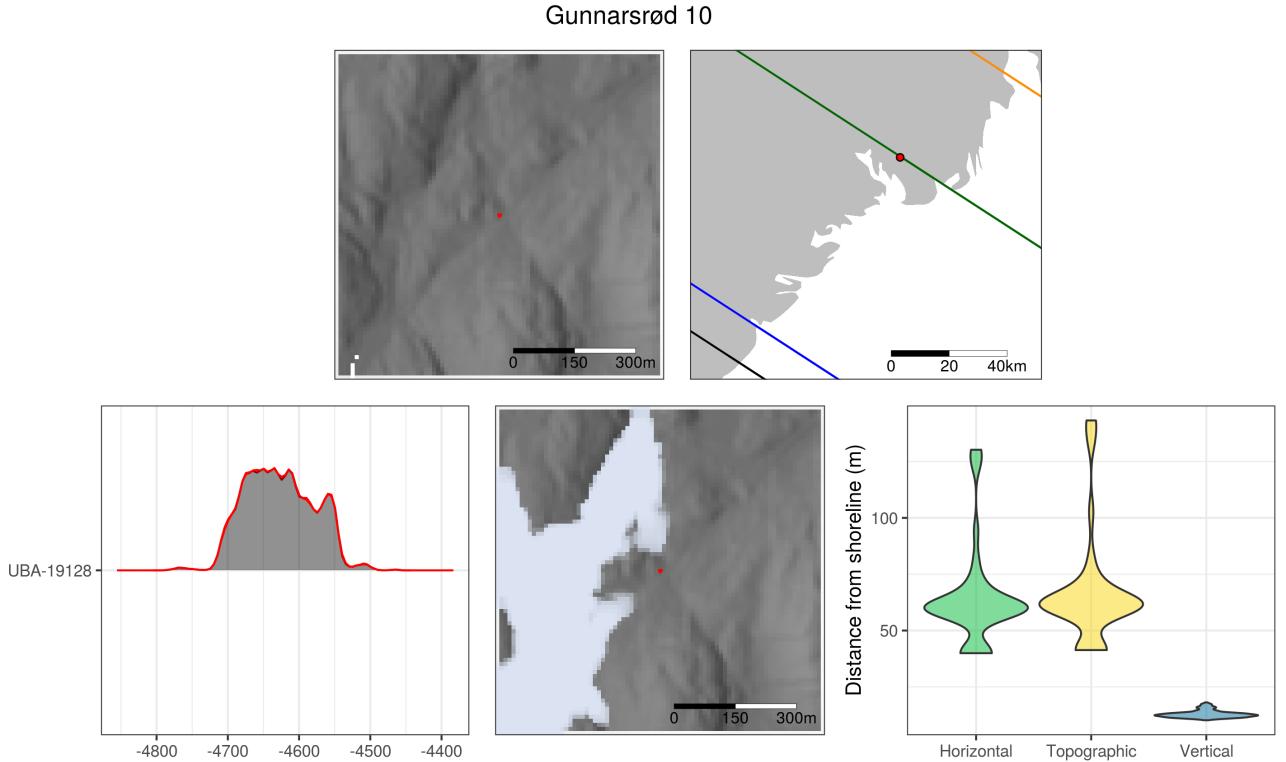


The lithic inventory from Gunnarsrød 7 is of a Middle Mesolithic character and does not match the ^{14}C -dates (Fossum 2014a).

```
## Warning in include_graphics(here("analysis/figures/gunnarsrod10.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/
## home/isak/phd/assessing.sealevel.dating/analysis/figures/gunnarsrod10.png"
```

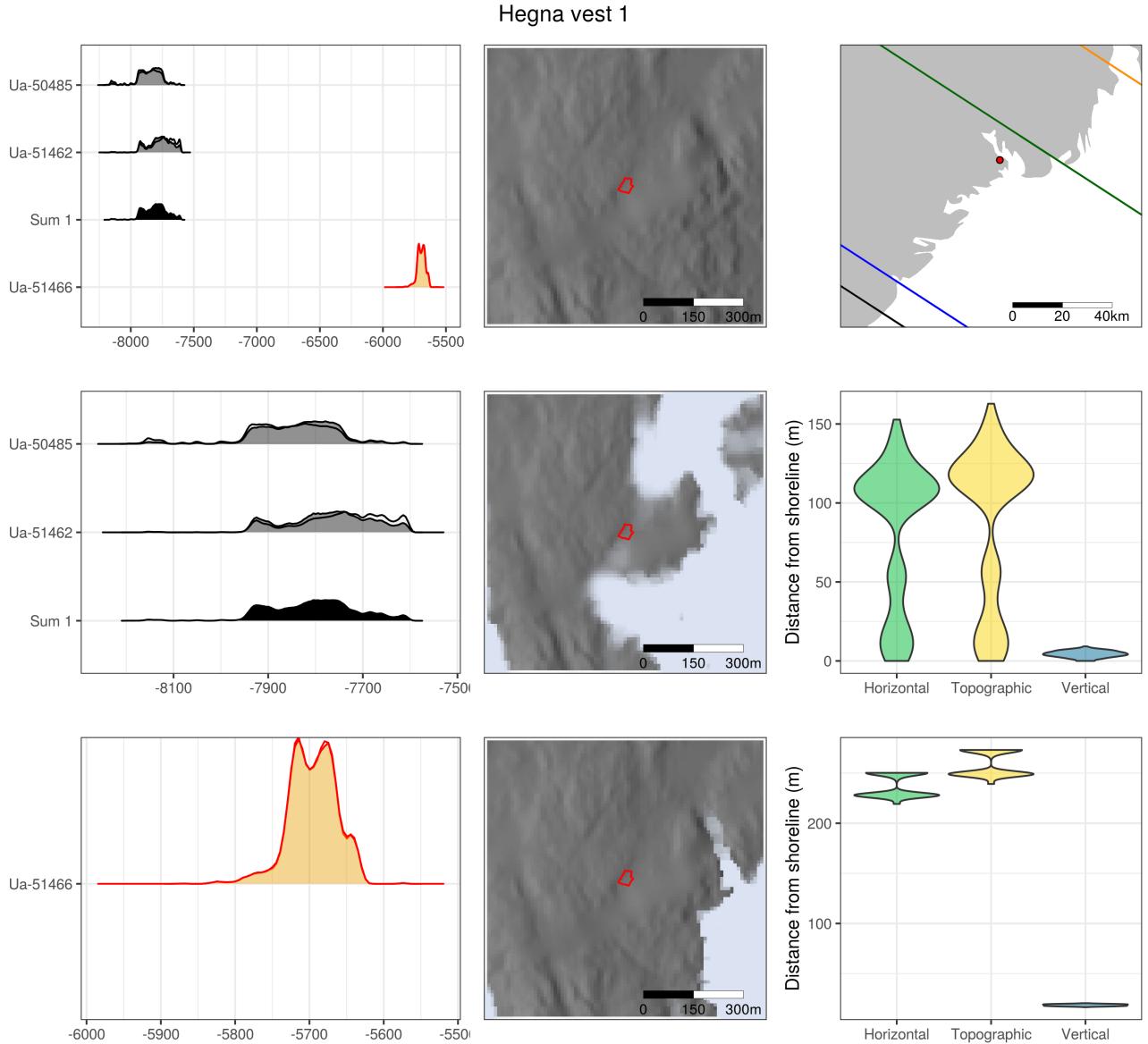
Table 17: Gunnarsrød 10

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 2014a).

```
## Warning in include_graphics(here("analysis/figures/hegnavest1.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
## home/isak/phd/assessing.sealevel.dating/analysis/figures/hegnavest1.png"
```



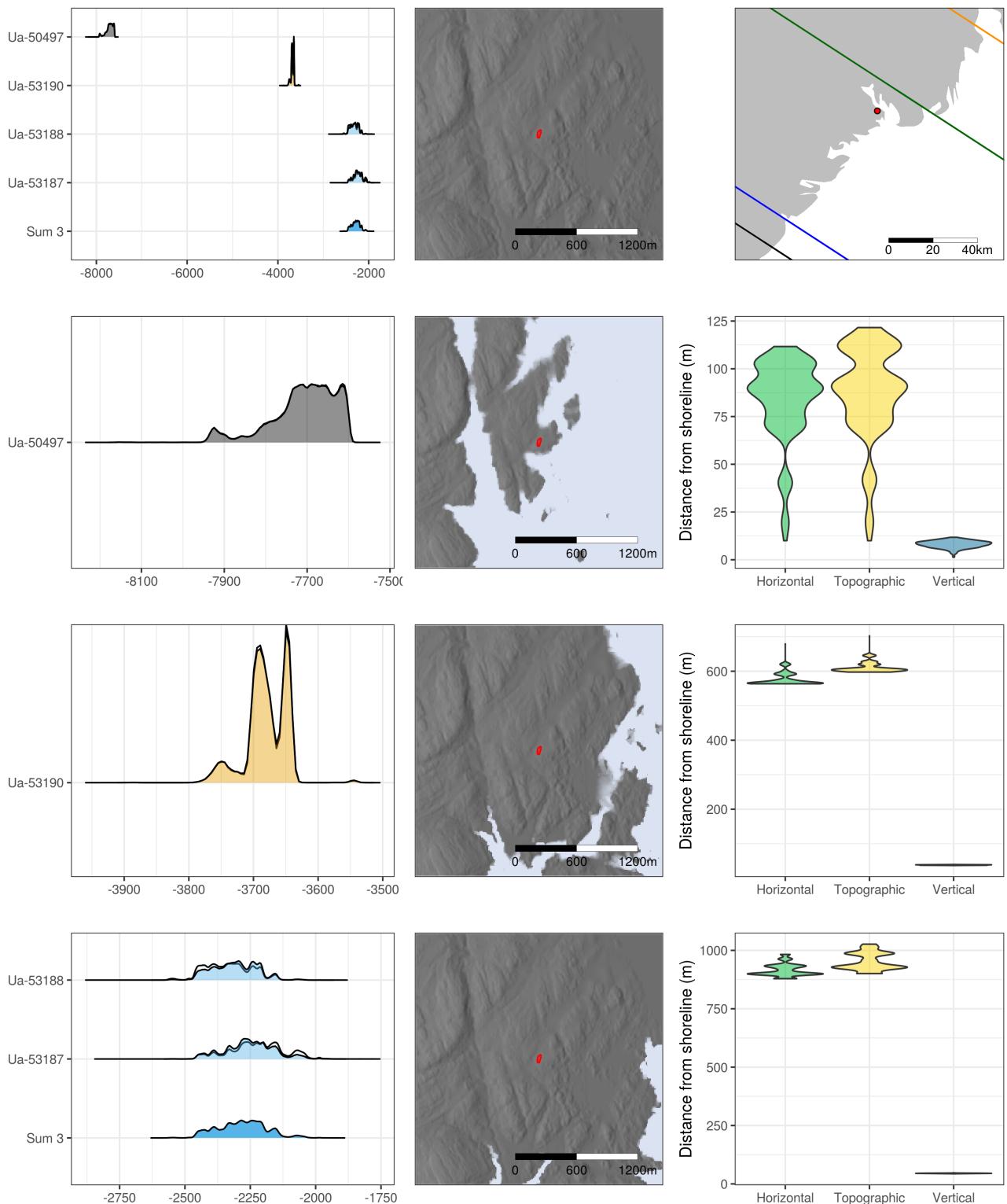
Example site from the main text. Hegna vest 1 has been visited multiple times throughout prehistory. The lithic inventory is distinctly Middle Mesolithic and Neolithic in character, with some finds that might be even younger. This is also reflected in the pottery finds, which are deemed to be from the 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.

```
## Warning in include_graphics(here("analysis/figures/hegnavest2.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
## home/isak/phd/assessing.sealevel.dating/analysis/figures/hegnavest2.png"
```

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

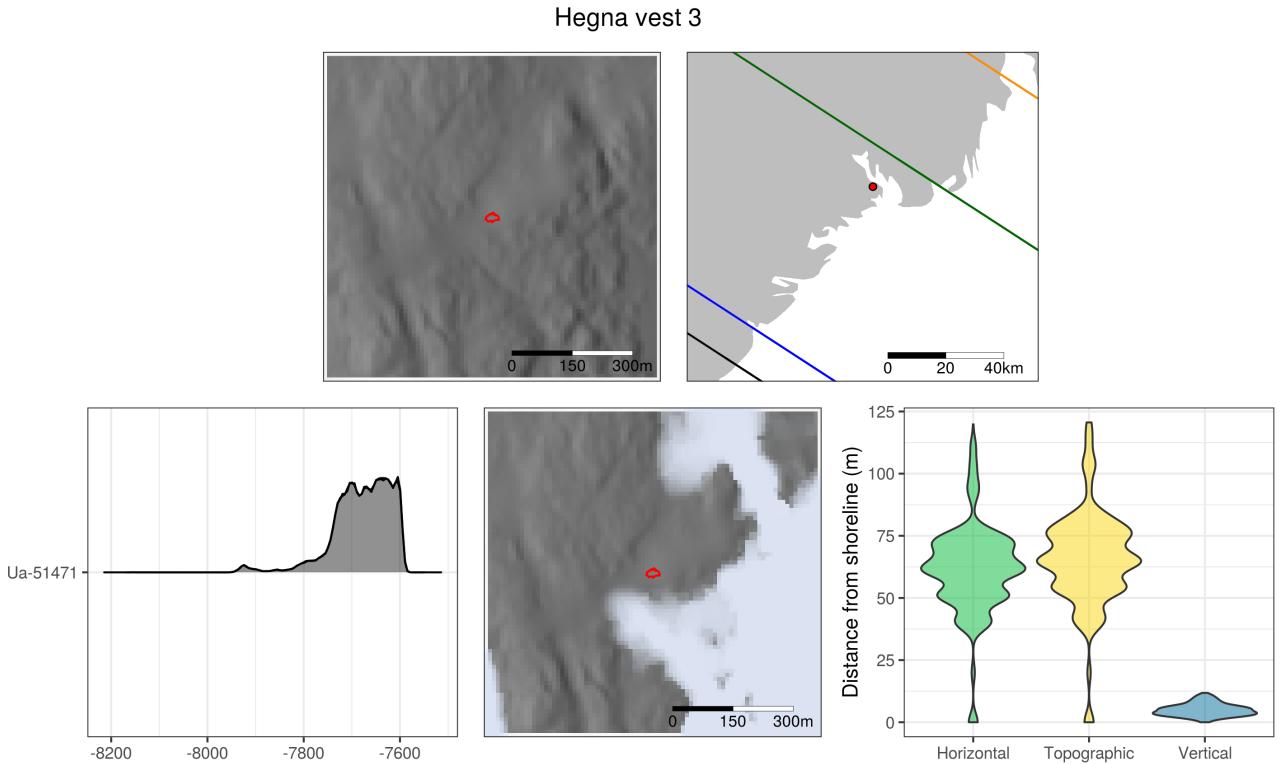
ID	¹⁴ C BP	Error	Material	Context
Ua-50497	8708	38	Pine (Pinus)	Cooking pit (ID 11906)
Ua-53190	4900	30	Burnt bone, mammal	Square (523x346y)
Ua-53188	3863	57	Burnt bone, beaver (Castor)	Undefined feature (ID 11546)
Ua-53187	3789	60	Burnt bone, Sus/Canis	Undefined feature (ID 11546)
Ua-50494	3337	27	Pine (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.

```
## Warning in include_graphics(here("analysis/figures/hegnavest3.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
## home/isak/phd/assessing.sealevel.dating/analysis/figures/hegnavest3.png"
```

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)

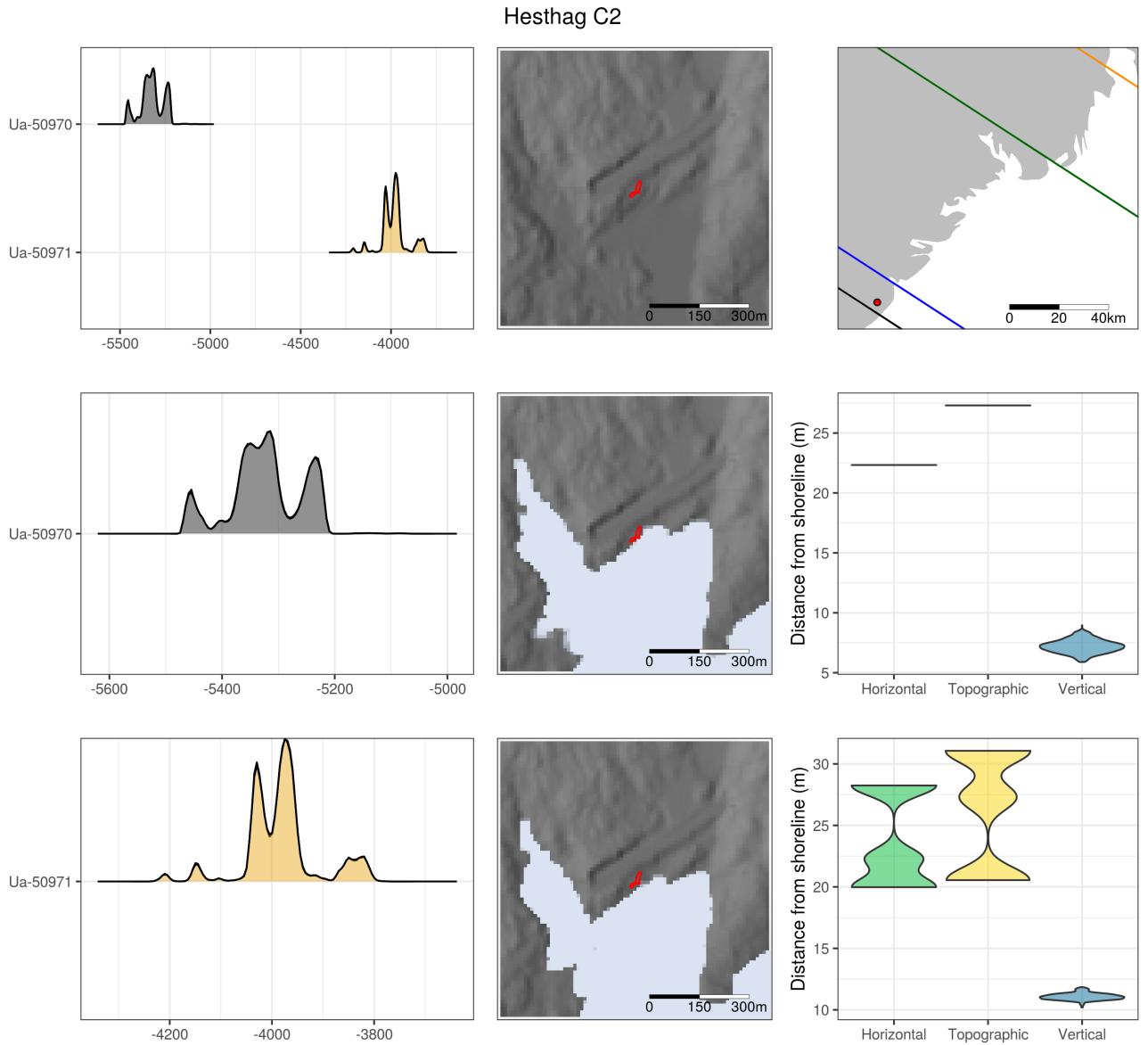


Along with Hegna vest 2 (above), Hegna vest 3 was situated where the highway runs today. The highway has been removed, and it would seem successfully so, as related to the sea-level adjustments. The ^{14}C -date to the Middle Mesolithic fits well with the lithic inventory (Eigeland and Fossum 2017).

```
## Warning in include_graphics(here("analysis/figures/hesthagc2.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/
## home/isak/phd/assessing.sealevel.dating/analysis/figures/hesthagc2.png"
```

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)

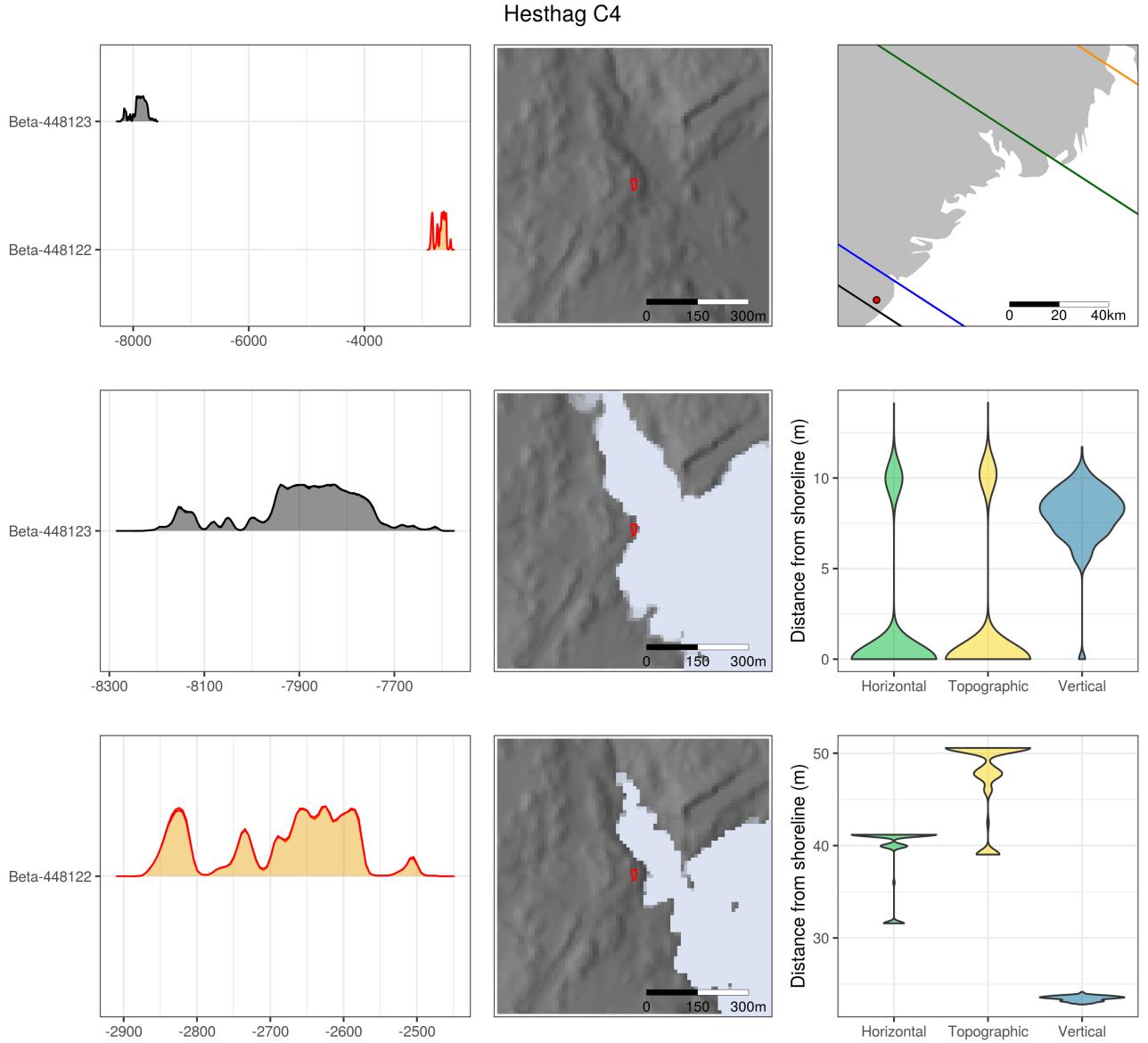


Hesttag C2 has seen repeated use, as evidenced both by ^{14}C -dates and the artefact inventory (Viken 2018a). While only a few finds can be typologically dated to the Late Mesolithic, these were deemed substantial enough to trust the two ^{14}C -dates to the period (Viken 2018a, 271). No editing of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

Table 22: Hesthag C4

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

```
## Warning in include_graphics(here("analysis/figures/hesthagc4.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/
## home/isak/phd/assessing.sealevel.dating/analysis/figures/hesthagc4.png"
```

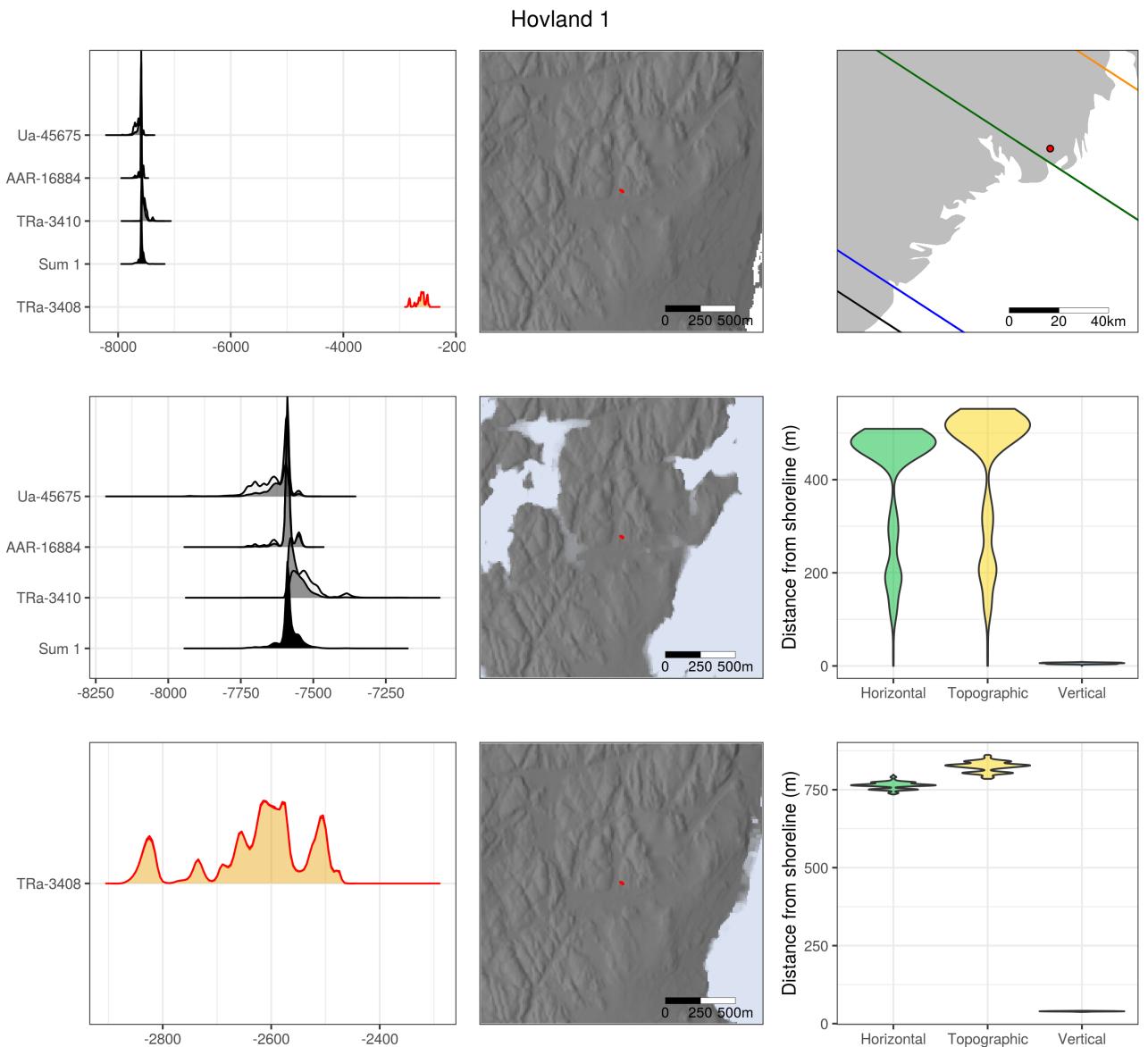


Typology and radiocarbon date match, and there are no modern disturbances in the vicinity of Hesthag C4 (Viken 2018b). The second ^{14}C -date is a reference date of charcoal from a context believed not to be anthropogenic.

