IODP Proposal Cover Sheet

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North Atlantic Fjord Sediment Archives

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Title	Fjord sediment archives: assessing the recent (post LGM) millennial to sub-decadal scale variability of marine and continental climates in the northeastern North Atlantic.
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Keywords	Marine-and-continental-paleoclimates, Holocene, Deglaciation, fjords, geo-hazards,
Area	Coastal Norway and Svalbard

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Abstract

The northeastern North Atlantic is a key area for unraveling oceanographic and atmospheric processes implied into millennial to decadal-scale climate changes of the present interglacial as well as the mechanisms involved into the last retreat of northern European ice sheets. As the seat of the northward transport of Atlantic water to the Arctic and of the formation of oceanic deep water, the eastern sector of the Nordic Seas has a direct control over the climate of Northwestern Europe. The impact of the major mode of atmospheric circulation in the northern hemisphere (North Atlantic/Arctic Oscillations – NAO/AO) is particularly strengthened in this region: NAO/AO explains much of the present strength of the poleward flow of the surface and sub-surface waters over the NW European continental margin as well as recent changes in the mass balance of the maritime Scandinavian glaciers.

The general lack of high resolution, continuous, coupled marine and continental records of Holocene environmental changes in the northeastern North Atlantic region since the initial decay of the NW European ice-sheets precludes any firm assumption on (1) the behavior and impact in this region of internal modes of the climate system variability (alike NAO and the Atlantic Multidecadal Oscillation), (2) their interactions with external climate forcing acting over short (volcanic and solar forcing) and long time-scales (orbital forcing), (3) the coupled ocean/cryosphere/atmosphere dynamics and the connections between marine and continental climates.

Addressing these three important scientific issues is the main motivation behind the FANA initiative. A second incentive and co-benefit of FANA's researches derives from the occurrence of frequent mass transport events in coastal systems of Norway and Svalbard. Hence, the climate-related records obtained as part of FANA will incidentally help moving forward on the questions of (4) the synchronicity and trigger mechanisms of past mass movements in high latitude coastal environments of Northwestern Europe.

A major step towards understanding natural climate changes in the northeastern North Atlantic region during the Holocene and the last glacial Termination, as well as their relation to the occurrence and frequency of mass failures, can be achieved through the generation and interpretation of paleoceanographic, paleoclimatic, and age-model reconstructions from ultra-high-resolution sedimentary records retrieved from Norwegian and Svalbard fjords.

FANA targets nine fjord systems distributed along a latitudinal gradient from Southern Norway to Svalbard spanning the spread of the western sector of the last Scandinavian and Svalbard ice sheets.

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Scientific Objectives

Scientific objectives essentially refer to a theme on Holocene millennial to sub-centennial climate changes and post-glacial dynamics of ice-sheets and tidewater glaciers.
As part of this theme FANA will address the following questions:
- What are the main controls of sedimentation in glaciated and non-glaciated fjords? Did long- and short-term changes in Holocene climate impact the hierarchy of controls of sedimentation in fjords?
- What can decadal to millennial scale cycles of climate changes preserved in fjord sediment tell about modes of North Atlantic climate variability?
- Were the flow strength and temperature of Atlantic water in the NE North Atlantic affected by high amplitude changes since the early Holocene initiation of modern circulation?
- Were the Holocene dynamics of marine and continental climates synchronous across the Norwegian and Svalbard margins?
- What are the relative impacts of climatic changes and local fjord physiography upon the origin and amount of carbon stored in Norwegian and Svalbard fjords?
- Is the modern climate anomalous compared to previous Holocene warm periods?

Paleoclimate investigations will contribute to address a second set of questions on the chronology, local or regional significance, preconditioning, and triggering of mass transport deposits (MTDs) in coastal settings:
- How do relative sea level changes and deglacial history explain contrasts in the post-glacial occurrence of MTDs within and between fjords?
- Were Norwegian fjords widely impacted by MTDs related to the main offshore megaslide events? Do these events explain first order clusters of MTDs around 8000 and 4000 years BP?

Non-standard measurements technology needed to achieve the proposed scientific objectives

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Proposed Sites (Total proposed sites: 59; pri: 33; alt: 26; N/S: 0)