Table 23: Hovland 1

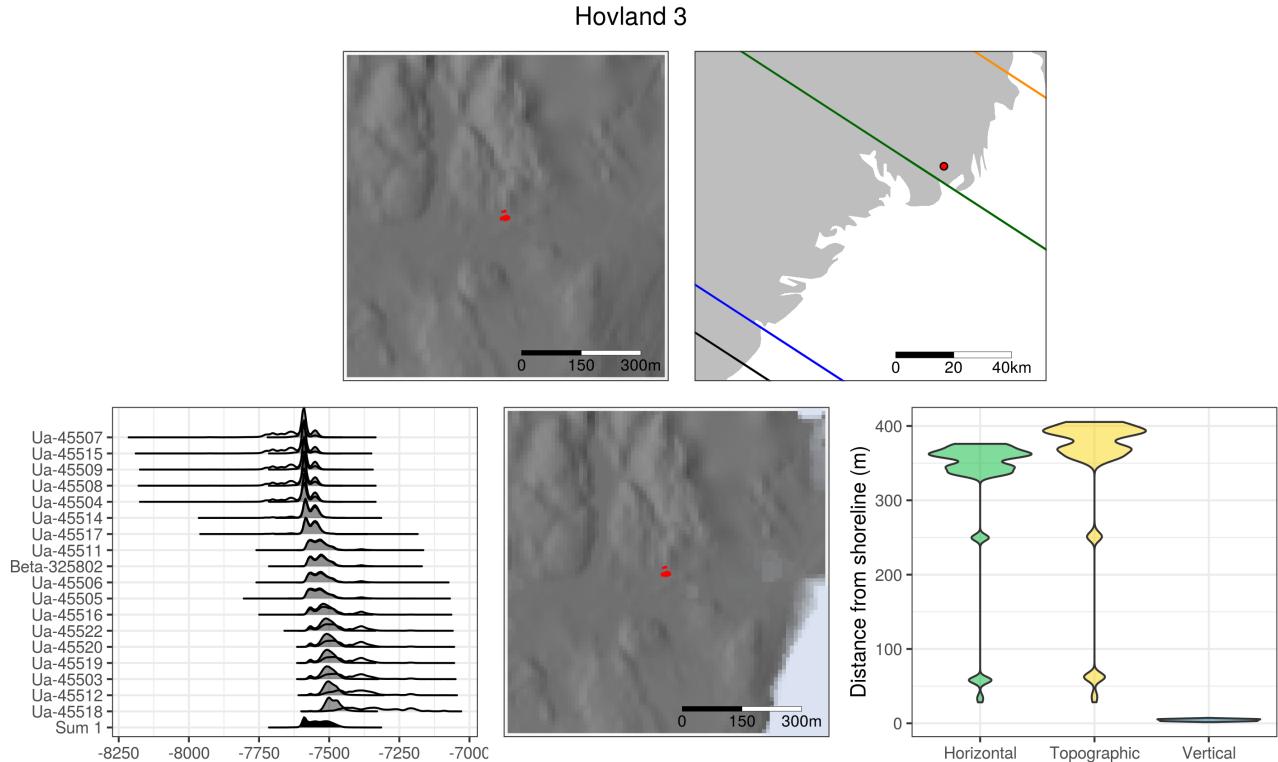
ID	^{14}C BP	Error	Material	Context
TRA-3410	8465	55	Hazel (<i>Corylus</i>)	Cooking pit (ID 4)
Ua-45675	8623	50	Aspen/willow (<i>Populus/Salix</i>)	Cooking pit (ID 4)
AAR-16884	8582	33	Birch resin (<i>Betula</i>) on microblade	Quadrant (172x159ySW, layer 2)
TRA-3408	4070	35	Hazel (<i>Corylus</i>), nutshell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

```
## Warning in include_graphics(here("analysis/figures/hovland1.png")): It is highly
## recommended to use relative paths for images. You had absolute paths: "/home/
## isak/phd/assessing.sealevel.dating/analysis/figures/hovland1.png"
```



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 2013). 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 a relatively short vertical distance from the sea, but the terrain makes this result in quite high horizontal and topographic distances.

```
## Warning in include_graphics(here("analysis/figures/hovland3.png")): It is highly
## recommended to use relative paths for images. You had absolute paths: "/home/
## isak/phd/assessing.sealevel.dating/analysis/figures/hovland3.png"
```



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.

```
## Warning in include_graphics(here("analysis/figures/hovland4.png")): It is highly
## recommended to use relative paths for images. You had absolute paths: "/home/
## isak/phd/assessing.sealevel.dating/analysis/figures/hovland4.png"
```

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)

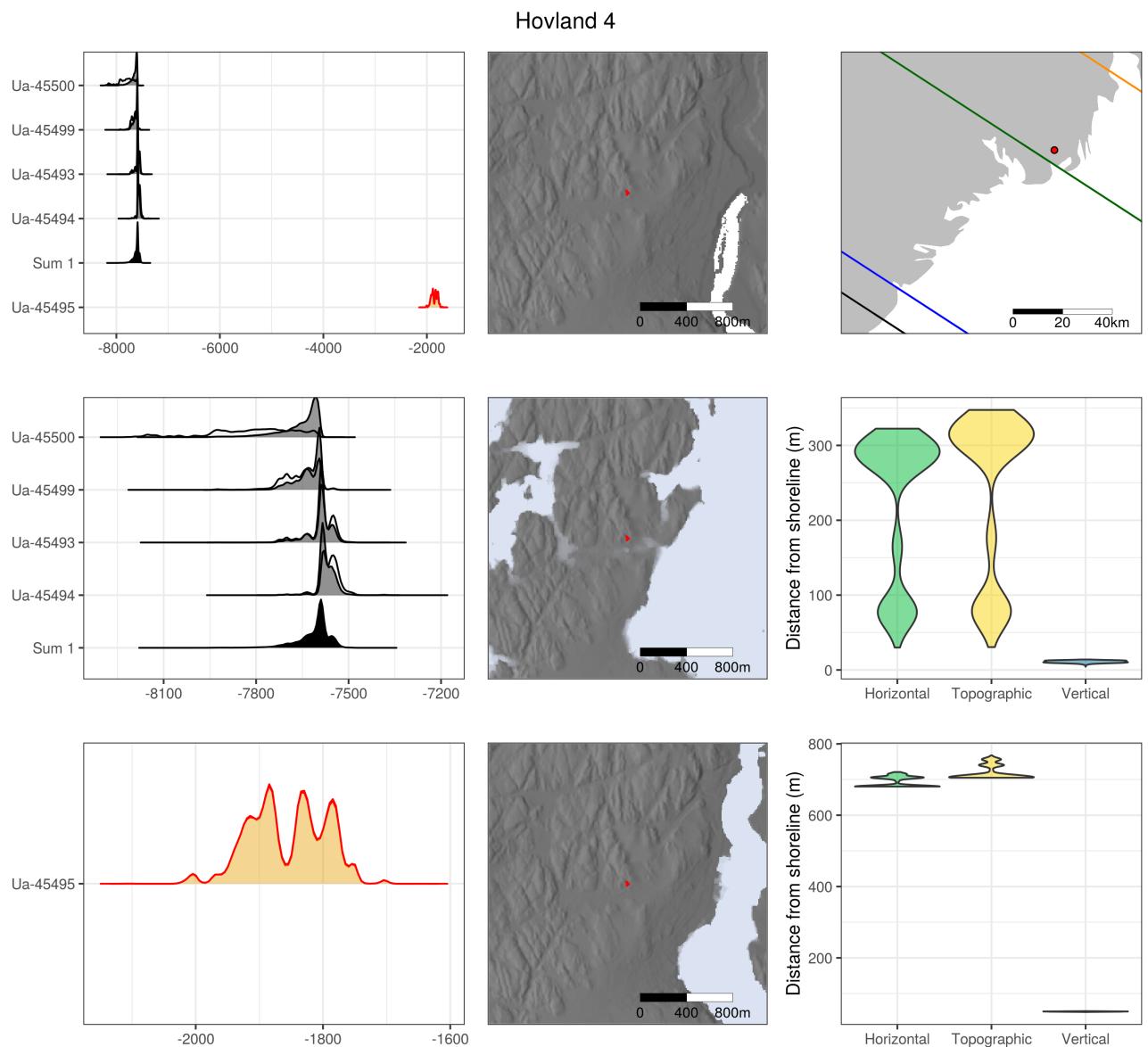
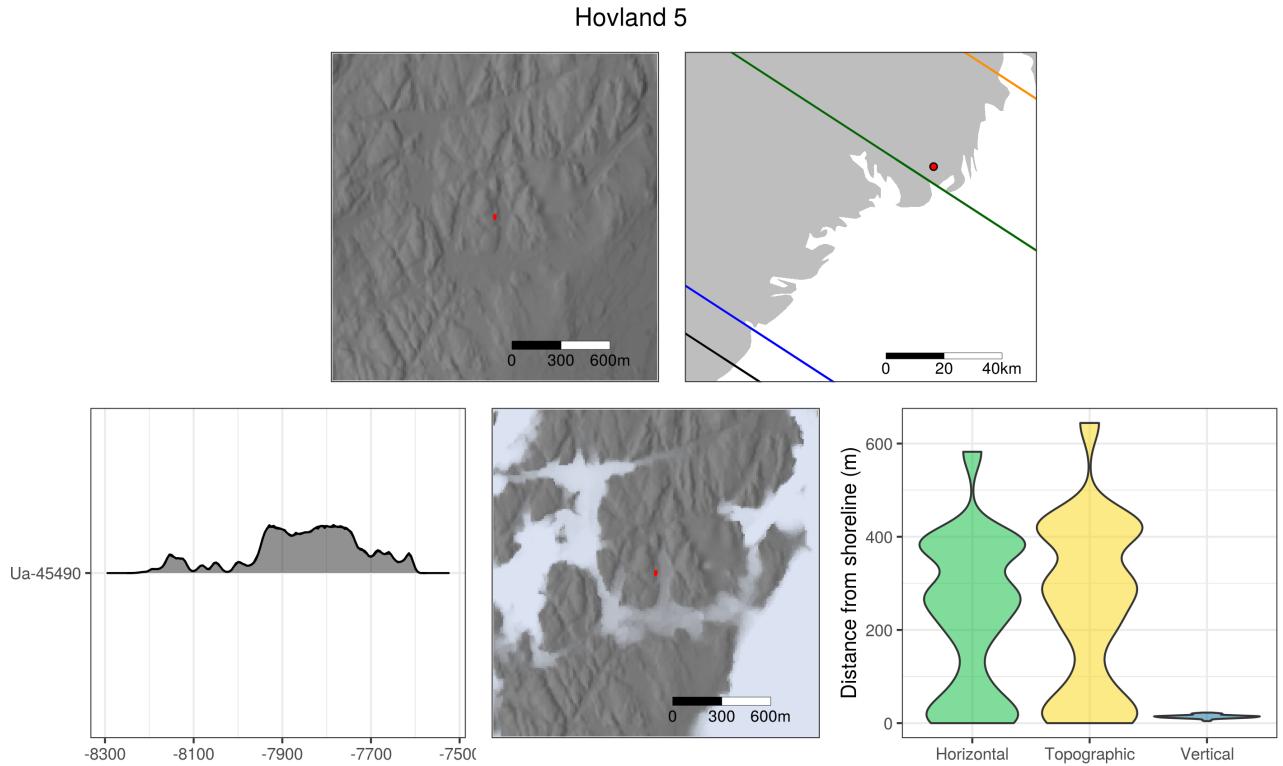


Table 26: Hovland 5

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.

```
## Warning in include_graphics(here("analysis/figures/hovland5.png")): It is highly
## recommended to use relative paths for images. You had absolute paths: "/home/
## isak/phd/assessing.sealevel.dating/analysis/figures/hovland5.png"
```

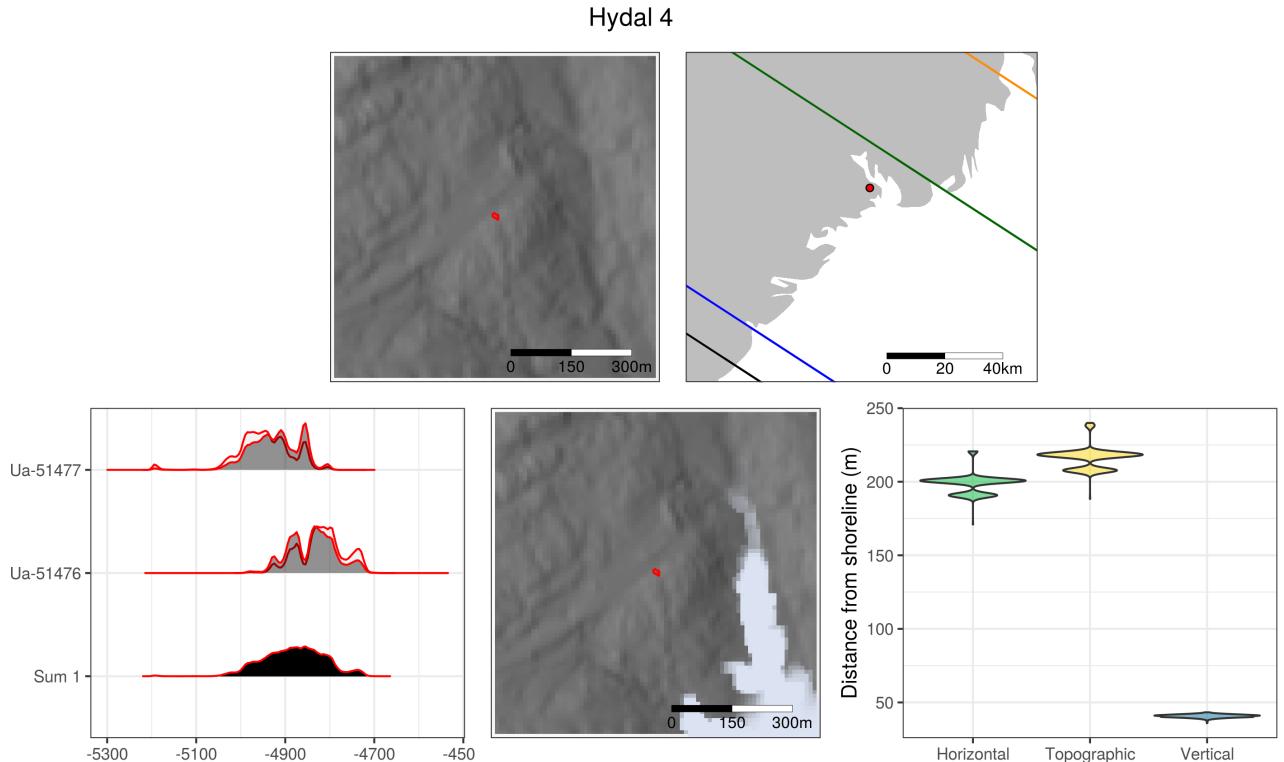


Hovland 5 is situated more withdrawn from the highway than the other Hovland sites (above), and the DTM did therefore not require any editing. The site only has a single ^{14}C -date to the Stone Age, but this does match the typological indicators of the assemblage (Mansrud and Koxvold 2013).

```
## Warning in include_graphics(here("analysis/figures/hydal4.png")): It is highly
## recommended to use relative paths for images. You had absolute paths: "/home/
## isak/phd/assessing.sealevel.dating/analysis/figures/hydal4.png"
```

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.

```
## Warning in include_graphics(here("analysis/figures/krogenesd1.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
## home/isak/phd/assessing.sealevel.dating/analysis/figures/krogenesd1.png"
```

Krøgenes D1

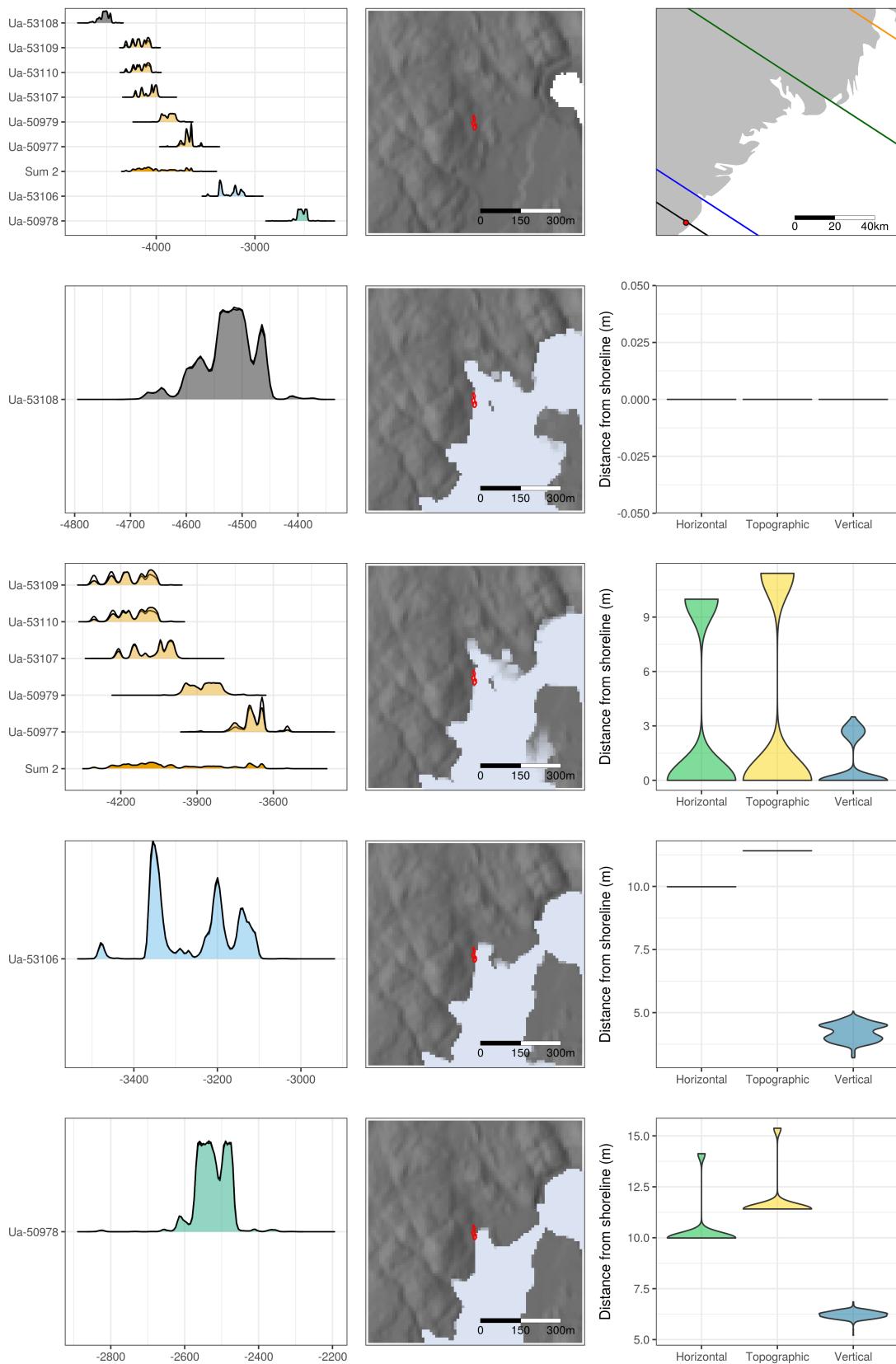


Table 28: Krøgenes D1

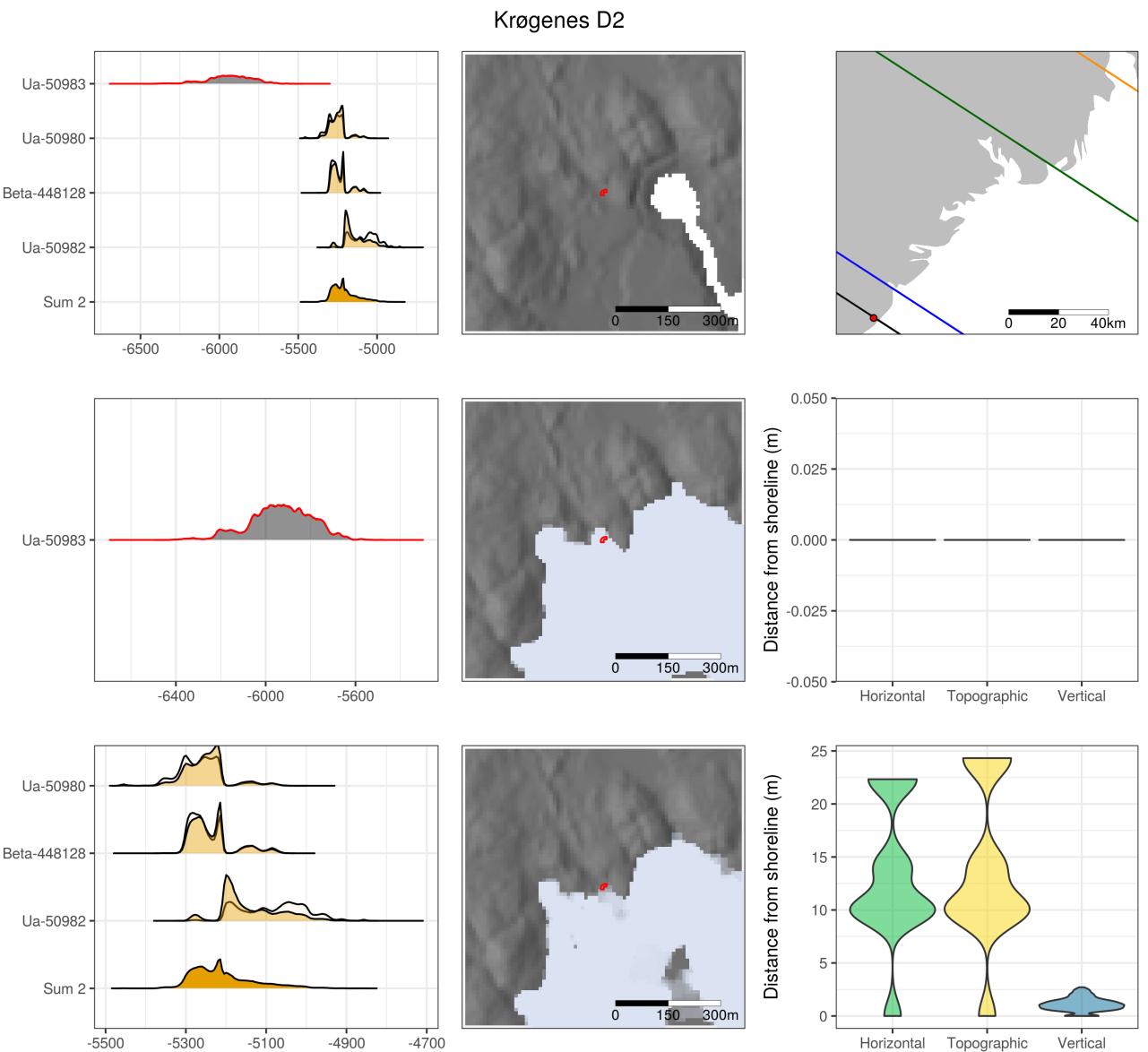
ID	^{14}C BP	Error	Material	Context
Ua-53108	5694	32	Ash (<i>Fraxinus</i>)	Cooking pit/fireplace (ID 204387)
Ua-53109	5351	31	Pine (<i>Pinus</i>)	Cooking pit/fireplace (ID 207098)
Ua-53110	5334	31	Pine (<i>Pinus</i>)	Cooking pit/fireplace (ID 207811)
Ua-53107	5249	31	Birch (<i>Betula</i>)	Posthole? (ID 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 2018). 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.

```
## Warning in include_graphics(here("analysis/figures/krogenesd2.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
## home/isak/phd/assessing.sealevel.dating/analysis/figures/krogenesd2.png"
```

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)



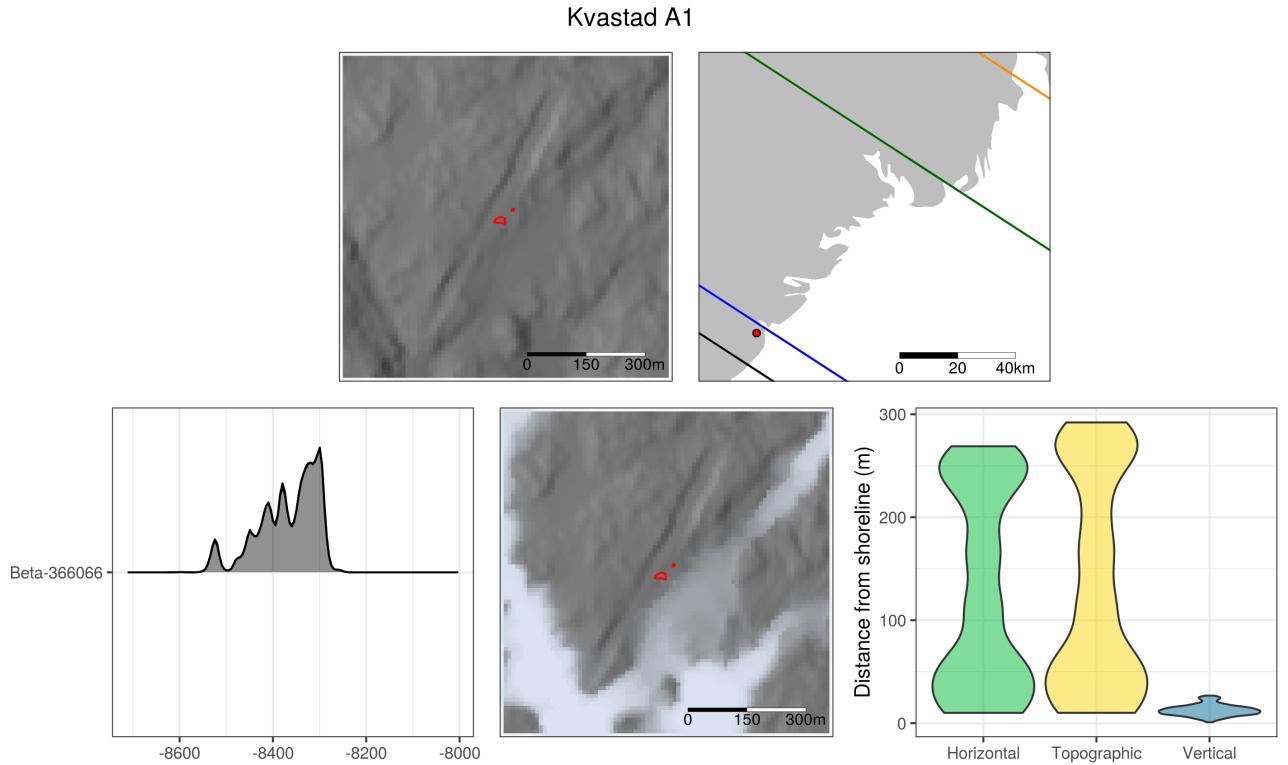
Dates match the artefact inventory of Krøgenes D2, with the exception of the oldest date which is not seen as relevant for the main occupation of the site, in part also due to the large error (Mansrud, Eigeland, and Reitan 2018). The site location is similar to that of Krøgenes D1 (above), and did not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

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)

the DTM.

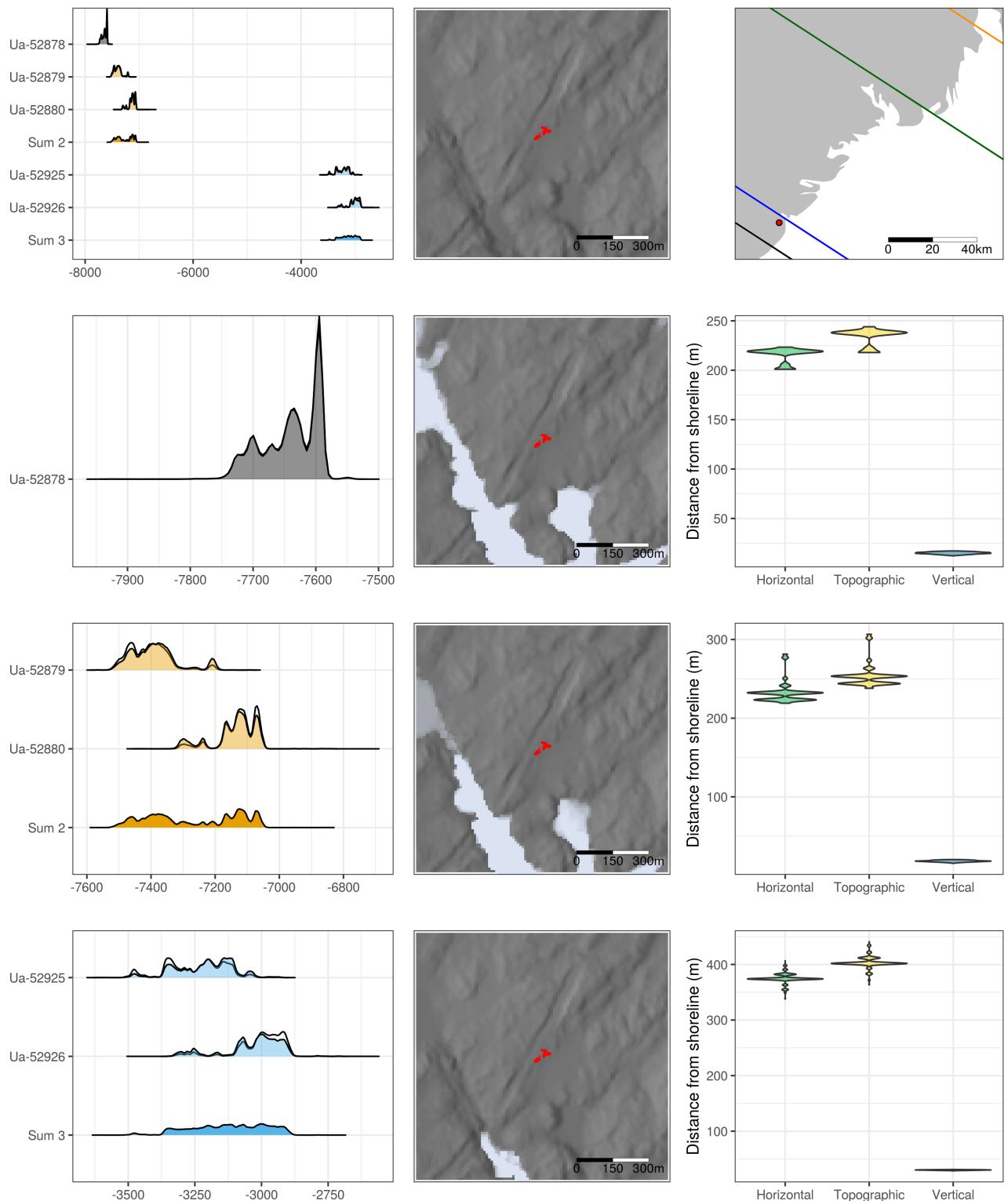
```
## Warning in include_graphics(here("analysis/figures/kvastada1.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/
## home/isak/phd/assessing.sealevel.dating/analysis/figures/kvastada1.png"
```



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

```
## Warning in include_graphics(here("analysis/figures/kvastada2.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/
## home/isak/phd/assessing.sealevel.dating/analysis/figures/kvastada2.png"
```

Kvastad A2



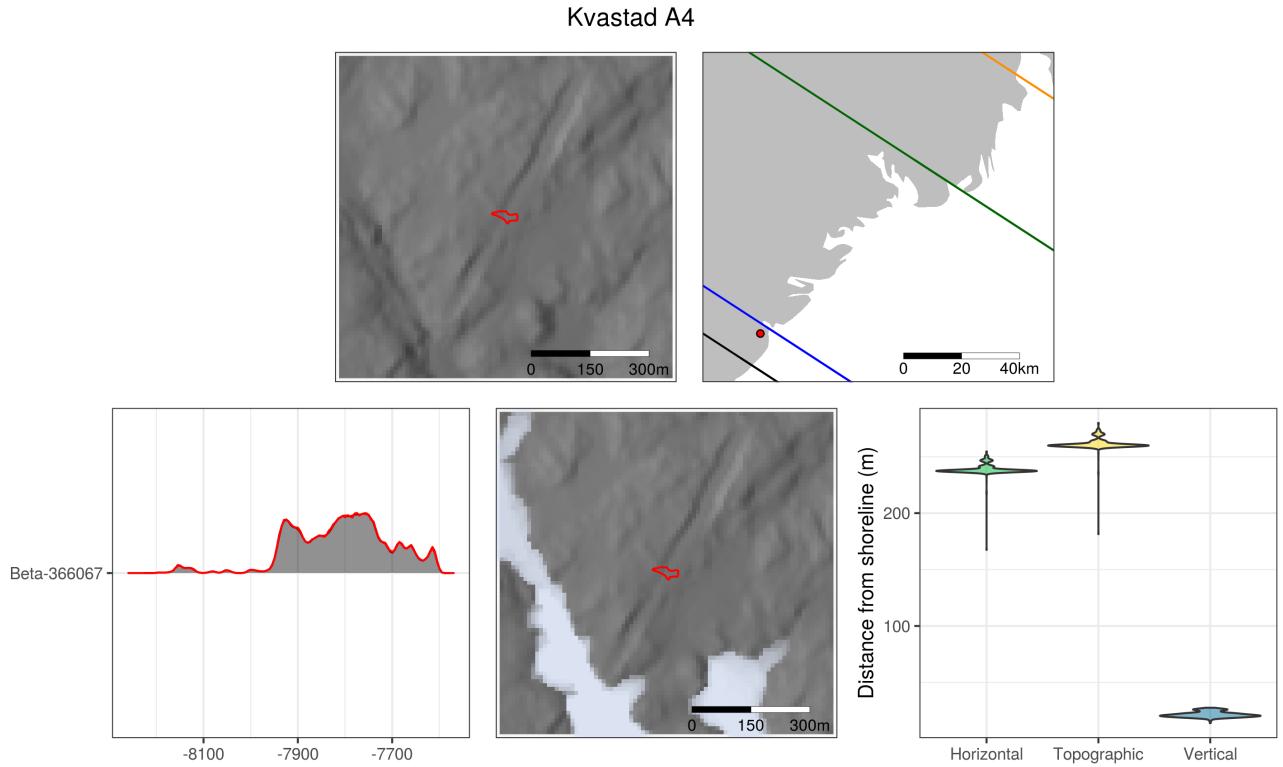
The two find areas at Kvastad A2 are predominantly Mesolithic (to the south-west) and Neolithic (to the north-east) but were treated in combination here as one Mesolithic date was from the Neolithic area (Stokke

Table 31: Kvastad A2

ID	^{14}C BP	Error	Material	Context
Ua-52878	8625	35	Pine (<i>Pinus</i>)	Fireplace (ID 57753)
Ua-52879	8339	35	Pine (<i>Pinus</i>)	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)

and Reitan 2018). There is also a late Neolithic element in the lithic inventory that is not reflected in the ^{14}C -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.

```
## Warning in include_graphics(here("analysis/figures/kvastada4.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
## home/isak/phd/assessing.sealevel.dating/analysis/figures/kvastada4.png"
```



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.

```
## Warning in include_graphics(here("analysis/figures/kvastada9.png")): It is
```

Table 32: Kvastad A4

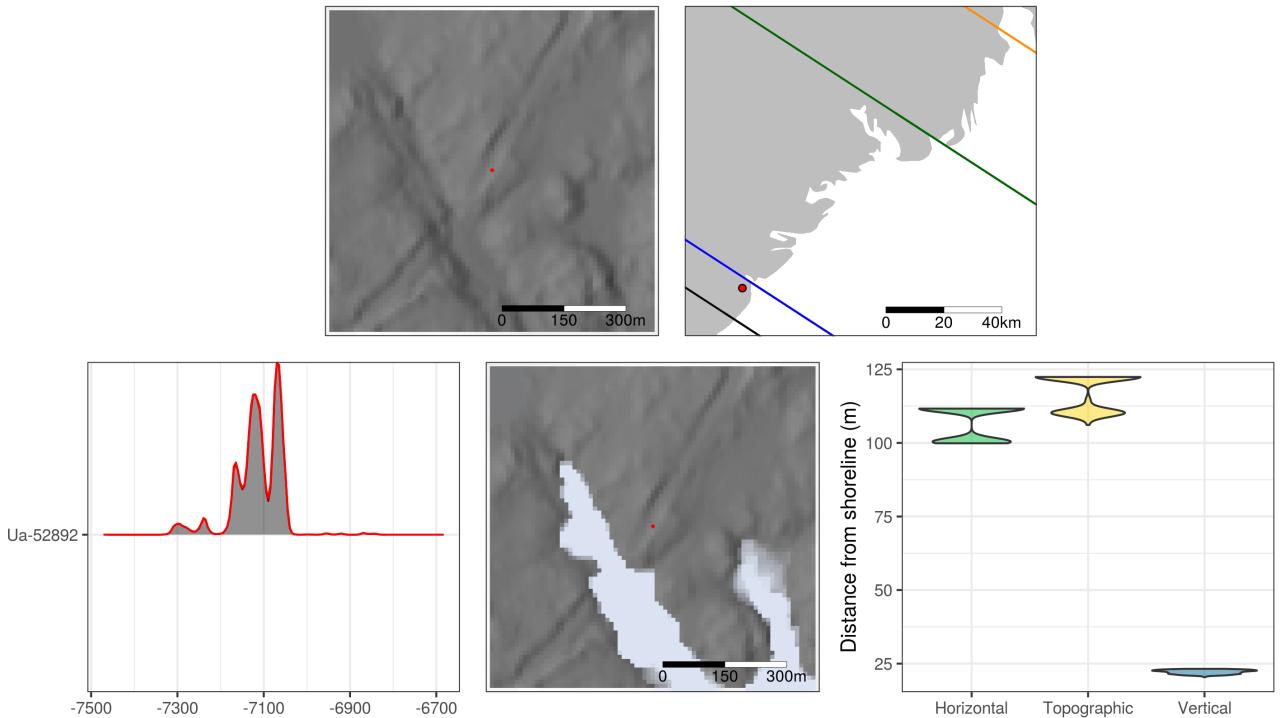
ID	^{14}C BP	Error	Material	Context
Ua-52887	2395	27	Ash (<i>Fraxinus</i>)	Cooking pit (ID 153273)
Ua-52882	809	26	Oak (<i>Quercus</i>)	Fireplace (ID 150637)
Ua-52886	1100	26	Pine (<i>Pinus</i>)	Trench profile (ID 153311)
Beta-366067	8760	40		Test pit (ID 21410)

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)

```
## highly recommended to use relative paths for images. You had absolute paths: "/
## home/isak/phd/assessing.sealevel.dating/analysis/figures/kvastada9.png"
```

Kvastad A9

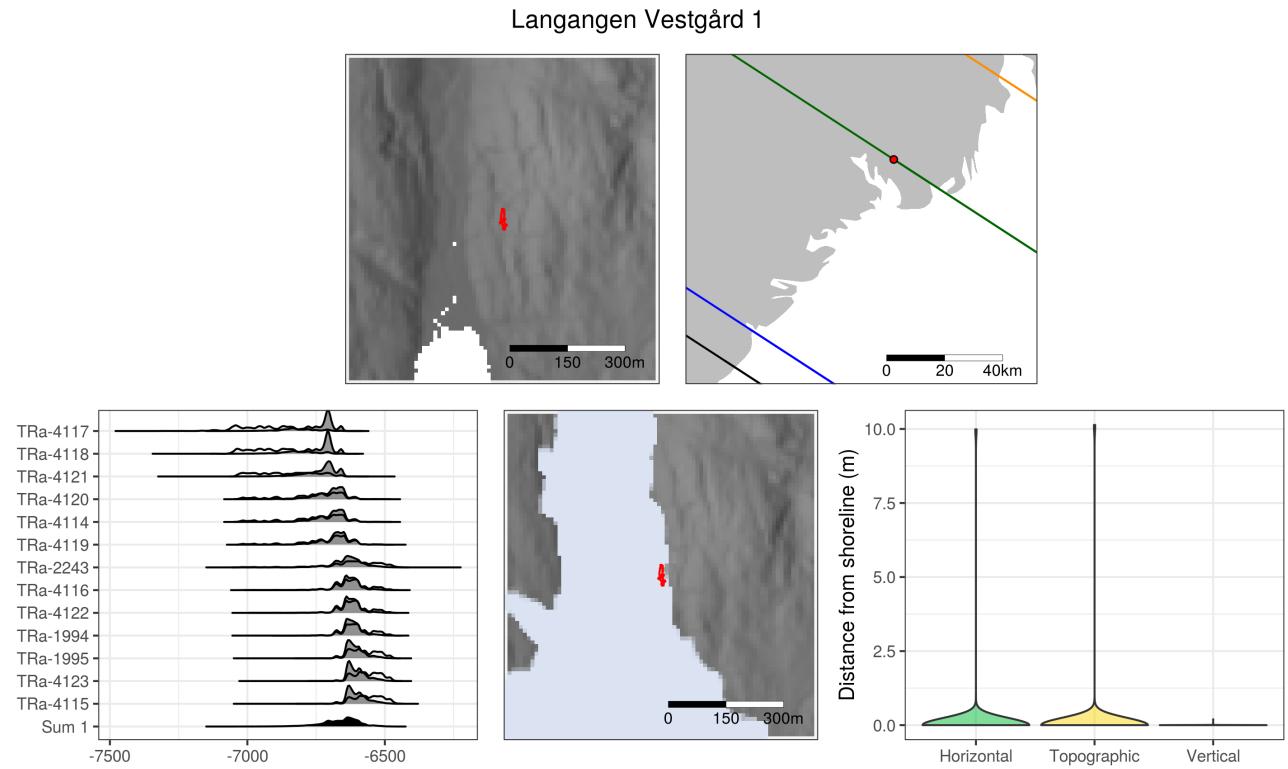


The Stone Age date from Kvastad A9 is not related to the Early Mesolithic assemblage (Darmark 2018a). The highway running by the site does not seem relevant to the simulation results.

```
## Warning in include_graphics(here("analysis/figures/langangenv1.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/
## home/isak/phd/assessing.sealevel.dating/analysis/figures/langangenv1.png"
```

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)

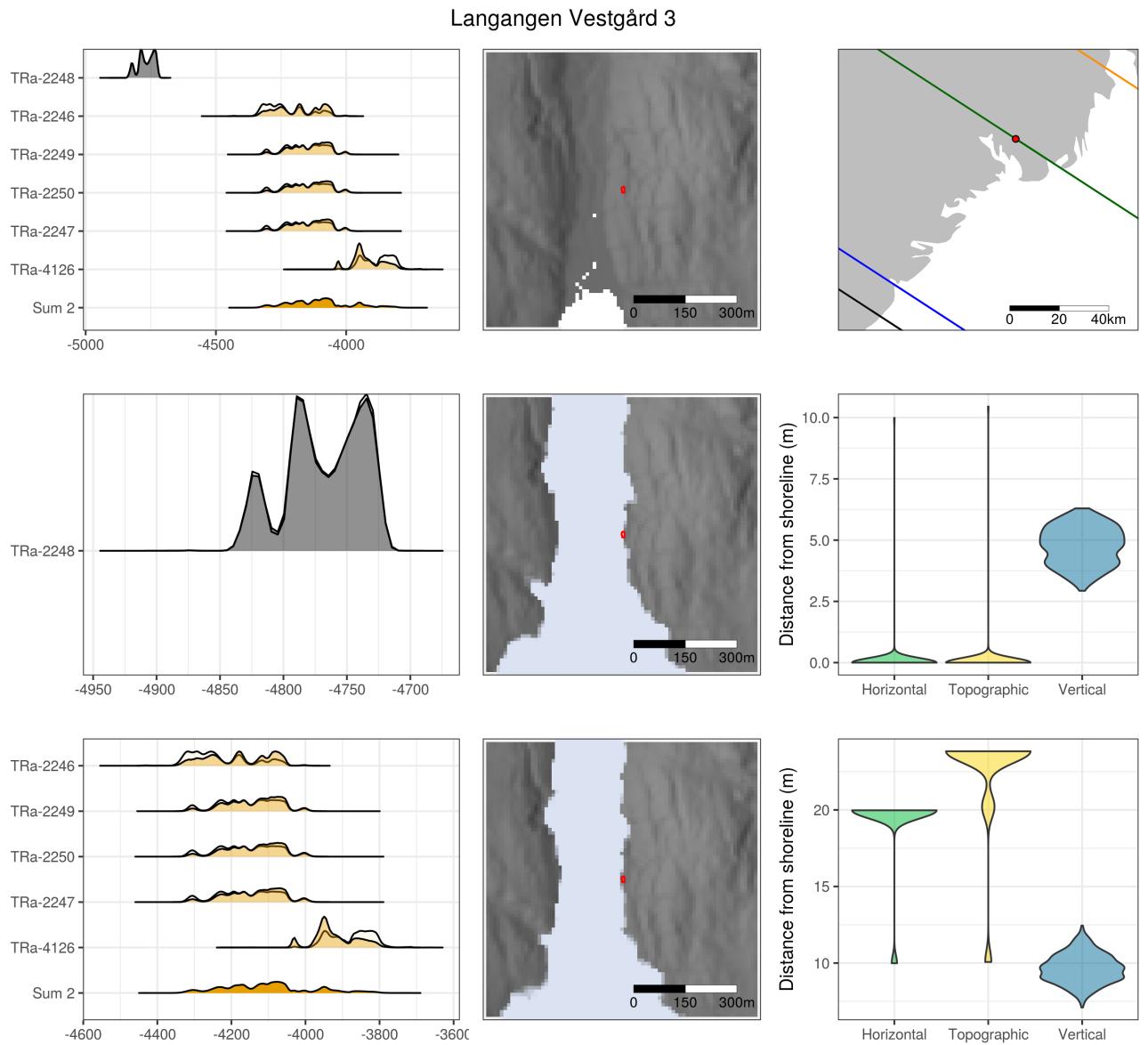


Langangen Vestgård 1 is a securely dated site with both ^{14}C -dates and typology (Melvold and Eigeland 2014). No modern disturbances appear relevant for the sea-level adjustment.

```
## Warning in include_graphics(here("analysis/figures/langangenv3.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
## home/isak/phd/assessing.sealevel.dating/analysis/figures/langangenv3.png"
```

Table 35: Langangen Vestgård 3

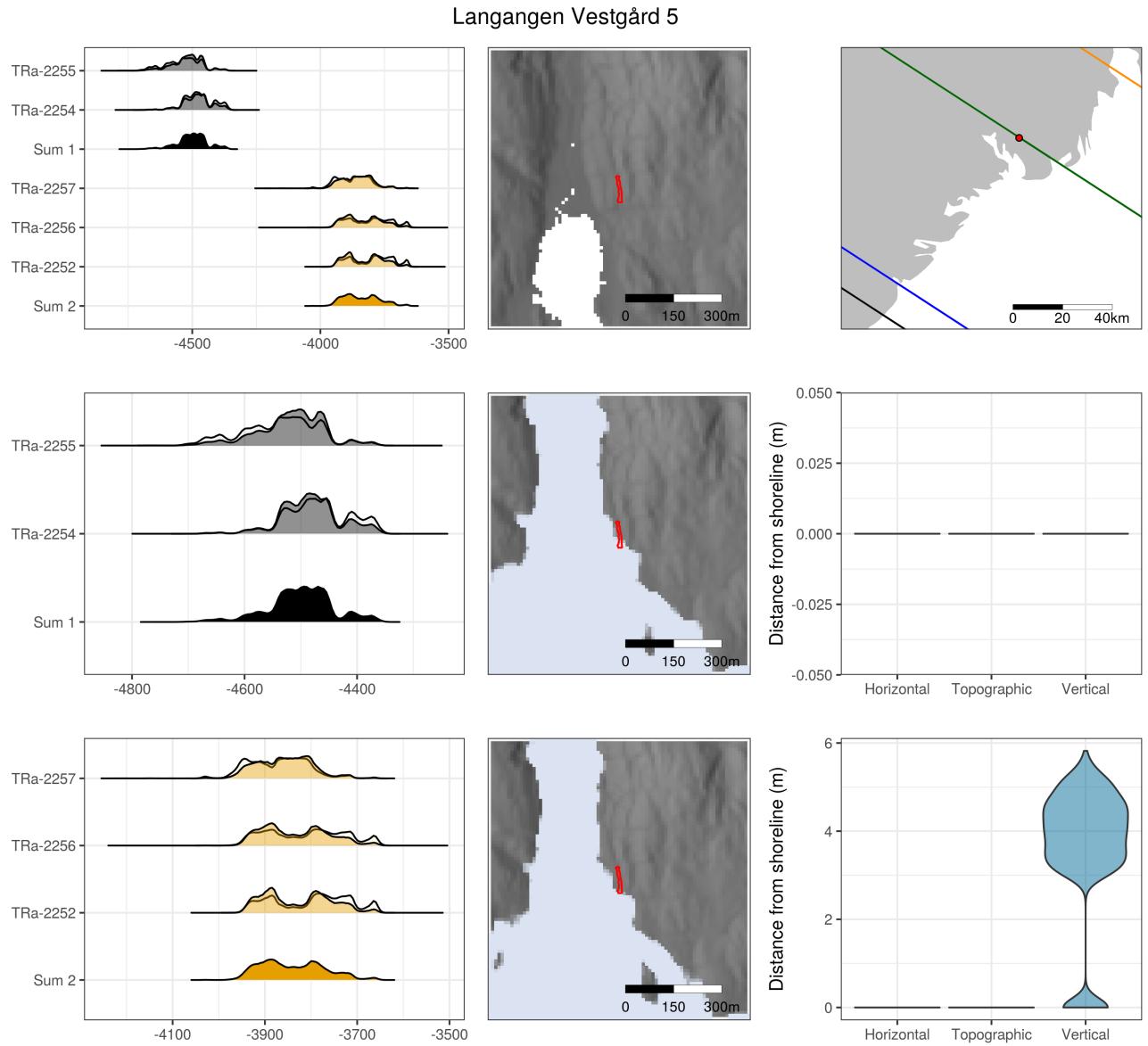
ID	^{14}C BP	Error	Material	Context
TRa-2245	1080	30	Birch (Betula)	Cooking pit (ID 1640)
TRa-2246	5400	55	Pine (Pinus)	Cooking pit (ID 1600)
TRa-2247	5325	50	Pine (Pinus)	Cooking pit (ID 1600)
TRa-2248	5910	10	Pine (Pinus)	Cooking pit (ID 1664)
TRa-4126	5095	40	Pine (Pinus)	Cooking pit (ID 1664)
TRa-2249	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 2014). Typological indicators are too coarse to offer any insight on the division into two phases done here for the ^{14}C -dates (see

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

```
## Warning in include_graphics(here("analysis/figures/langangenv5.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
## home/isak/phd/assessing.sealevel.dating/analysis/figures/langangenv5.png"
```



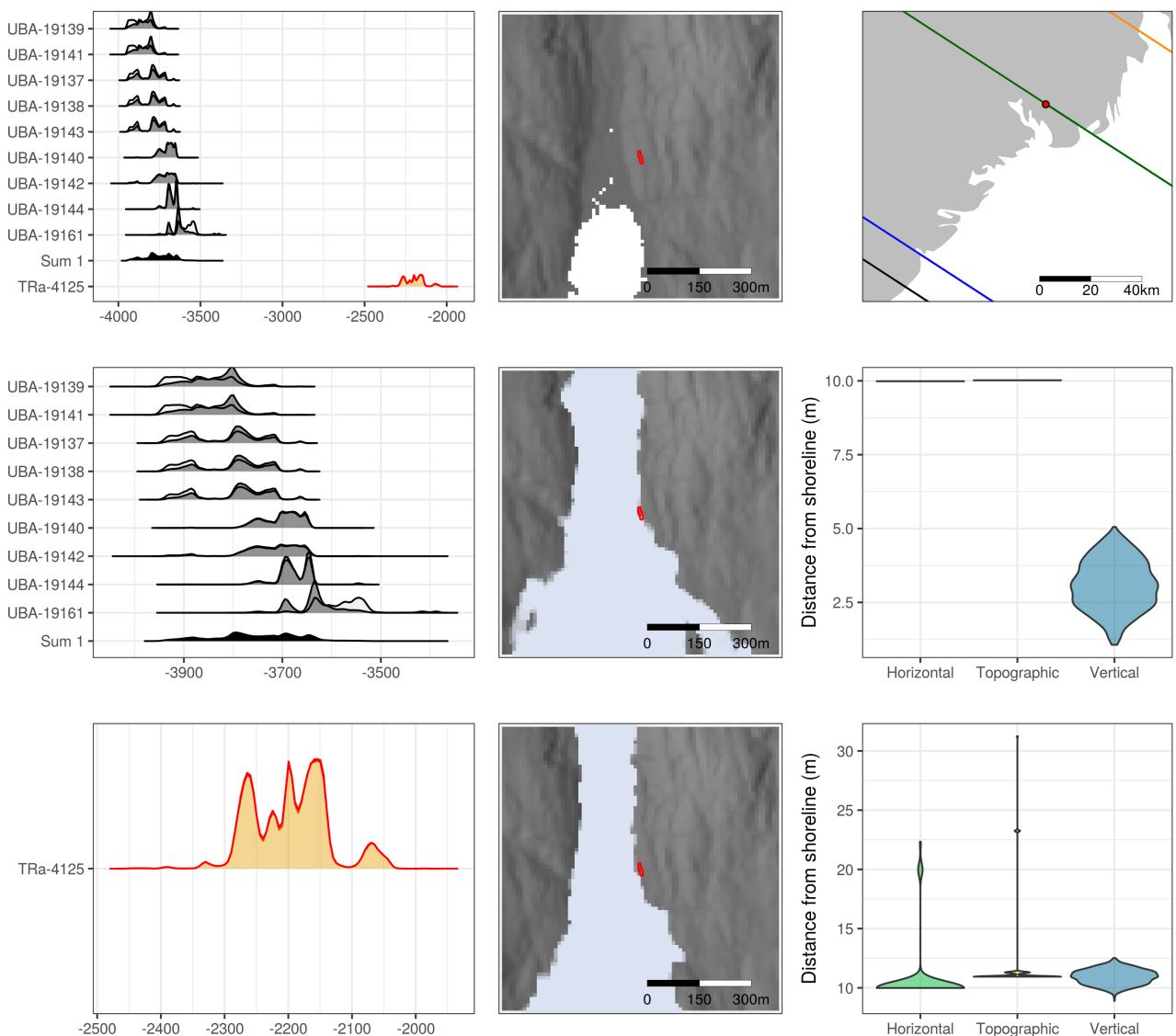
Langangen Vestgård 5. Typology match the ^{14}C -dates and a division into two settlement phases, one Late Mesolithic and one Early Neolithic (Reitan 2014d). No editing of the DTM deemed necessary.

```
## Warning in include_graphics(here("analysis/figures/langangenv6.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
## home/isak/phd/assessing.sealevel.dating/analysis/figures/langangenv6.png"
```

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)

Langangen Vestgård 6



Pottery and the lithic inventory of Langanven Vestgård 6 match ^{14}C -dates to the Early Neolithic (Reitan

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)

2014e). Nothing in the artefact inventory could be related to the Late Neolithic date. The DTM did not require editing.

```
## Warning in include_graphics(here("analysis/figures/langangenv7.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
## home/isak/phd/assessing.sealevel.dating/analysis/figures/langangenv7.png"
```

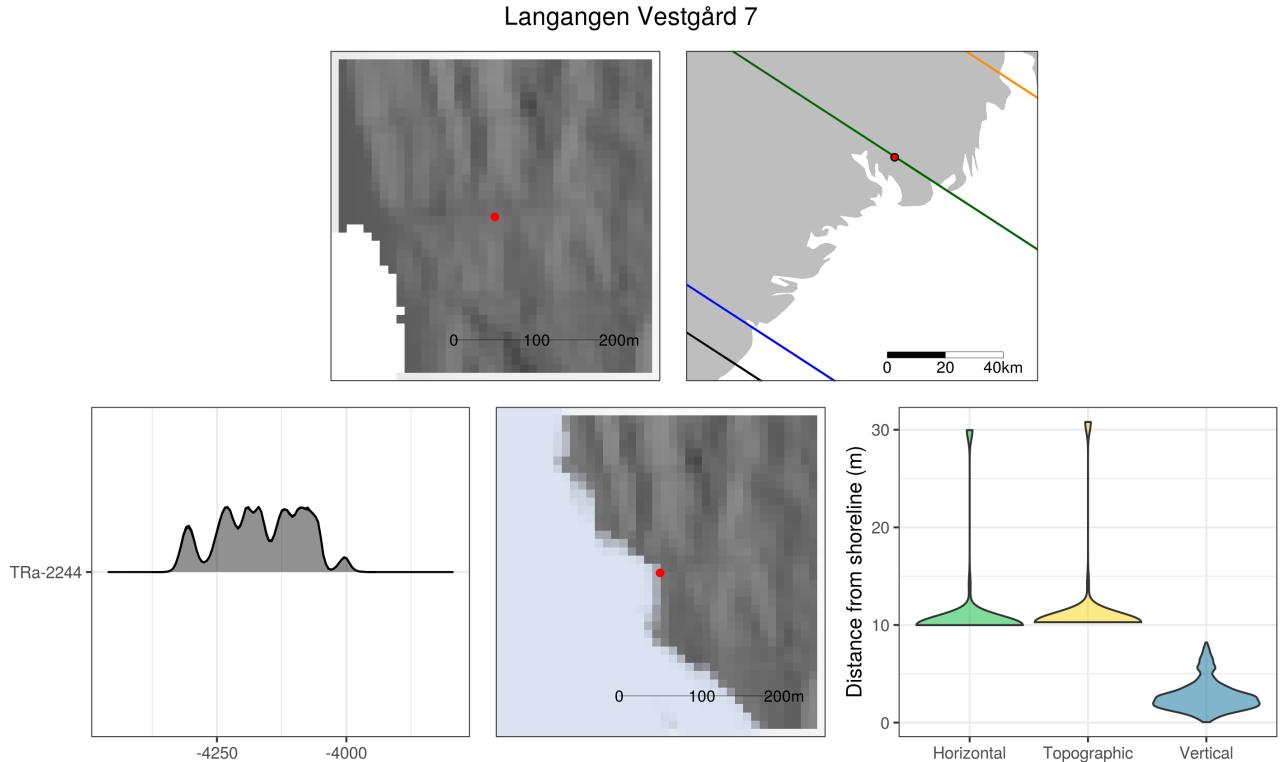
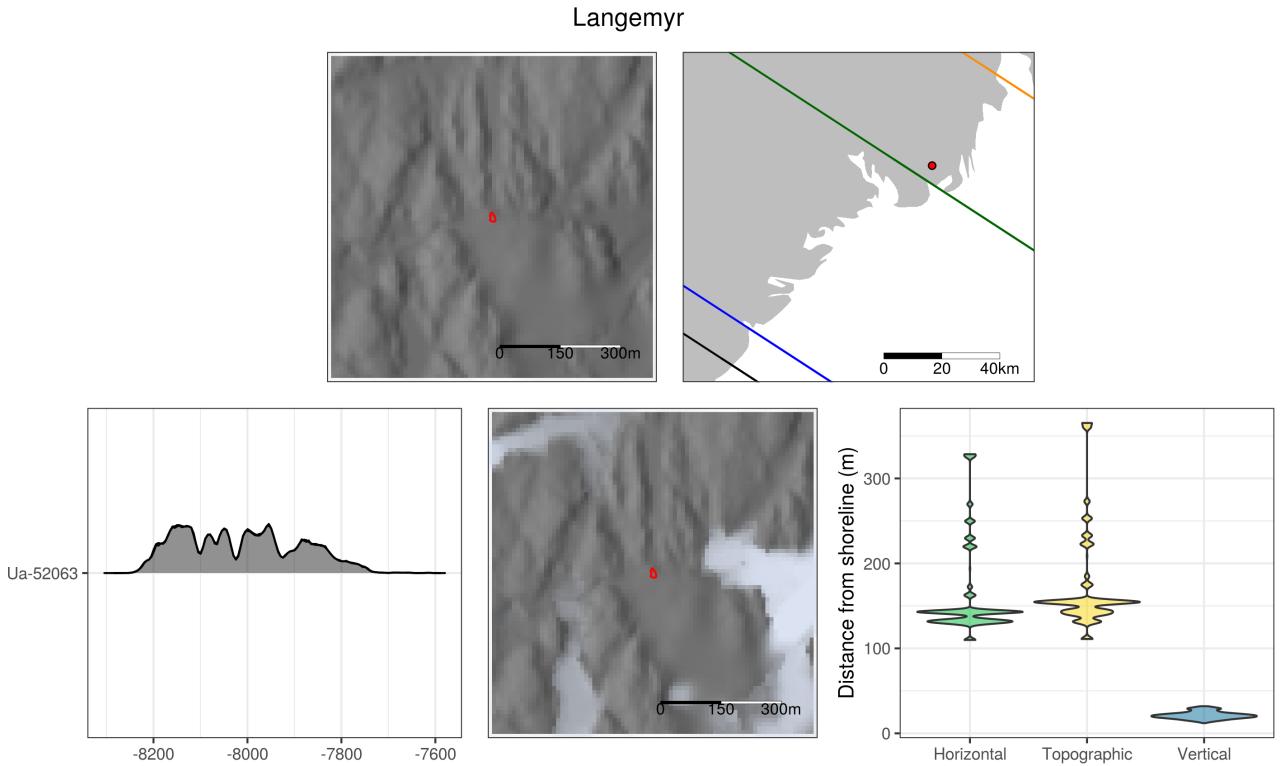


Table 39: Langemyr

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

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 2014f). The site was therefore only investigated to a limited degree. However, the material does typologically match the ^{14}C -date.

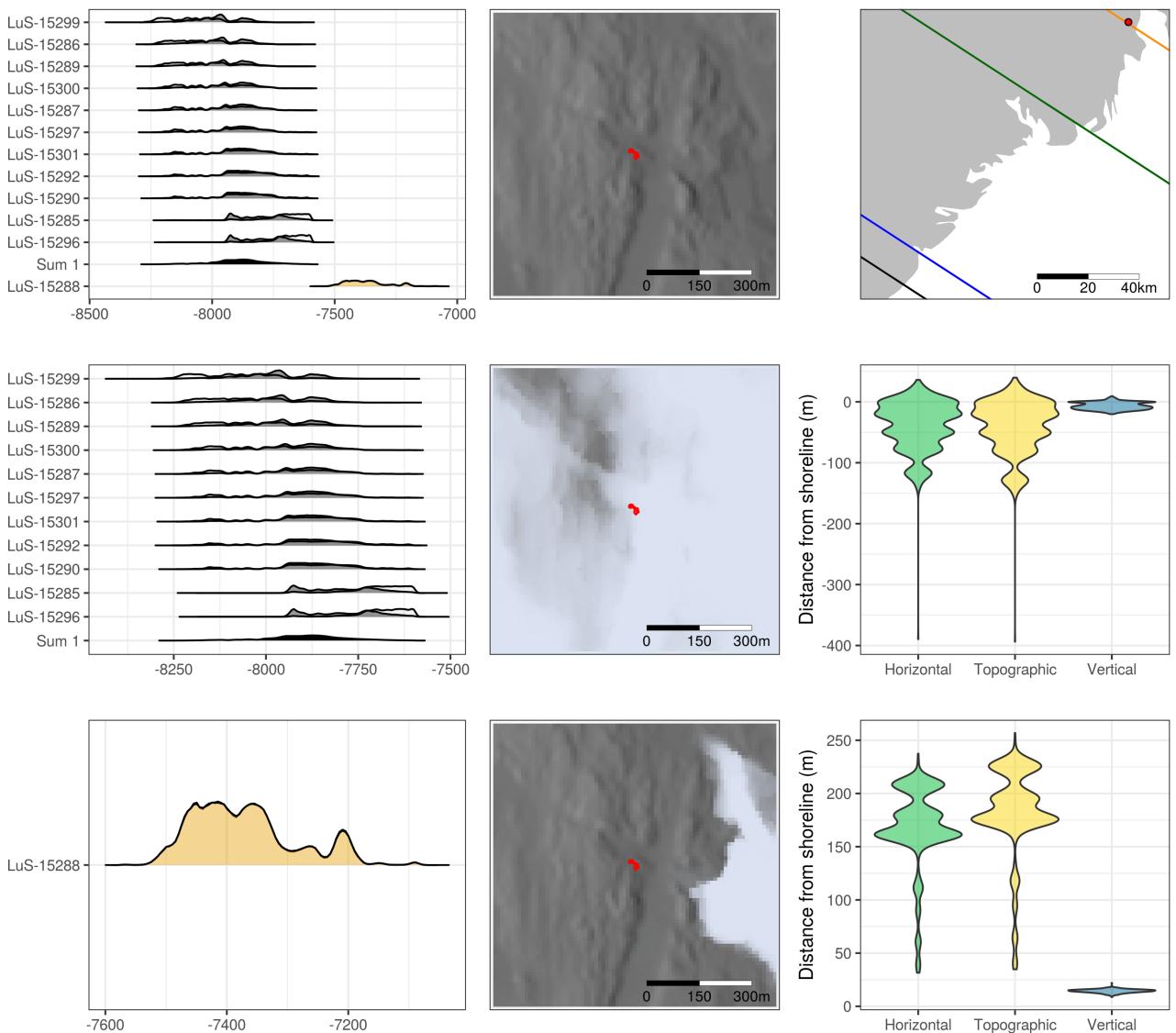
```
## Warning in include_graphics(here("analysis/figures/langemyr.png")): It is highly
## recommended to use relative paths for images. You had absolute paths: "/home/
## isak/phd/assessing.sealevel.dating/analysis/figures/langemyr.png"
```



Langemyr is typologically and radiometrically dated to the Middle Mesolithic (Koxvold 2018). 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.

```
## Warning in knitr::include_graphics(here("analysis/figures/lovass1.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/
## home/isak/phd/assessing.sealevel.dating/analysis/figures/lovass1.png"
```

Løvås 1

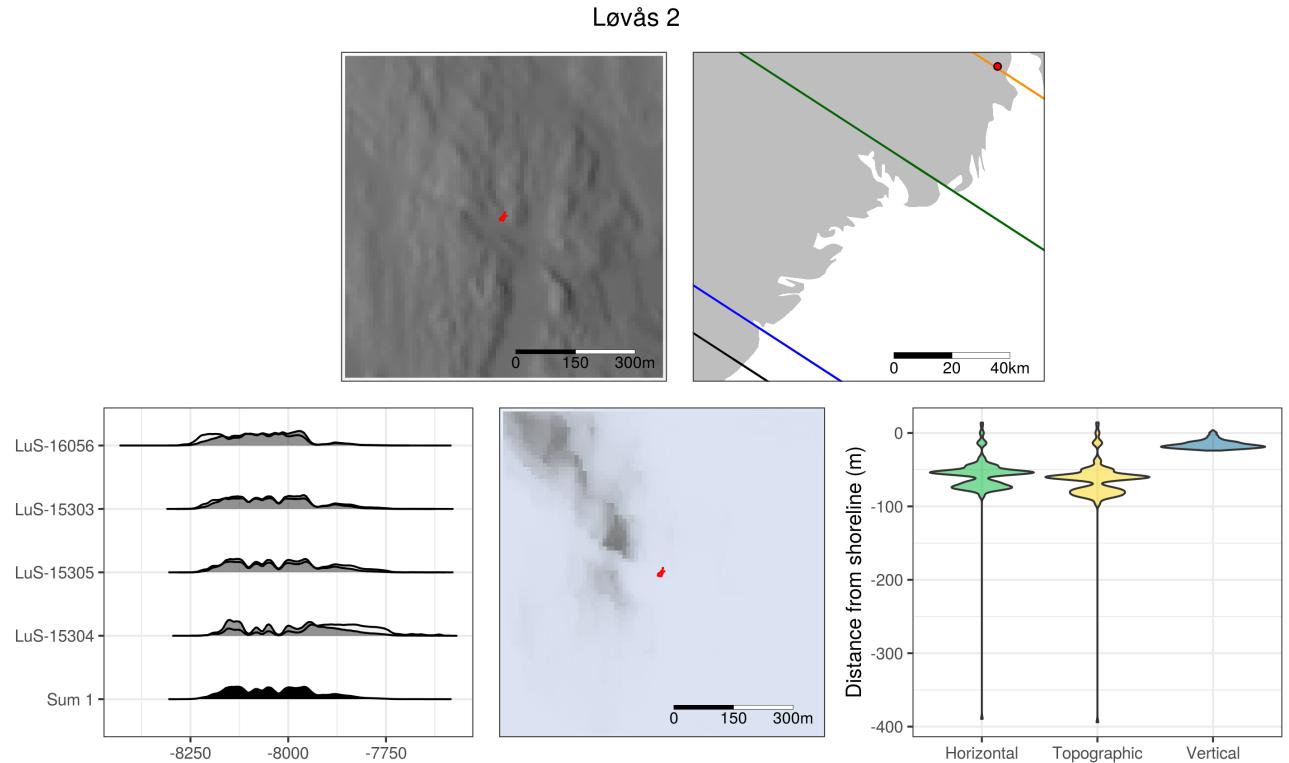


Løvås 1. No editing of the raster appeared to be necessary. Interestingly only the Løvås sites were simulated to be situated beneath the sea-level. The typologically secure inventory combined with the many overlapping dates from various features does indicate that the issue is with the displacement curve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

```
## Warning in knitr:::include_graphics(here("analysis/figures/lovås2.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "
## home/isak/phd/assessing.sealevel.dating/analysis/figures/lovås2.png"
```

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)



Løvås 2. Similar situation to that on Løvås 1 and 3 (above and below).

```
## Warning in knitr::include_graphics(here("analysis/figures/lovas3.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/
```

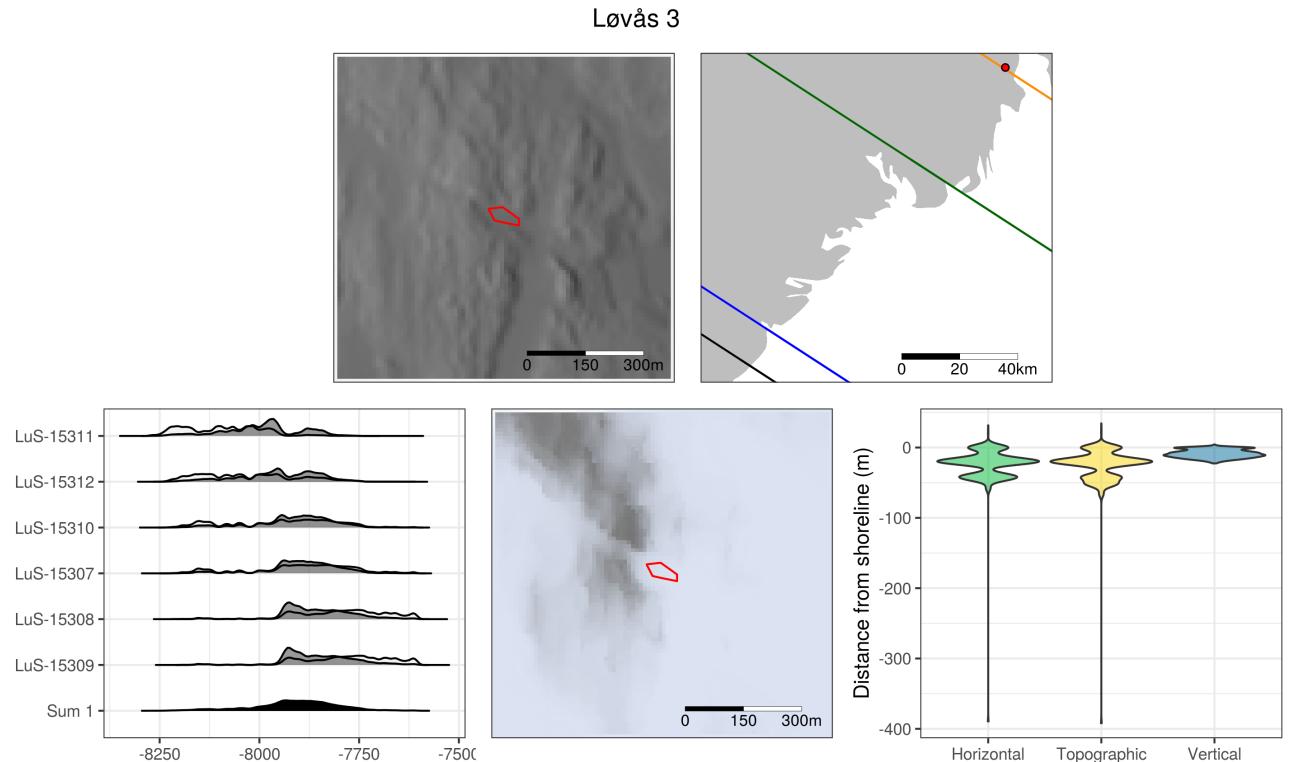
Table 41: Løvås 2

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)

home/isak/phd/assessing.sealevel.dating/analysis/figures/lovas3.png"

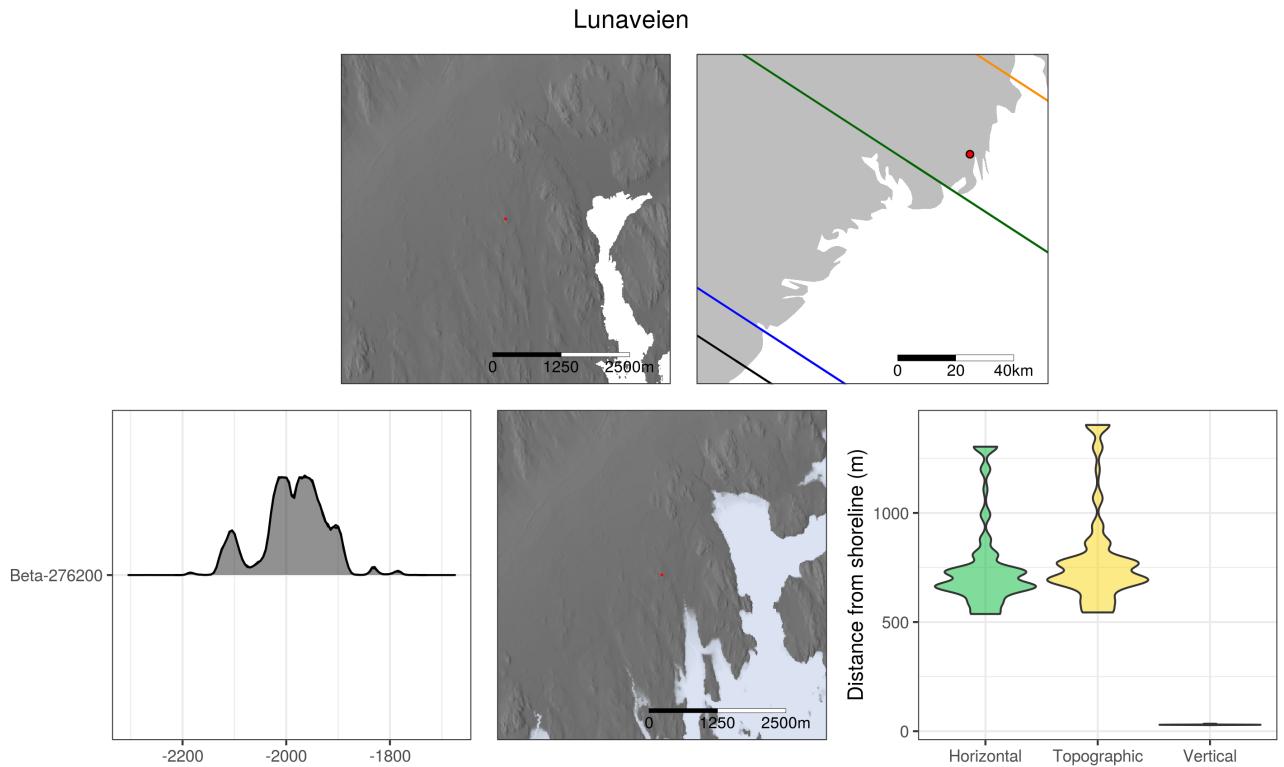


Similar situation to that on Løvås 1 and 2 (above).

Table 43: Lunaveien

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

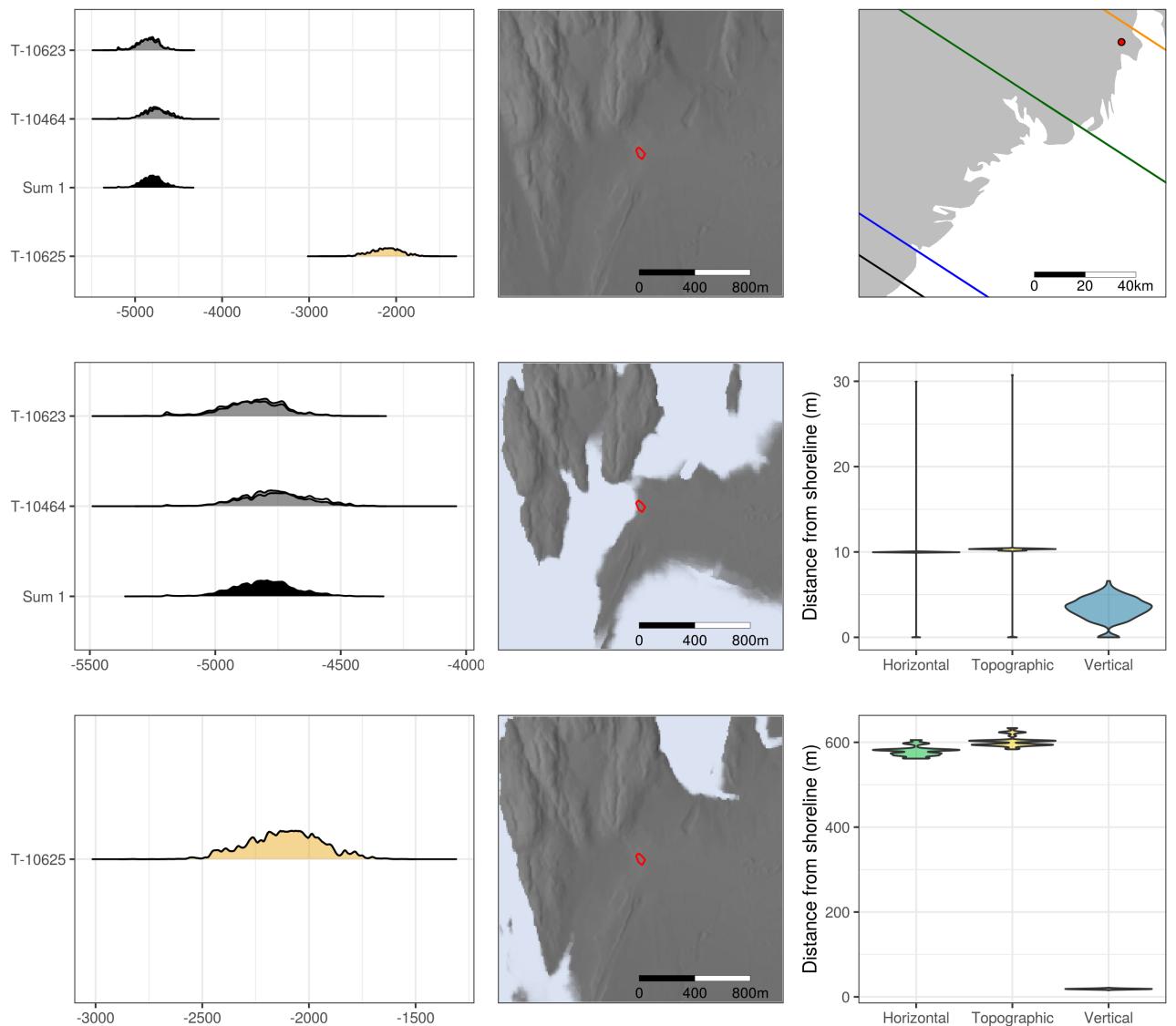
```
## Warning in include_graphics(here("analysis/figures/lunaveien.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/
## home/isak/phd/assessing.sealevel.dating/analysis/figures/lunaveien.png"
```



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.

```
## Warning in include_graphics(here("analysis/figures/nauena.png")): It is highly
## recommended to use relative paths for images. You had absolute paths: "/home/
## isak/phd/assessing.sealevel.dating/analysis/figures/nauena.png"
```

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.

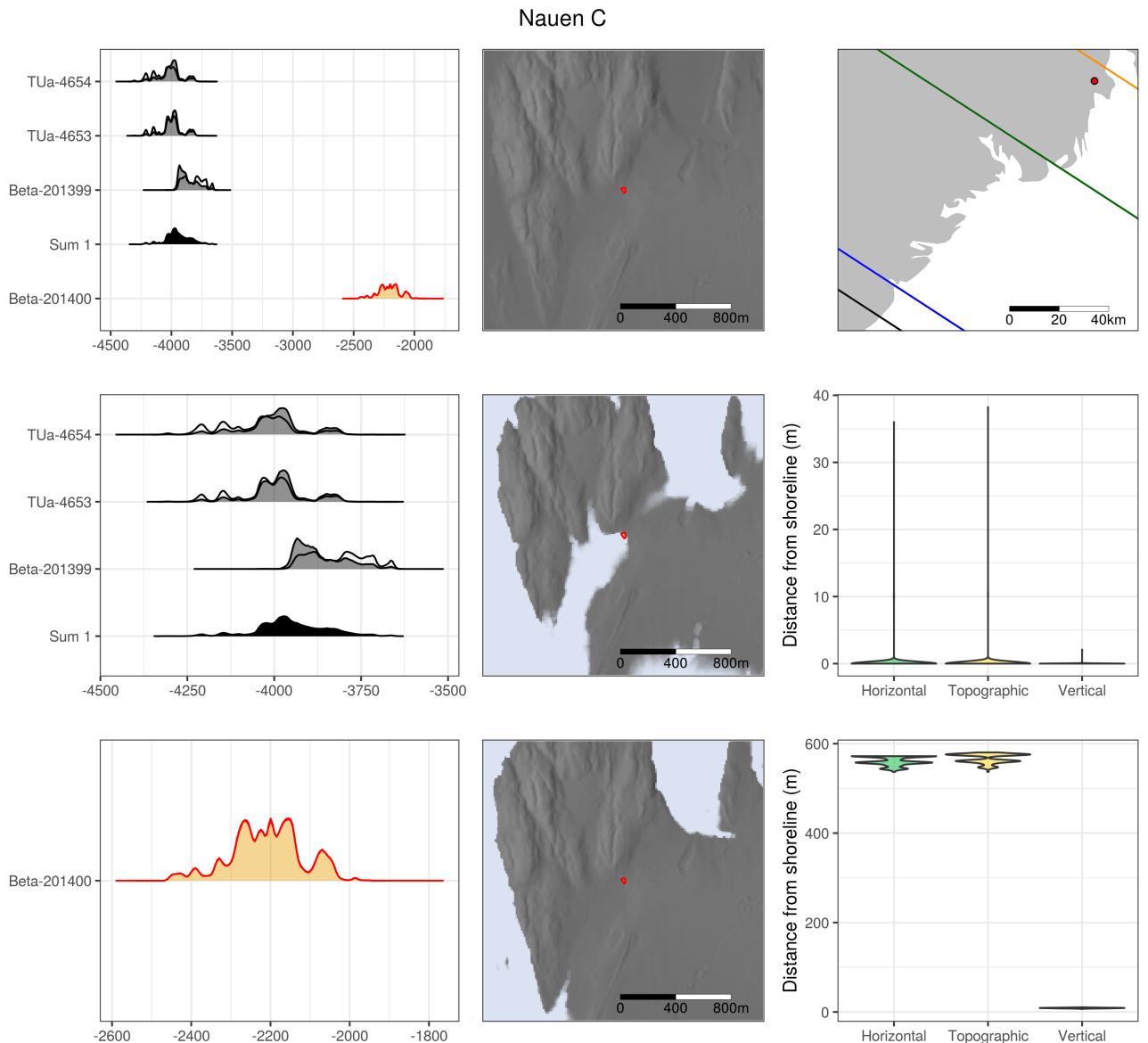
```
## Warning in include_graphics(here("analysis/figures/nauenc.png")): It is highly
## recommended to use relative paths for images. You had absolute paths: "/home/
## isak/phd/assessing.sealevel.dating/analysis/figures/nauenc.png"
```

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)



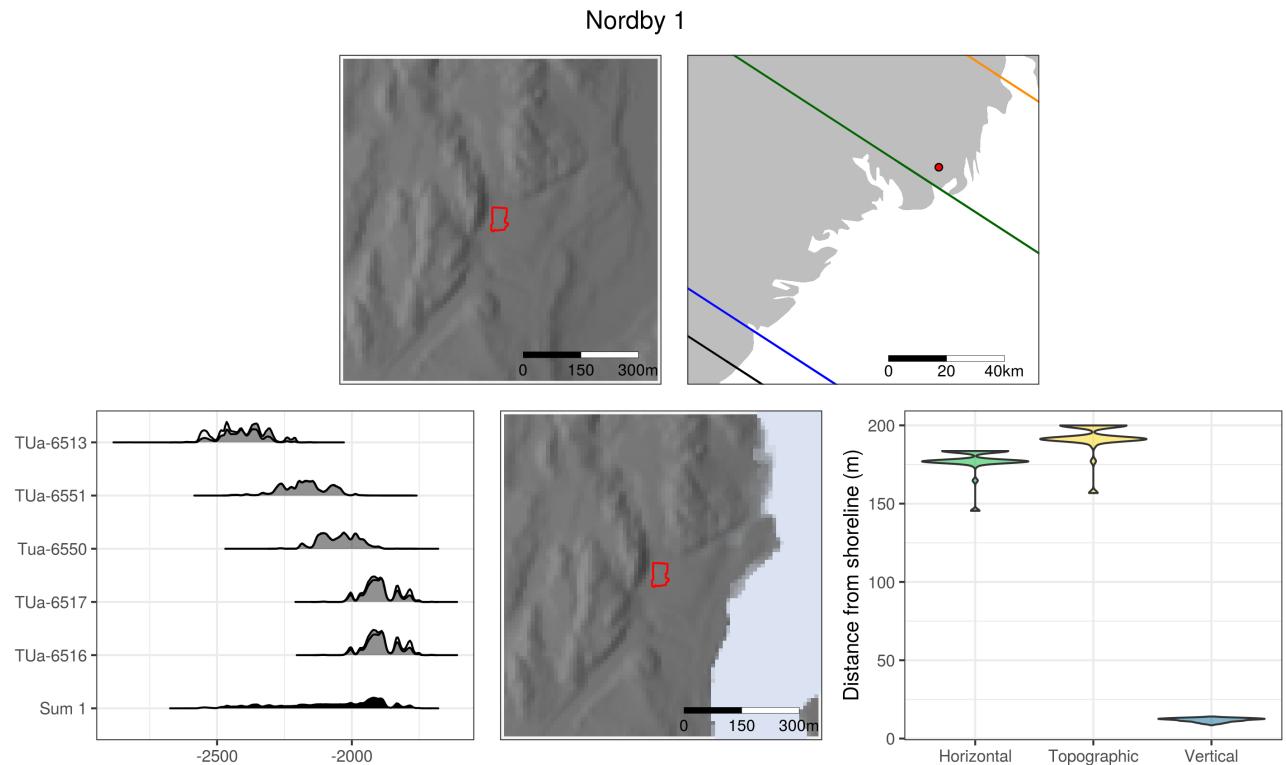
The typological indicators of the lithic inventory from Nauen C match the earliest dates (Persson 2008). As with Nauen A, above, the DTM was edited pre-emptively and does not appear to have been necessary.

```
## Warning in include_graphics(here("analysis/figures/nordby1.png")): It is highly
```

Table 46: Nordby 1

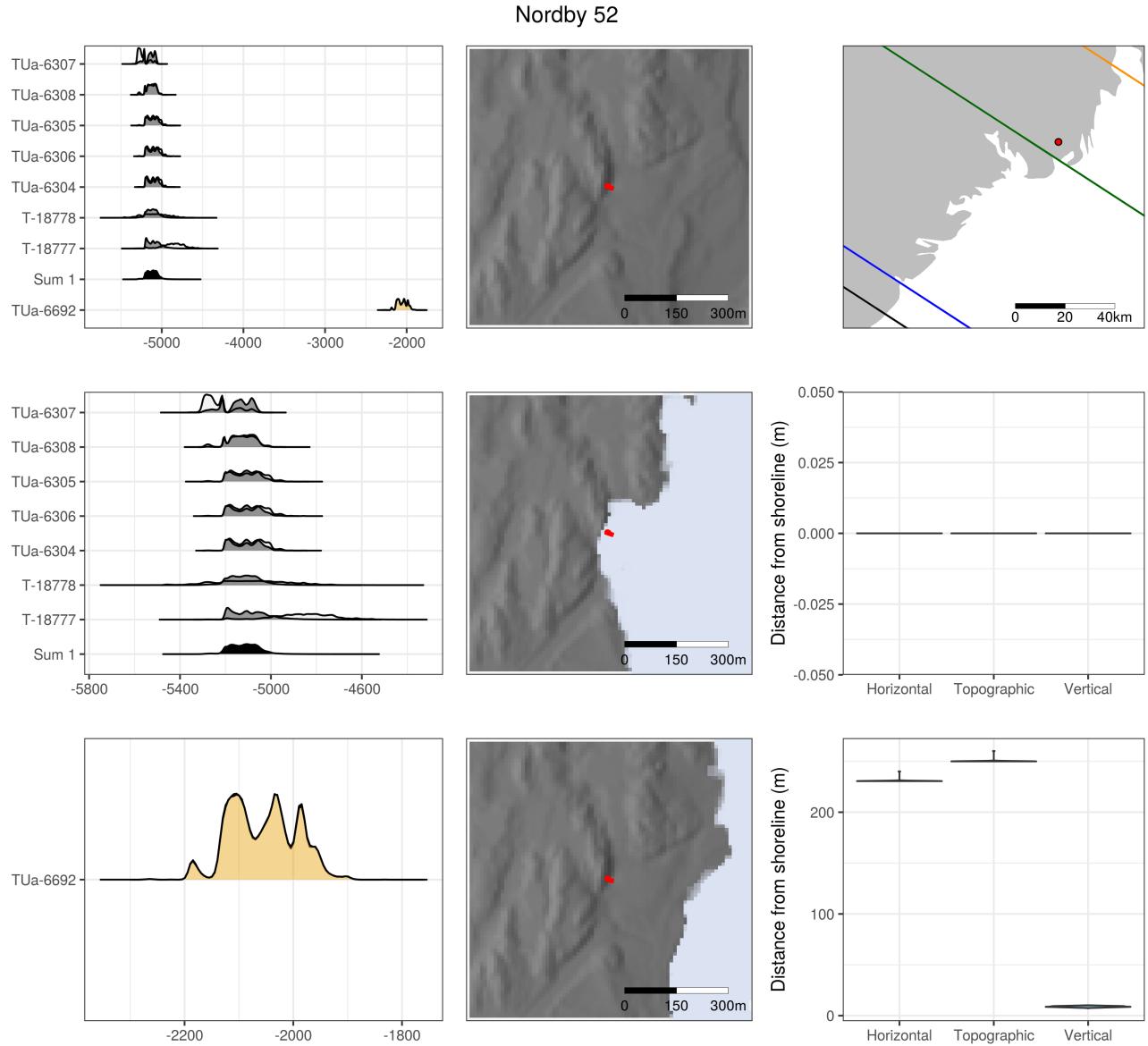
ID	¹⁴ C BP	Error	Material	Context
TUa-6513	3945	45	Hazel (<i>Corylus</i>), nutshell	Post hole, house 4 (ID 35188)
Tua-6550	3665	45	Oak (<i>Quercus</i>)	Post hole, house 4 (ID 35191)
TUa-6555	2025	30	Plant remains, unspecified	Post hole, house 3 (ID 35082)
TUA-6511	1805	35	Barley (<i>Hordeum vulgare</i>)	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)

```
## recommended to use relative paths for images. You had absolute paths: "/home/
## isak/phd/assessing.sealevel.dating/analysis/figures/nordby1.png"
```



Nordby 1 is dated to the Late Neolithic, Bronze Age and Early Iron Age (Gjerpe and Bukkemoen 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.

```
## Warning in include_graphics(here("analysis/figures/nordby52.png")): It is highly
## recommended to use relative paths for images. You had absolute paths: "/home/
## isak/phd/assessing.sealevel.dating/analysis/figures/nordby52.png"
```



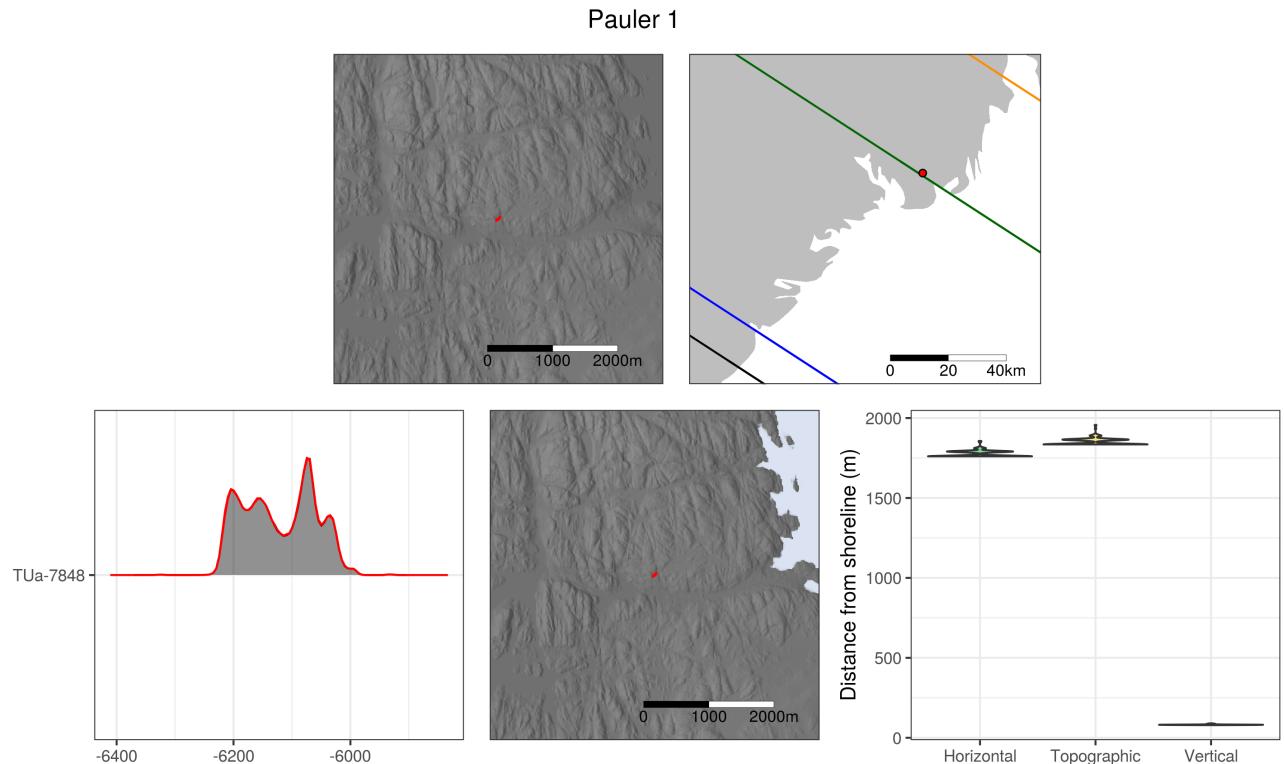
Nordby 52 is a rock-shelter that has been visited throughout prehistory (Gjerpe and Bukkemoen 2008b). The site has a clear typological date to both of the Stone Age periods defined by the ^{14}C -dates treated here. The site is located by where the highway runs today (see also Nordby 1 above). Edit appears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

```
## Warning in include_graphics(here("analysis/figures/pauler1.png")): It is highly
## recommended to use relative paths for images. You had absolute paths: "/home/
```

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

```
## isak/phd/assessing.sealevel.dating/analysis/figures/pauler1.png"
```

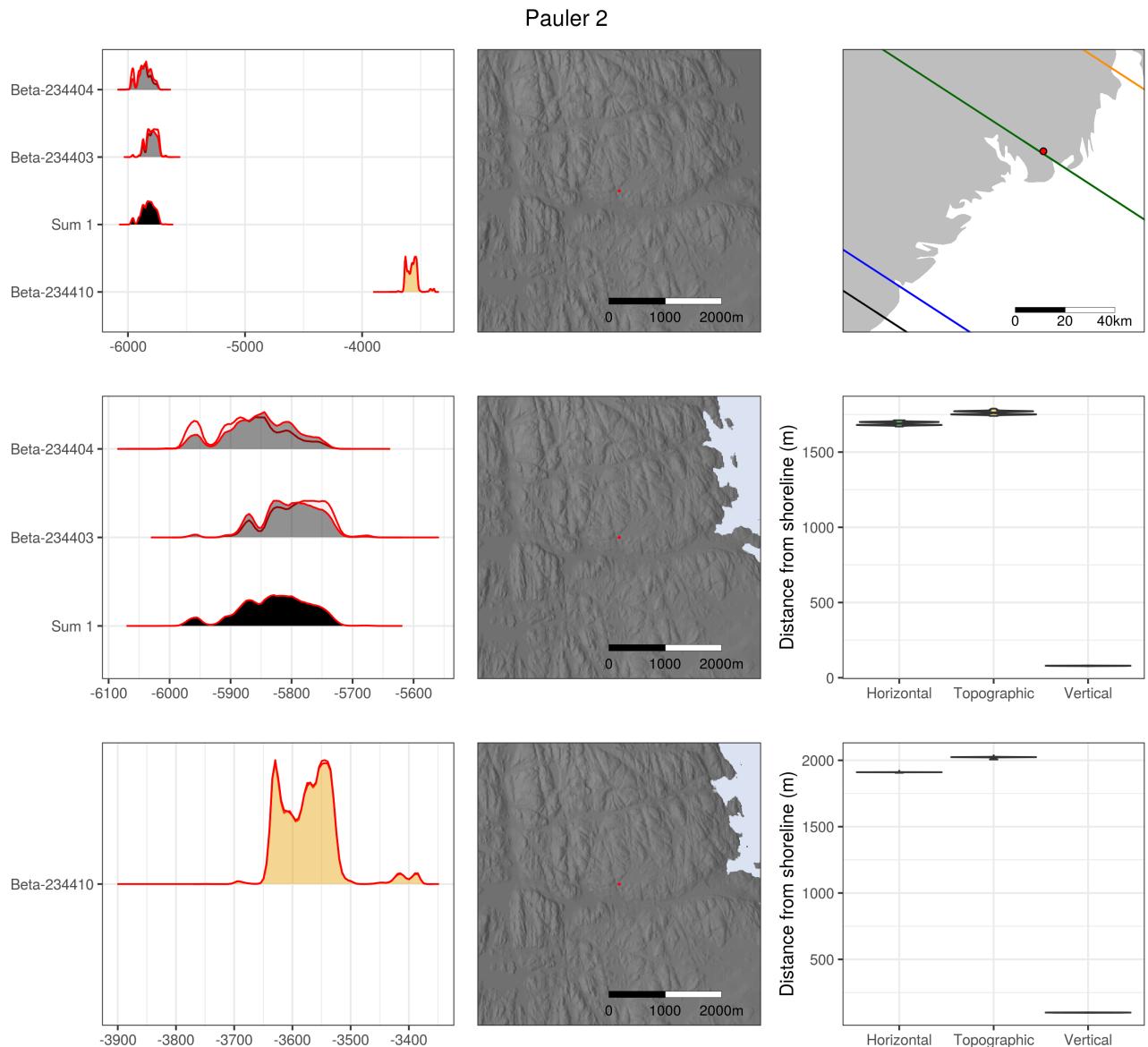


Pauler 1 has a distinctly Early Mesolithic artefact inventory that is not related to the ¹⁴C-dates (Schaller Åhrberg 2012).

```
## Warning in include_graphics(here("analysis/figures/pauler2.png")): It is highly
## recommended to use relative paths for images. You had absolute paths: "/home/
## isak/phd/assessing.sealevel.dating/analysis/figures/pauler2.png"
```

Table 48: Pauler 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 Pauler 1 (above), Pauler 2 has a distinctly Early Mesolithic artefact inventory that is not related to the ^{14}C -dates (Nyland 2012).

```
## Warning in include_graphics(here("analysis/figures/pjonkerodr1.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/
```

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)

home/isak/phd/assessing.sealevel.dating/analysis/figures/pjonkerodr1.png"

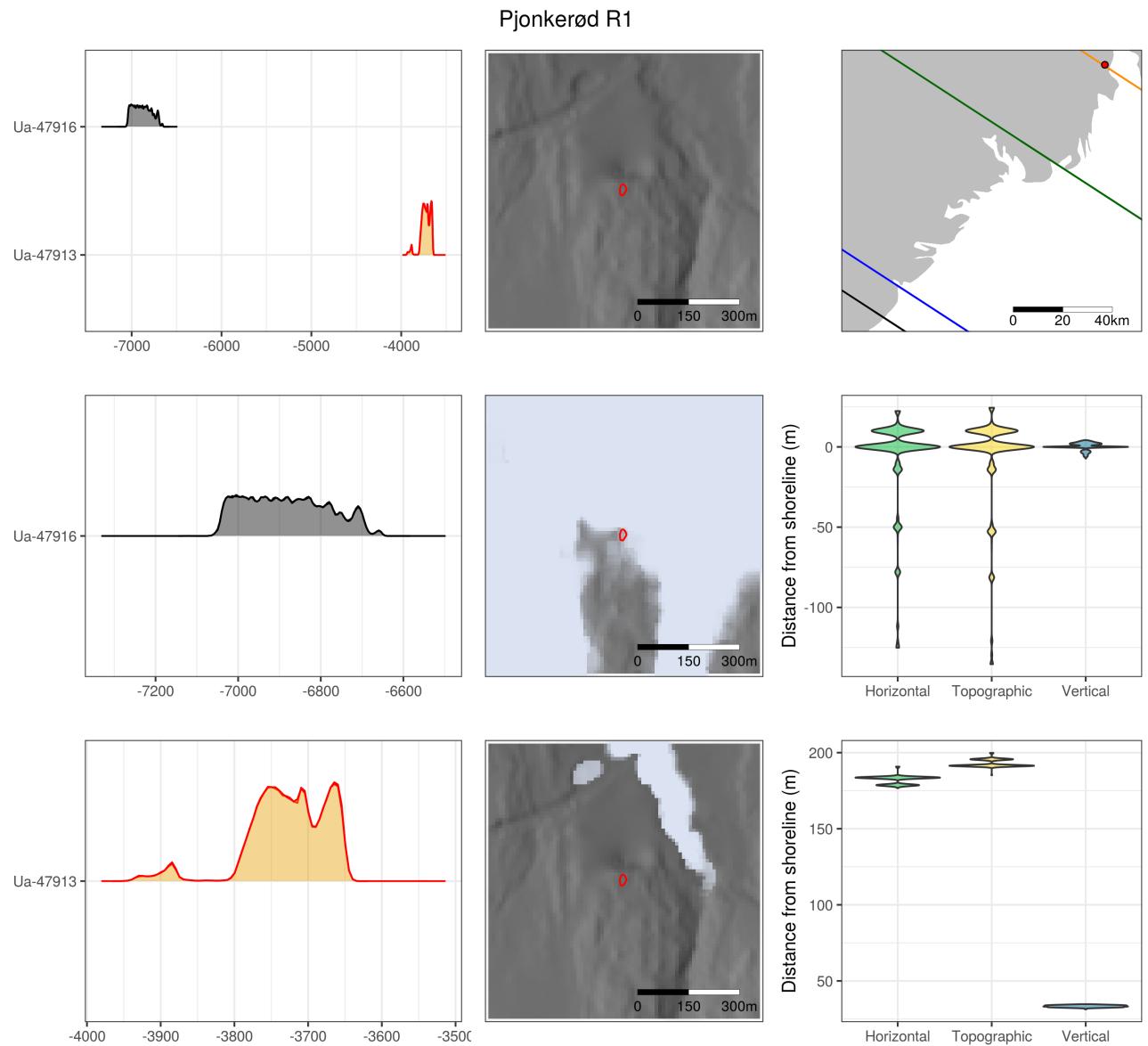


Table 50: Pjonkerød R1

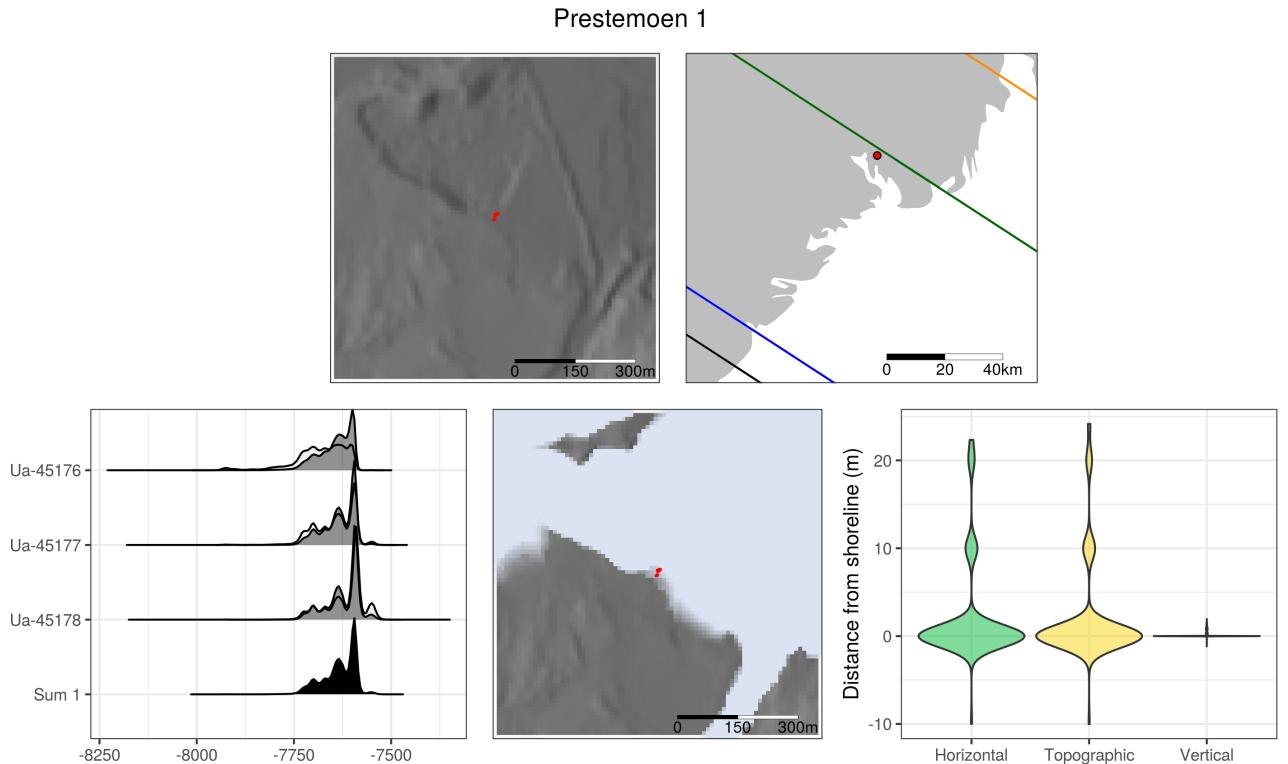
ID	^{14}C BP	Error	Material	Context
Ua-47916	7970	44	Burnt bone	Quadrant 50x50x10 (112x51y NE, layer 2)
Ua-47914	3178	32	Pine (Pinus)	Undefined feature (ID 2001)
Ua-47915	3117	31	Pine (Pinus)	Cooking pit (ID 2002)
Ua-47917	1373	30	Oak (Quercus)	Cooking pit (ID 2007)
Ua-47913	4959	34	Pine (Pinus)	Undefined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

Table 51: Prestemoen 1

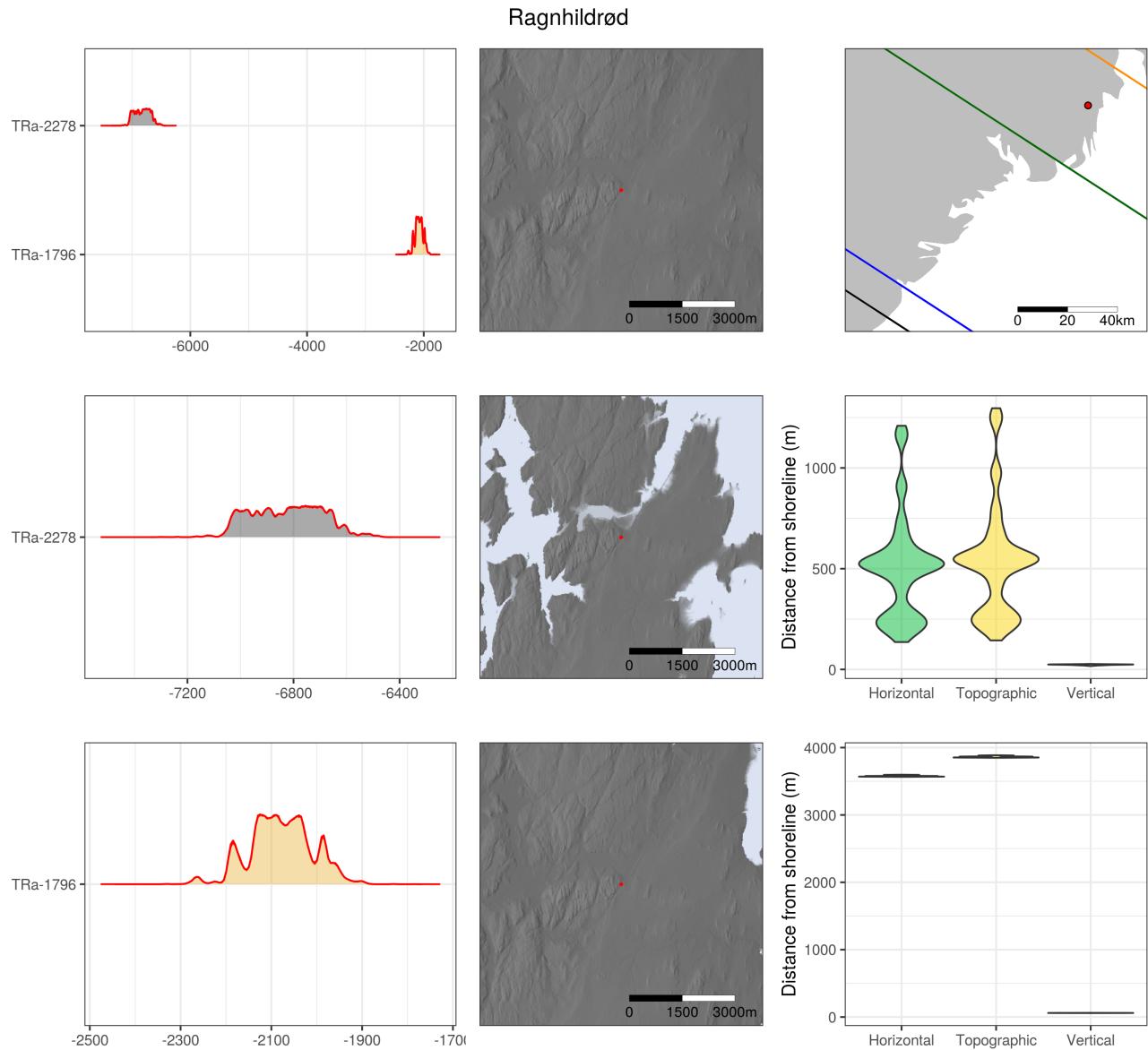
ID	^{14}C BP	Error	Material	Context
Ua-45176	8671	45	Hazel (Corylus), nutshell	Square (620x149y, layer 6)
Ua-45177	8620	45	Burnt bone	Square (620x149y, layer 6)
Ua-45178	8593	46	Hazel (Corylus), nutshell	Square (620x149y, layer 8)

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

```
## Warning in include_graphics(here("analysis/figures/prestemoen1.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
## home/isak/phd/assessing.sealevel.dating/analysis/figures/prestemoen1.png"
```



Prestemoen 1 has a lithic inventory consistent with the ^{14}C -dates (Persson 2014). 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 2014, fig. 10.20).

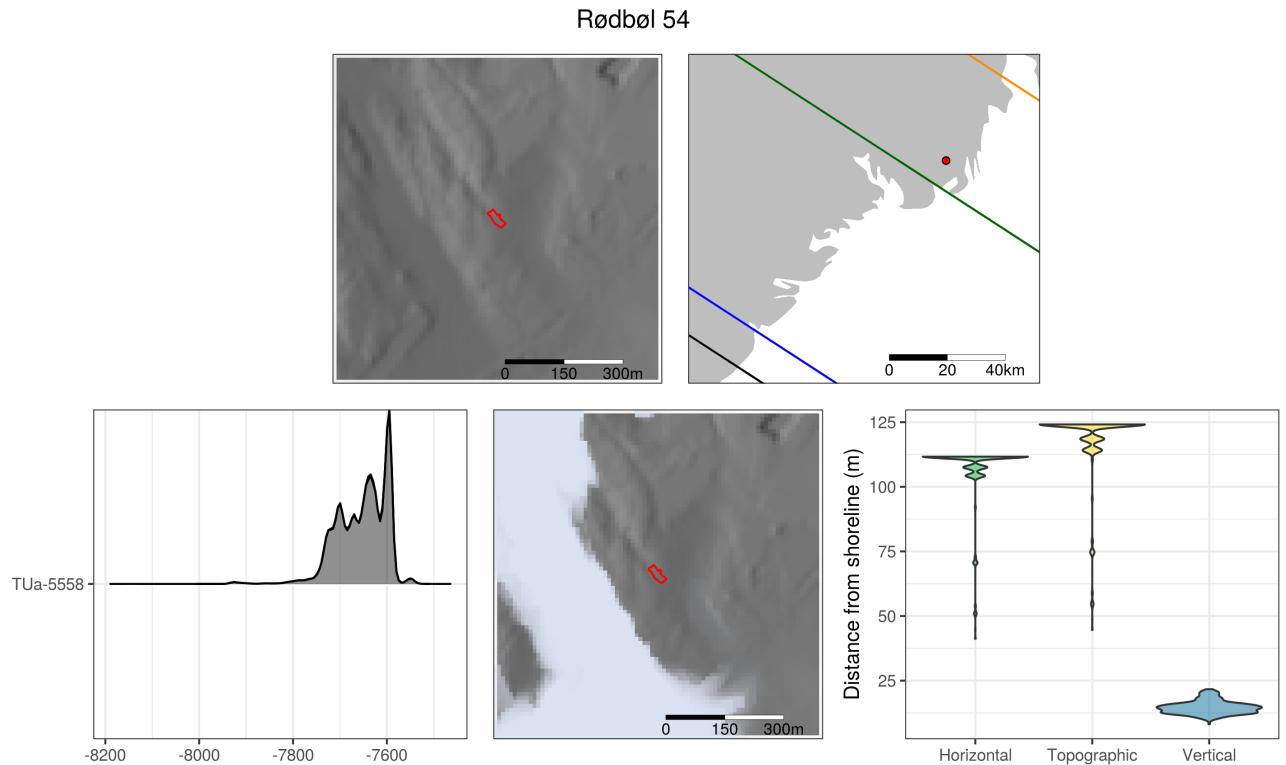


The earliest ^{14}C -date does not match the Middle Mesolithic inventory from Ragnhildrød (Mjærum 2012). The post-hole dated to the Late Neolithic/Bronze Age could be related to a single find of a pressure flaked object, but was not given much weight in the report (Mjærum 2012, 76).

```
## Warning in include_graphics(here("analysis/figures/rodbol54.png")): It is highly
## recommended to use relative paths for images. You had absolute paths: "/home/
## isak/phd/assessing.sealevel.dating/analysis/figures/rodbol54.png"
```

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)



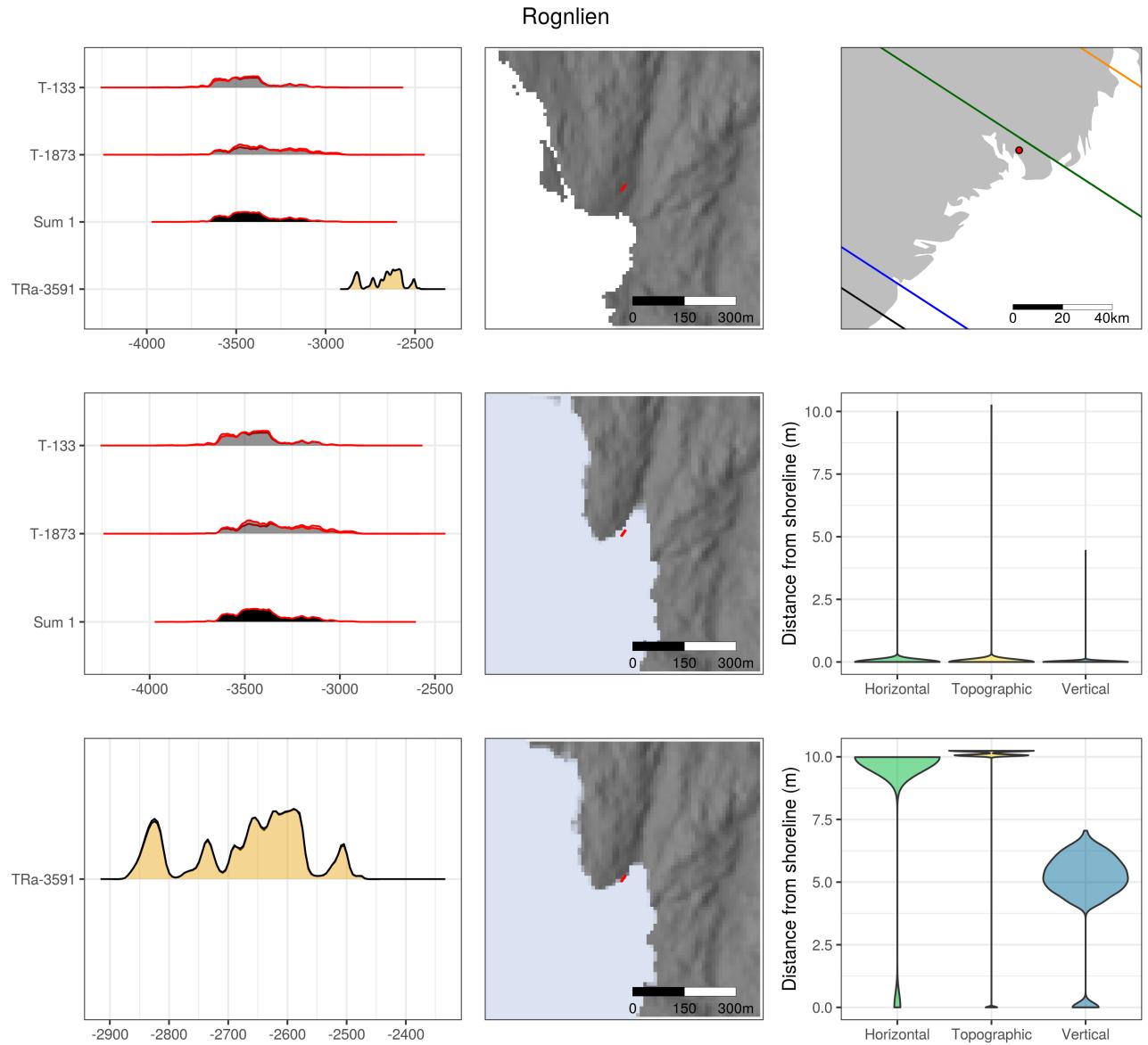
Lithic inventory match the ^{14}C -date from Rødbøl 54 (Mansrud 2008). The site is situated where the highway runs today, which required editing and which is deemed to have been successful.

```
## Warning in include_graphics(here("analysis/figures/rognlien.png")): It is highly
```

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)

```
## recommended to use relative paths for images. You had absolute paths: "/home/
## isak/phd/assessing.sealevel.dating/analysis/figures/rognlien.png"
```



Rognlien was originally excavated in (**ingstad1970?**). The site limit has been manually defined based on the description given in the report and the spatial geometry of the site as defined in the database Askeladden.

Table 54: Rognlien

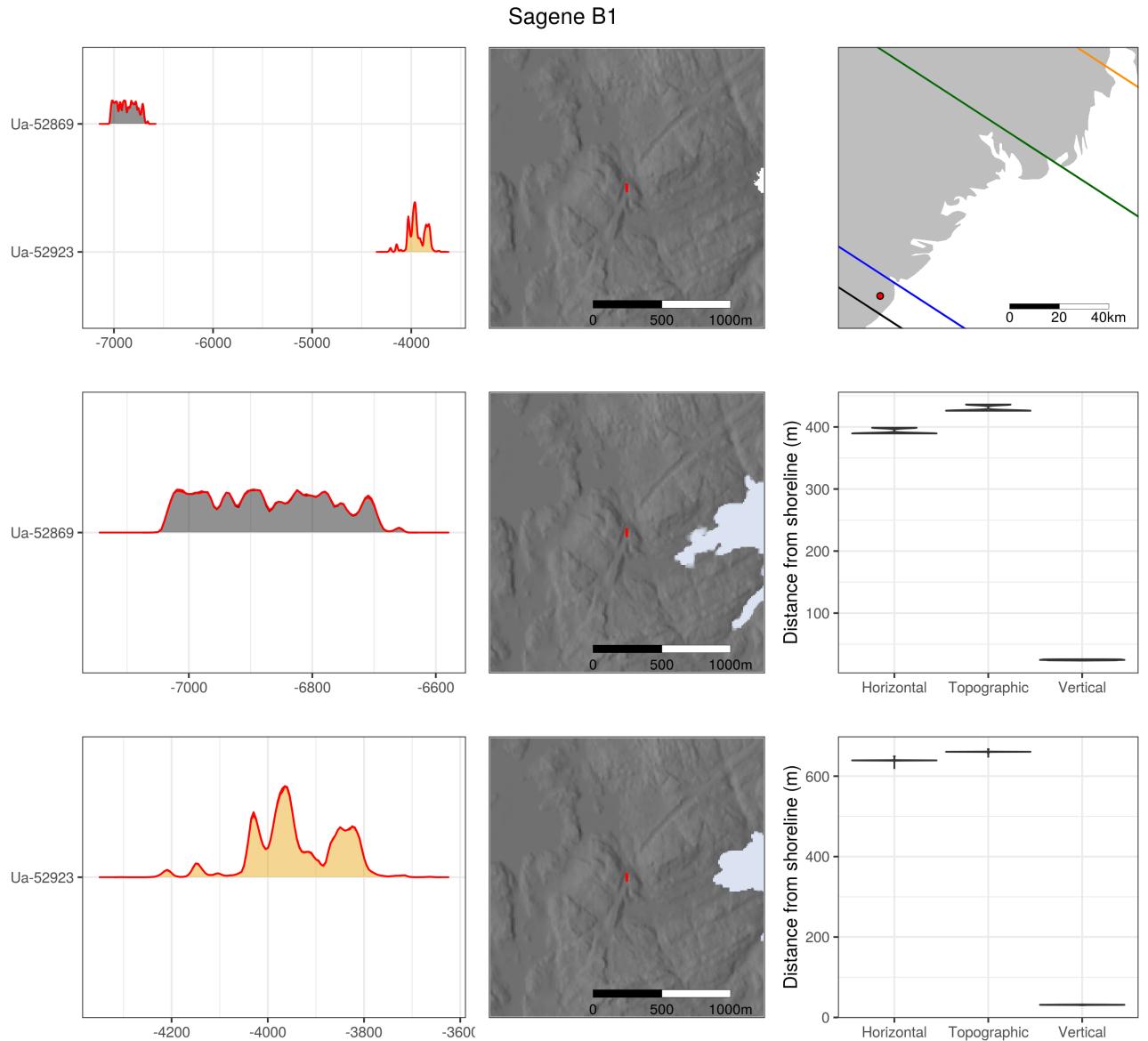
ID	^{14}C BP	Error	Material	Context
T-133	4700	120	Charcoal, unspecified	Unspecified excavation unit
T-1873	4600	130	Charcoal, unspecified	Unspecified excavation unit
TRA-3591	4090	35	Burnt bone, elk (<i>Alces alces</i>)	Unspecified excavation unit

The manually defined limit could be slightly off, but should match the elevation of the site given in the publication (ingstad1970?). The ^{14}C -dates from the original excavation 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.

```
## Warning in include_graphics(here("analysis/figures/sageneb1.png")): It is highly
## recommended to use relative paths for images. You had absolute paths: "/home/
## isak/phd/assessing.sealevel.dating/analysis/figures/sageneb1.png"
```

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)



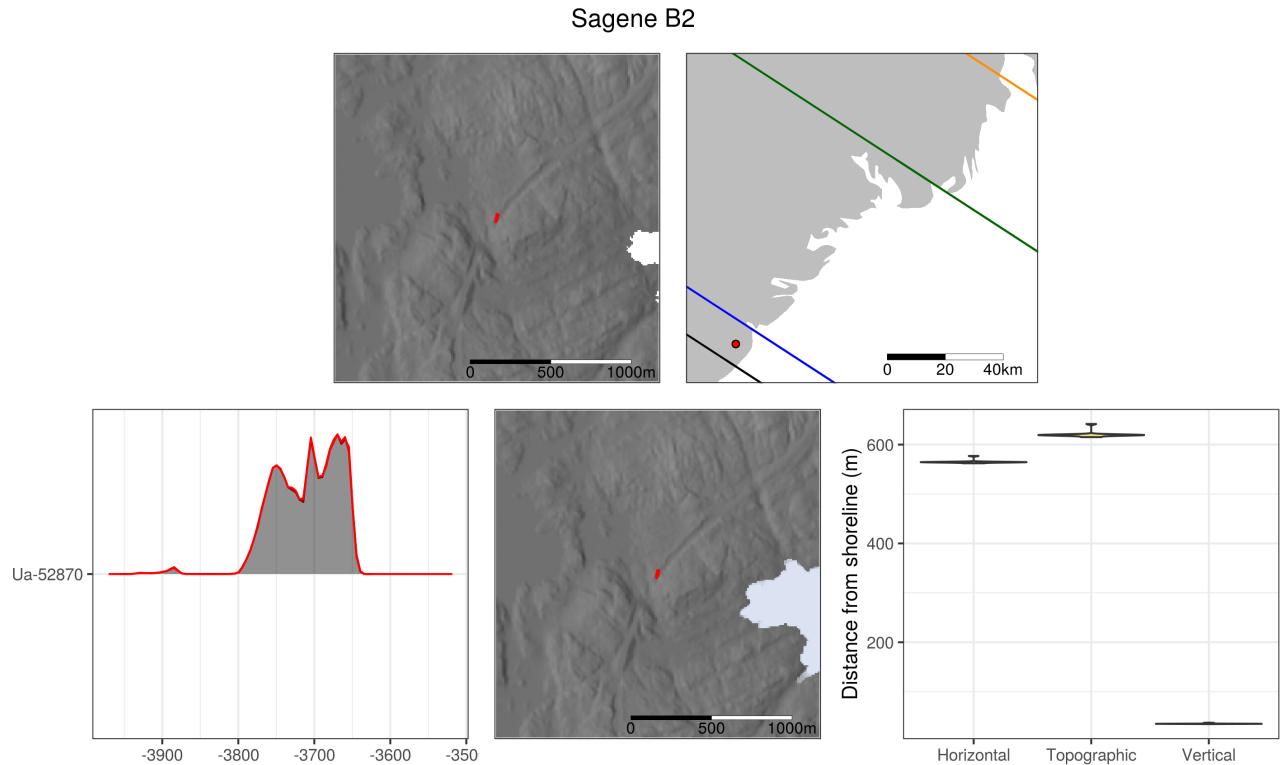
^{14}C -dates from Sagene B1 do not match the Early Mesolithic inventory of the site (Viken 2018c). The wide discrepancy of the dates from the post-holes also led Viken (2018c) to suggest that these features might actually be non-anthropogenic and that they could instead be related to trees that have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

```
## Warning in include_graphics(here("analysis/figures/sageneb2.png")): It is highly
```

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)

```
## recommended to use relative paths for images. You had absolute paths: "/home/
## isak/phd/assessing.sealevel.dating/analysis/figures/sageneb2.png"
```

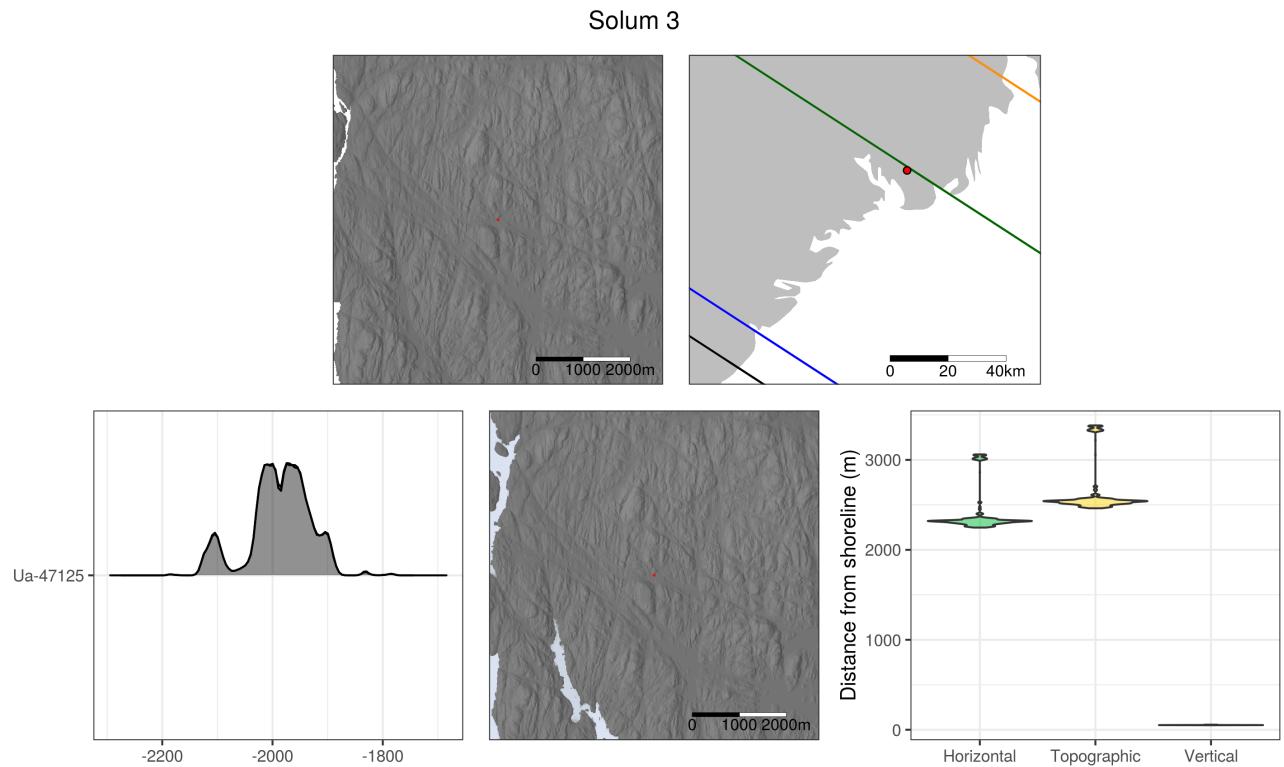


The ^{14}C -dates from Sagene B2 do not match the clearly Early Mesolithic inventory of the site (Darmark 2018b).

```
## Warning in include_graphics(here("analysis/figures/solum3.png")): It is highly
## recommended to use relative paths for images. You had absolute paths: "/home/
## isak/phd/assessing.sealevel.dating/analysis/figures/solum3.png"
```

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).

```
## Warning in include_graphics(here("analysis/figures/stokkep1.png")): It is highly
## recommended to use relative paths for images. You had absolute paths: "/home/
## isak/phd/assessing.sealevel.dating/analysis/figures/stokkep1.png"
```

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)

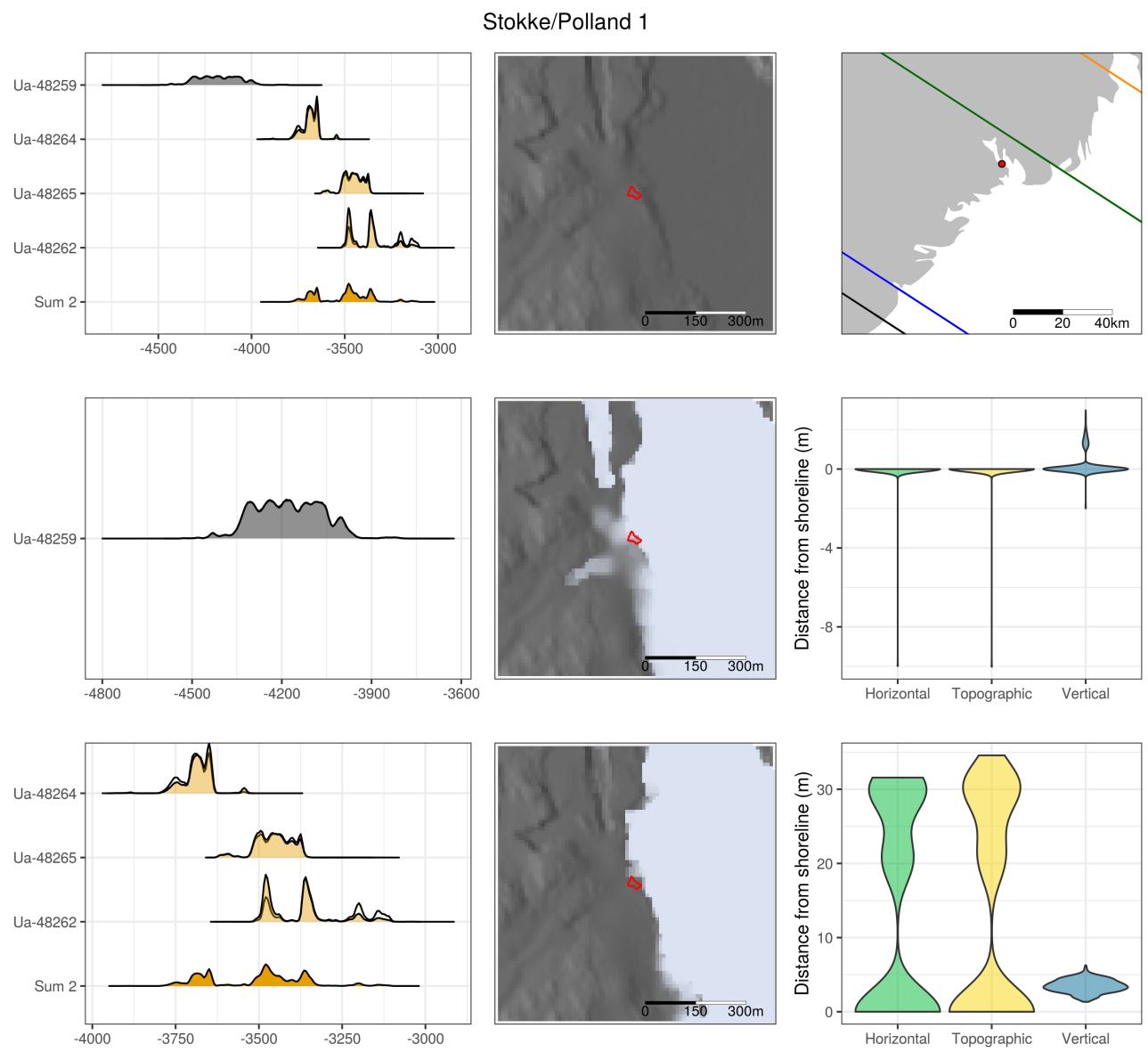
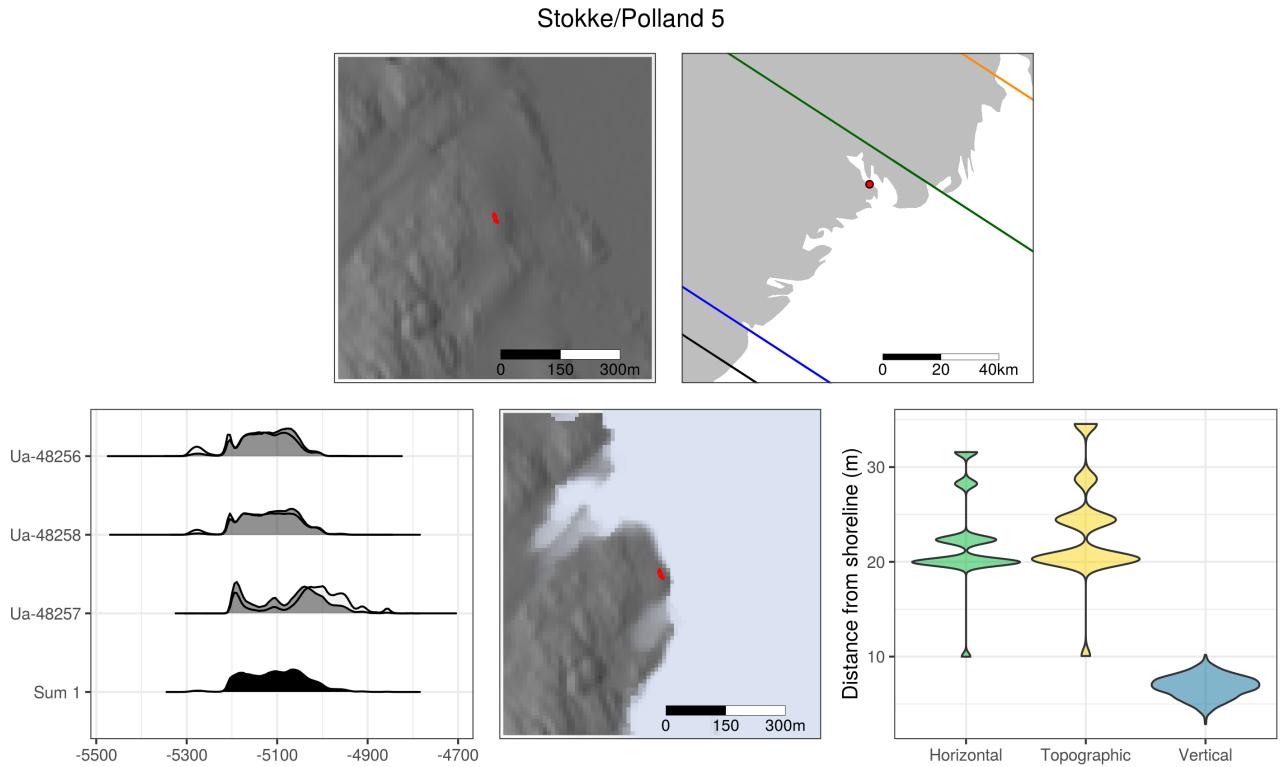


Table 59: Stokke/Polland 5

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.

```
## Warning in include_graphics(here("analysis/figures/stokkep5.png")): It is highly
## recommended to use relative paths for images. You had absolute paths: "/home/
## isak/phd/assessing.sealevel.dating/analysis/figures/stokkep5.png"
```

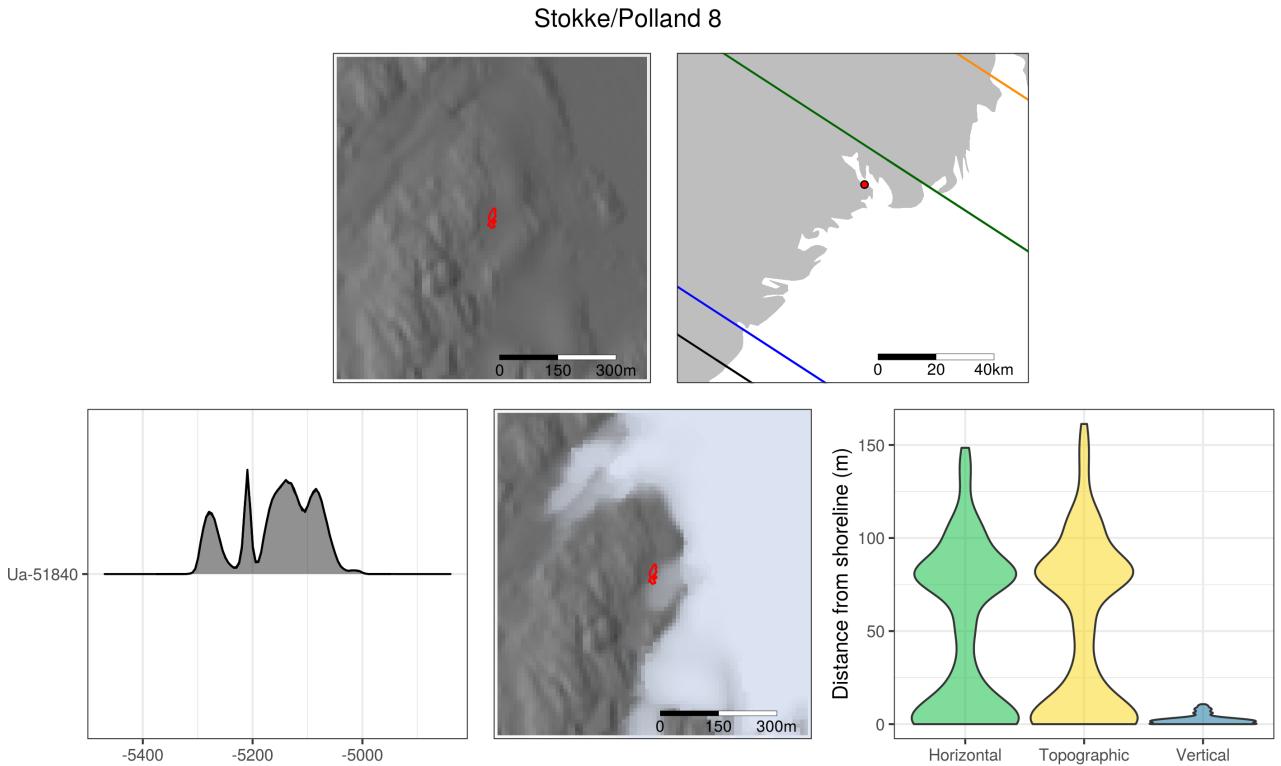


The ^{14}C -dates matches the lithic inventory from Stokke/Polland 5 (Mansrud 2017). The site is located where the highway runs today. This appears to have been successfully edited. The excavated area is more extensive (field A-C in the report) than what is used as the site limit here, but the relation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

```
## Warning in include_graphics(here("analysis/figures/stokkep8.png")): It is highly
## recommended to use relative paths for images. You had absolute paths: "/home/
## isak/phd/assessing.sealevel.dating/analysis/figures/stokkep8.png"
```

Table 60: Stokke/Polland 8

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

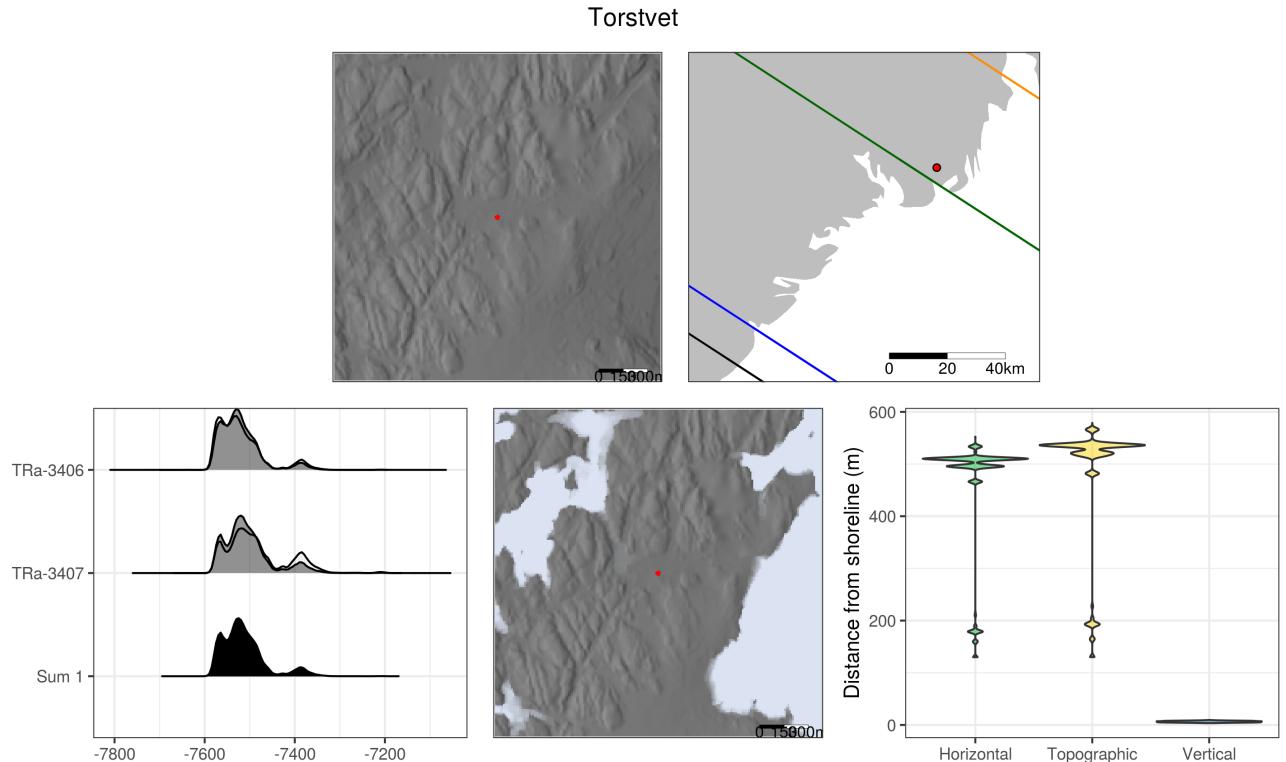


Stokke/Polland 8 have corresponding lithic inventory and ^{14}C -date (Fossum 2017c). The site is situated just east of where the highway runs today. This appears to have been successfully edited (cf. Fossum 2017c, fig. 28.3).

```
## Warning in include_graphics(here("analysis/figures/torstvet.png")): It is highly
## recommended to use relative paths for images. You had absolute paths: "/home/
## isak/phd/assessing.sealevel.dating/analysis/figures/torstvet.png"
```

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)

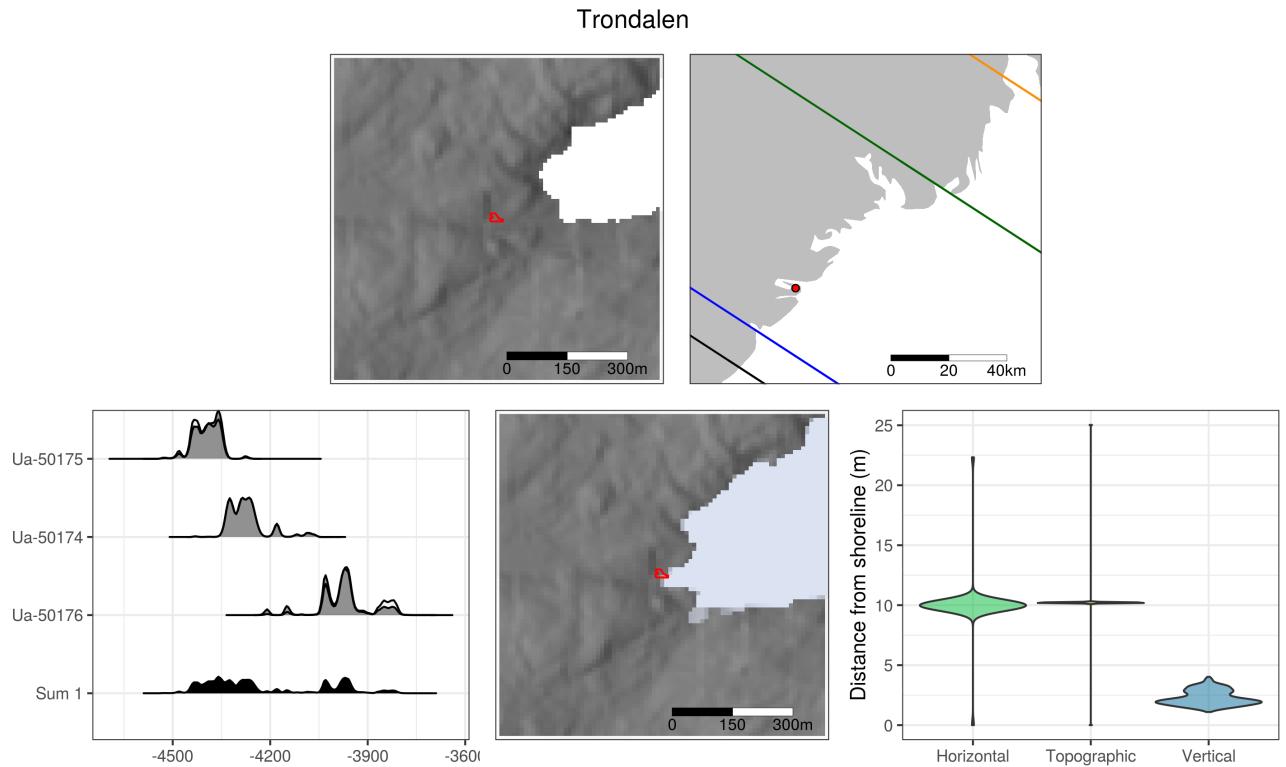


Typology of lithics match the ^{14}C -dates from Torstvet (Mansrud 2013b). The site is located where the highway runs today. This appears to have been successfully edited, although there is a possibility that this has led to the sea-level being simulated slightly further away from the site than what 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 which makes the reconstruction more uncertain than in areas with a higher relief.

```
## Warning in include_graphics(here("analysis/figures/trondalen.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
## home/isak/phd/assessing.sealevel.dating/analysis/figures/trondalen.png"
```

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)

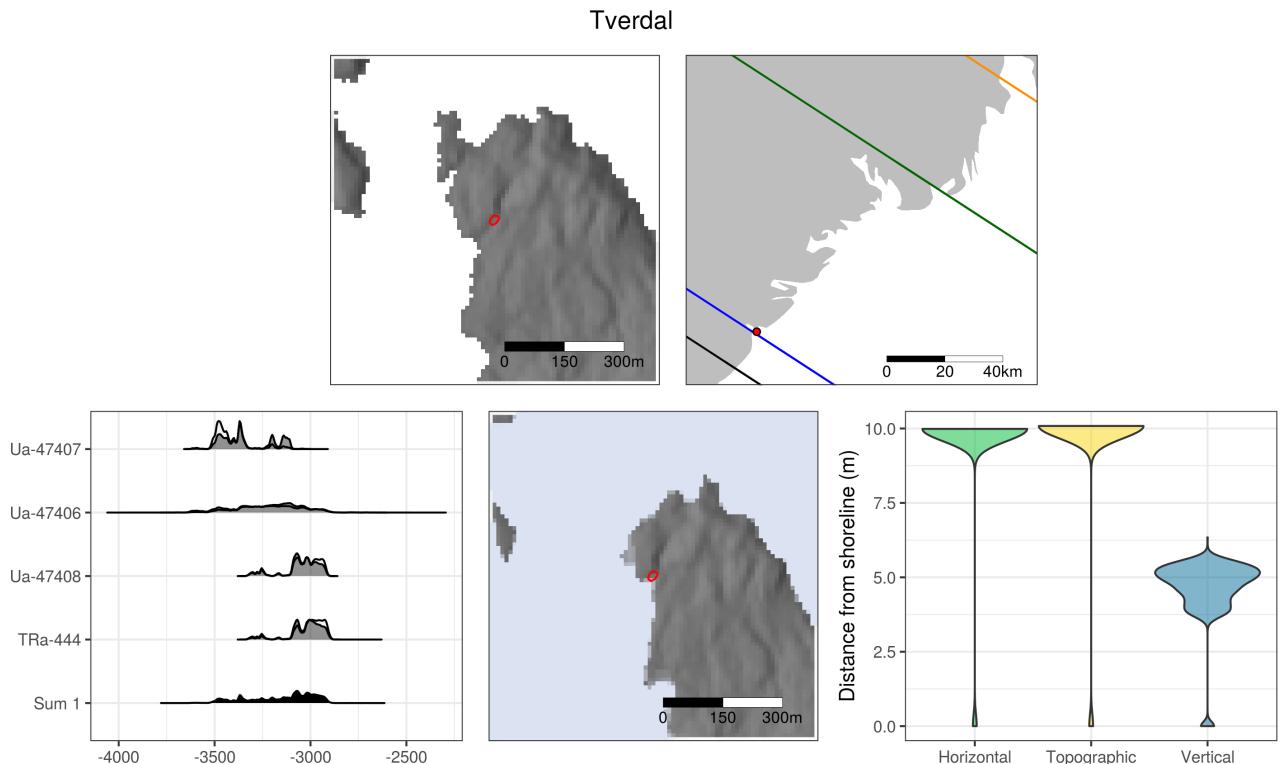


^{14}C -dates match the typological indicators in the artefact assemblage at Trondalen (Mansrud 2018). No disturbances required editing in the DTM.

```
## Warning in include_graphics(here("analysis/figures/tverdal.png")): It is highly
## recommended to use relative paths for images. You had absolute paths: "/home/
## isak/phd/assessing.sealevel.dating/analysis/figures/tverdal.png"
```

Table 63: Tverdal

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

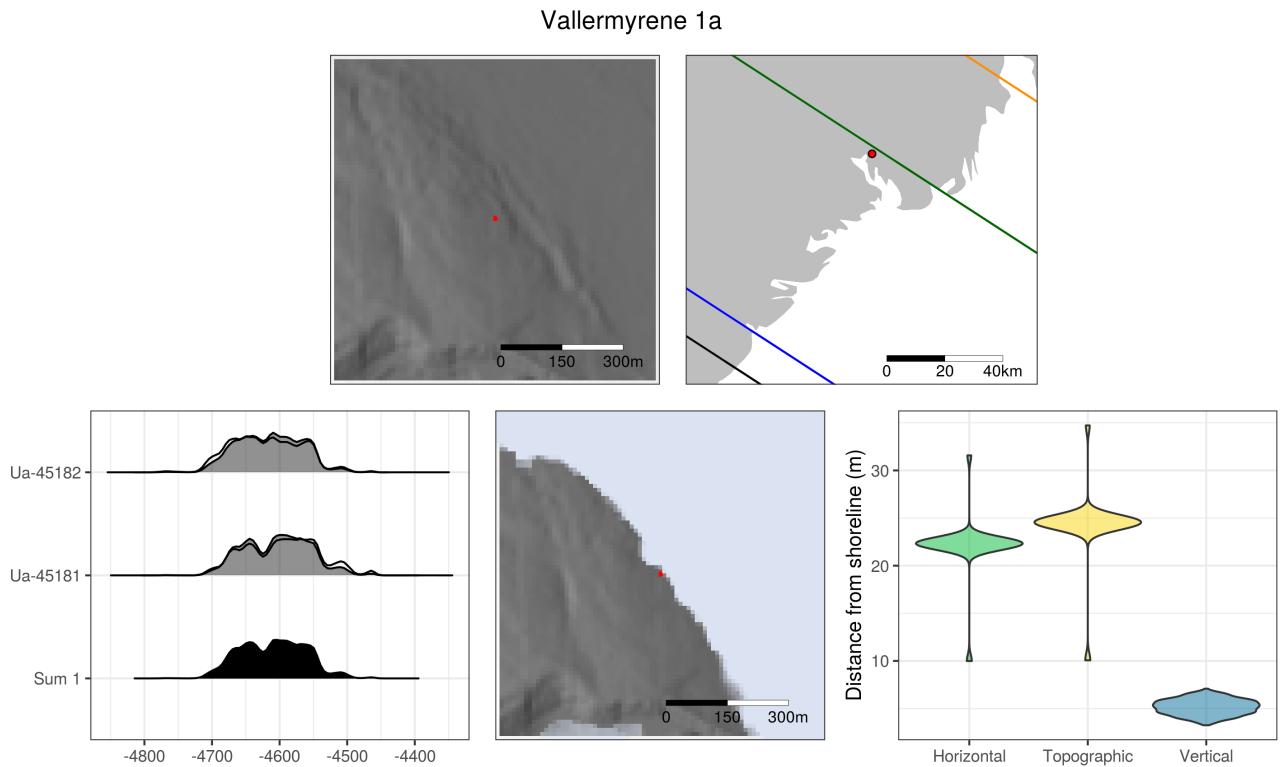


Tverdal is an unpublished site. Preliminary analysis indicates that radiocarbon dates and typological indicators match. The area surrounding the site appears relatively undisturbed by modern activity.

```
## Warning in include_graphics(here("analysis/figures/vallermyrene1a.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
## home/isak/phd/assessing.sealevel.dating/analysis/figures/vallermyrene1a.png"
```

Table 64: Vallermyrene 1a

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

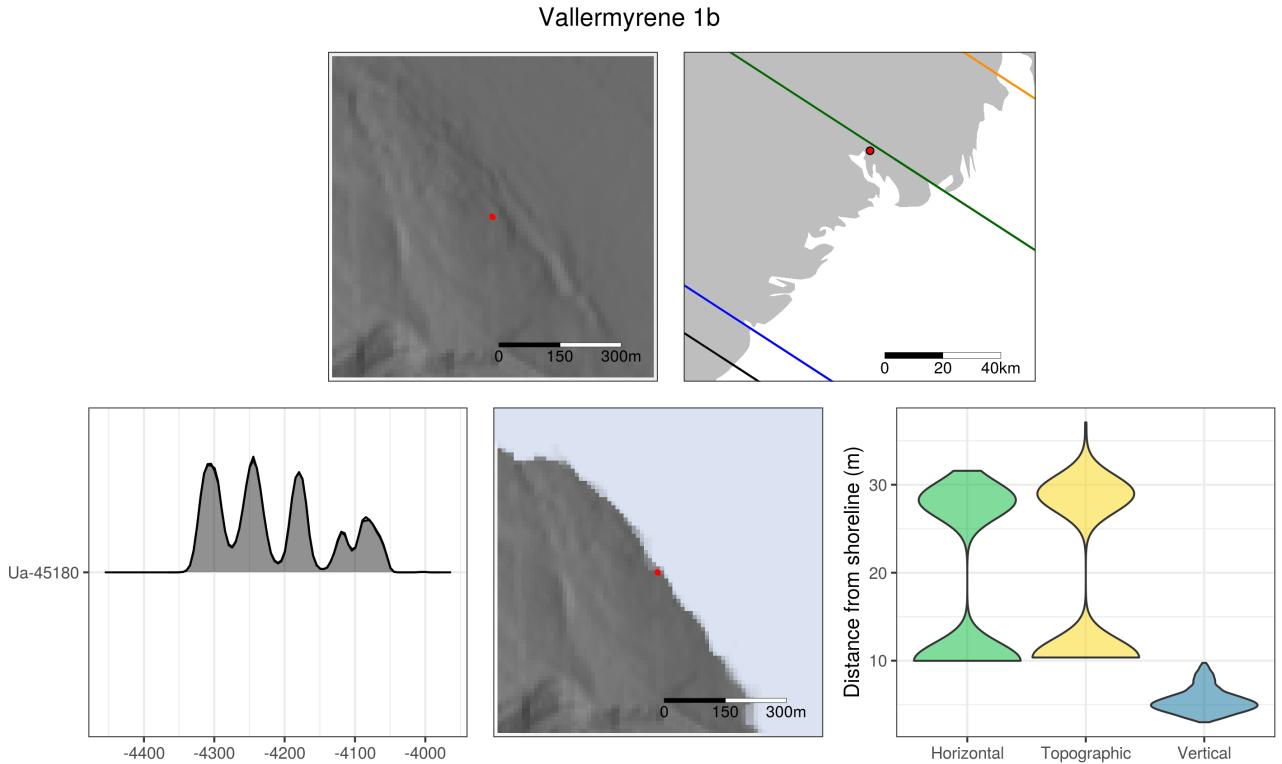


Vallermyrene 1 was divided into 1a and 1b based on elevation difference, typology and ^{14}C -dates (Reitan 2014g). Vallermyene 1a is the oldest of the two. Although situated not that far from the railway, the area immediately surrounding the site has not been disturbed in a way that appears to impact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

```
## Warning in include_graphics(here("analysis/figures/vallermyrene1b.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
## home/isak/phd/assessing.sealevel.dating/analysis/figures/vallermyrene1b.png"
```

Table 65: Vallermyrene 1b

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

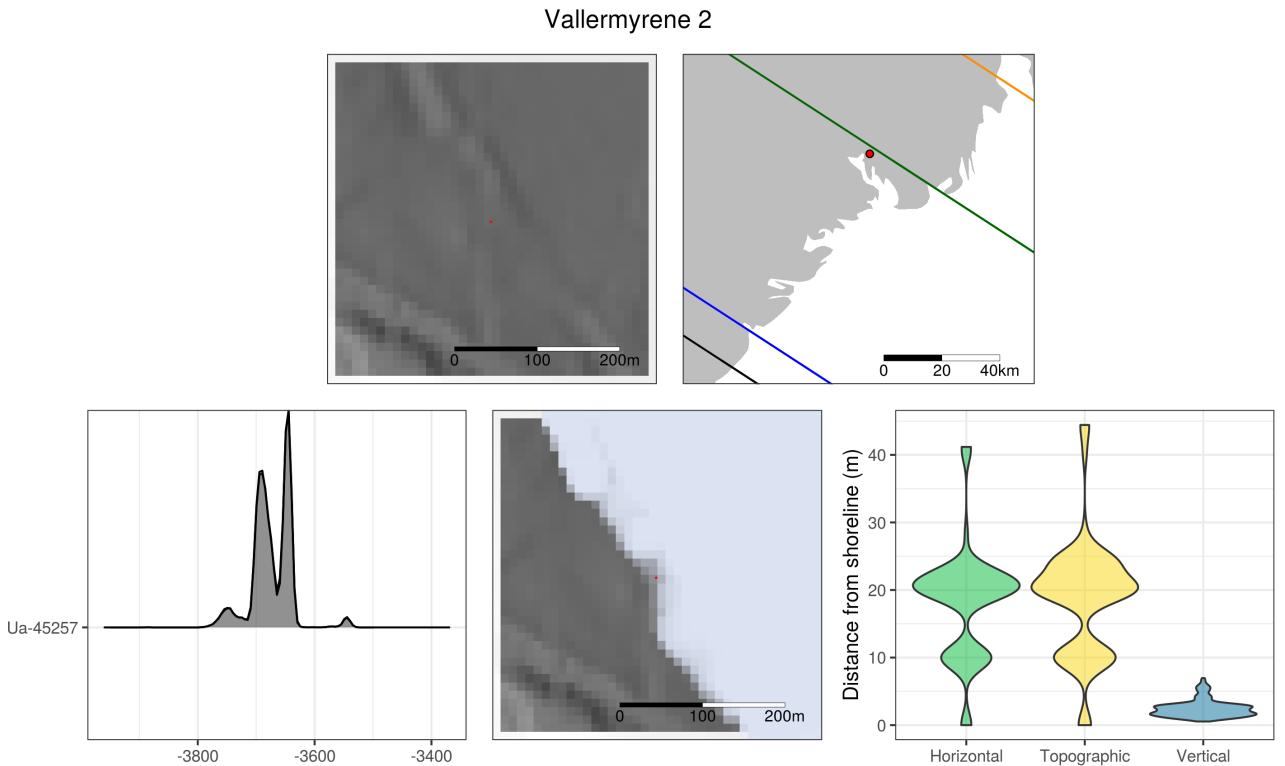


Vallermyrene 1b is the younger than Vallermyrene 1a (above), as indicated both by the radiocarbon date, typology and elevation (Reitan 2014g). The DTM did not require editing.

```
## Warning in include_graphics(here("analysis/figures/vallermyrene2.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
## home/isak/phd/assessing.sealevel.dating/analysis/figures/vallermyrene2.png"
```

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)

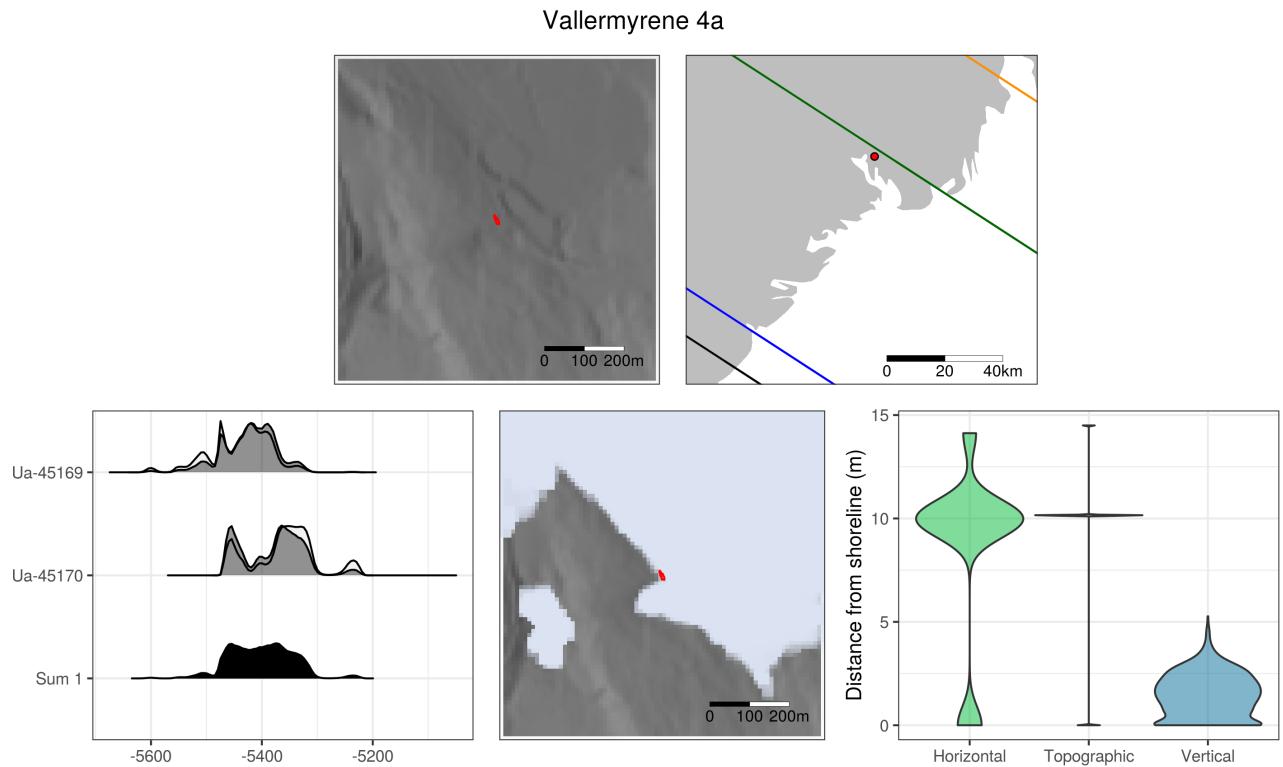


Vallermyrene 2 was a large site situated in a field (Reitan 2014h). The site has ¹⁴C-dates and artefacts dating occupations at the sites to multiple phases throughout prehistory, including the Bronze Age and phases up until the Viking Age. The Stone Age activity on the site was evidenced by 359 lithics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

```
## Warning in include_graphics(here("analysis/figures/vallermyrene4a.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "
## home/isak/phd/assessing.sealevel.dating/analysis/figures/vallermyrene4a.png"
```

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)

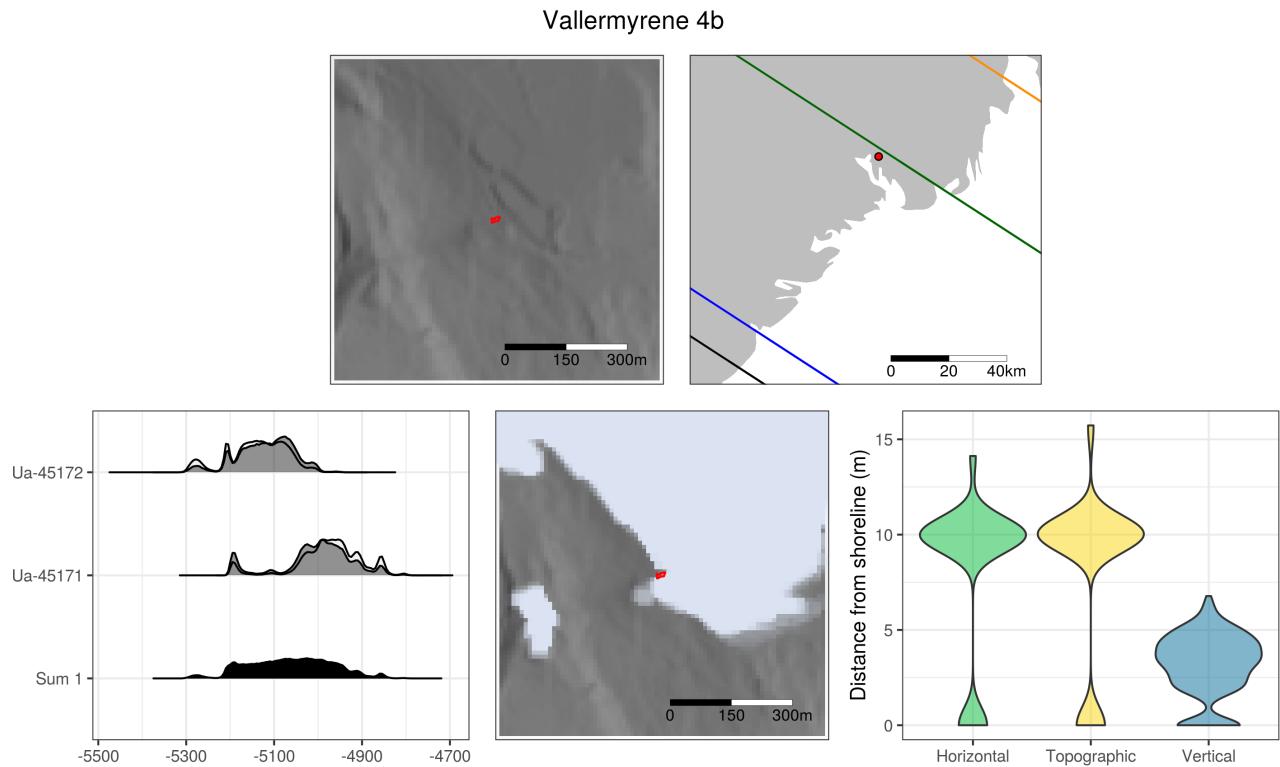


Vallermyrene 4 was, as with Vallermyrene 1 (above), divided into Vallermyrene 4a and 4b based on radiocarbon dates and differences in elevation (Eigeland and Fossum 2014). Typologically the sites are identical, and match the ^{14}C -dates. Vallermyrene 4a is the older of the two and was less disturbed 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.

```
## Warning in include_graphics(here("analysis/figures/vallermyrene4b.png")): It is
## highly recommended to use relative paths for images. You had absolute paths: "/"
## home/isak/phd/assessing.sealevel.dating/analysis/figures/vallermyrene4b.png"
```

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.

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