Site Name	Position (Lat, Lon)	Water Depth (m)	Penetration (m)			Brief Site-specific Objectives
			Sed	Bsm	Total	
HAR-01B (Primary)	60.38752 6.37941	855	160	0	160	• Construction of a continuous, high resolution, composite post-glacial climate record for southern Norway. • Chronological framework of acoustically laminated sedimentary units; relating the dynamics of the post-glacial retreat of the south-western sector of the Fennoscandian ice sheet (FIS) to marine and continental climate changes during the last deglaciation and the Holocene. • Chronology and frequencies of Holocene mass wasting events; regional seismicity and climate preconditioning. • Impacts of Holocene offshore megaslides (Storegga) on local deposits.
HAR-02B (Alternate)	60.39652 6.40930	855	125	0	125	• Construction of a continuous, high resolution, composite post-glacial climate record for southern Norway. • Chronological framework of acoustically laminated sedimentary units; relating the dynamics of the post-glacial retreat of the south-western sector of the Fennoscandian ice sheet (FIS) to marine and continental climate changes during the last deglaciation and the Holocene. • Chronology and frequencies of Holocene mass wasting events; regional seismicity and climate preconditioning. • Impacts of Holocene offshore megaslides (Storegga) on local deposits.
HAR-03B (Primary)	60.08776 6.05024	661	75	0	75	• Construction of a continuous, high resolution, composite post-glacial climate record for southern Norway. • Chronological framework of acoustically laminated sedimentary units; relating the dynamics of the post-glacial retreat of the south-western sector of the Fennoscandian ice sheet (FIS) to marine and continental climate changes during the last deglaciation and the Holocene. • Chronology and frequencies of Holocene mass wasting events; regional seismicity and climate preconditioning. • Impacts of Holocene offshore megaslides (Storegga) on local deposits.
HAR-04B (Alternate)	60.10610 6.09549	665	55	0	55	• Construction of a continuous, high resolution, composite post-glacial climate record for southern Norway. • Chronological framework of acoustically laminated sedimentary units; relating the dynamics of the post-glacial retreat of the south-western sector of the Fennoscandian ice sheet (FIS) to marine and continental climate changes during the last deglaciation and the Holocene. • Chronology and frequencies of Holocene mass wasting events; regional seismicity and climate preconditioning. • Impacts of Holocene offshore megaslides (Storegga) on local deposits.
HAR-05A (Primary)	59.91554 5.74263	510	78	0	78	• Construction of a continuous, high resolution, composite post-glacial climate record for southern Norway. • Chronological framework of acoustically laminated sedimentary units; relating the dynamics of the post-glacial retreat of the south-western sector of the Fennoscandian ice sheet (FIS) to marine and continental climate changes during the last deglaciation and the Holocene. • Chronology and frequencies of Holocene mass wasting events; regional seismicity and climate preconditioning. • Impacts of Holocene offshore megaslides (Storegga) on local deposits.
HAR-06A (Alternate)	59.89787 5.72085	512	76	0	76	• Construction of a continuous, high resolution, composite post-glacial climate record for southern Norway. • Chronological framework of acoustically laminated sedimentary units; relating the dynamics of the post-glacial retreat of the south-western sector of the Fennoscandian ice sheet (FIS) to marine and continental climate changes during the last deglaciation and the Holocene. • Chronology and frequencies of Holocene mass wasting events; regional seismicity and climate preconditioning. • Impacts of Holocene offshore megaslides (Storegga) on local deposits.

Proposed Sites (Continued; total proposed sites: 59; pri: 33; alt: 26; N/S: 0)

Site Name	Position (Lat, Lon)	Water Depth (m)	Penetration (m)			Brief Site-specific Objectives
			Sed	Bsm	Total	
HAR-07A (Primary)	59.72529 5.55632	376	83	0	83	• Construction of a continuous, high resolution, composite post-glacial climate record for southern Norway. • Chronological framework of acoustically laminated sedimentary units; relating the dynamics of the post-glacial retreat of the south-western sector of the Fennoscandian ice sheet (FIS) to marine and continental climate changes during the last deglaciation and the Holocene. • Chronology and frequencies of Holocene mass wasting events; regional seismicity and climate preconditioning. • Impacts of Holocene offshore megaslides (Storegga) on local deposits.
HAR-08A (Alternate)	59.73146 5.55132	377	65	0	65	• Construction of a continuous, high resolution, composite post-glacial climate record for southern Norway. • Chronological framework of acoustically laminated sedimentary units; relating the dynamics of the post-glacial retreat of the south-western sector of the Fennoscandian ice sheet (FIS) to marine and continental climate changes during the last deglaciation and the Holocene. • Chronology and frequencies of Holocene mass wasting events; regional seismicity and climate preconditioning. • Impacts of Holocene offshore megaslides (Storegga) on local deposits.
HAR-09A (Primary)	59.76136 5.54731	357	52	0	52	• Construction of a continuous, high resolution, composite post-glacial climate record for southern Norway. • Chronological framework of acoustically laminated sedimentary units; relating the dynamics of the post-glacial retreat of the south-western sector of the Fennoscandian ice sheet (FIS) to marine and continental climate changes during the last deglaciation and the Holocene. • Chronology and frequencies of Holocene mass wasting events; regional seismicity and climate preconditioning. • Impacts of Holocene offshore megaslides (Storegga) on local deposits.
NOR-01B (Primary)	61.87751 6.64613	257	101	0	101	• Construction of a continuous, high resolution, composite post-glacial climate record from dominantly acoustically laminated sediments: paleoenvironmental and paleoclimatological conditions at times (Bölling-Allerød) of initial retreat of the western sector of the FIS; high resolution paleocirculation of the Norwegian Coastal Current and Norwegian Atlantic Current off south-western Norway and relation to the initial melting of the western sector of the FIS and to the Holocene climate changes in the NE Atlantic region. • Chronology and frequency of post-YD mass failure events; regional seismicity and climate preconditioning. • Impacts of Holocene offshore megaslides (Storegga) on local deposits.
NOR-02B (Alternate)	61.87677 6.60396	352	82	0	82	• Construction of a continuous, high resolution, composite post-glacial climate record from dominantly acoustically laminated sediments: paleoenvironmental and paleoclimatological conditions at times (Bölling-Allerød) of initial retreat of the western sector of the FIS; high resolution paleocirculation of the Norwegian Coastal Current and Norwegian Atlantic Current off south-western Norway and relation to the initial melting of the western sector of the FIS and to the Holocene climate changes in the NE Atlantic region. • Chronology and frequency of post-YD mass failure events; regional seismicity and climate preconditioning. • Impacts of Holocene offshore megaslides (Storegga) on local deposits.
NOR-03B (Primary)	61.81834 6.45390	438	88	0	88	• Construction of a continuous, high resolution, composite post-glacial climate record from dominantly acoustically laminated sediments: paleoenvironmental and paleoclimatological conditions at times (Bölling-Allerød) of initial retreat of the western sector of the FIS; high resolution paleocirculation of the Norwegian Coastal Current and Norwegian Atlantic Current off south-western Norway and relation to the initial melting of the western sector of the FIS and to the Holocene climate changes in the NE Atlantic region. • Chronology and frequency of post-YD mass failure events; regional seismicity and climate preconditioning. • Impacts of Holocene offshore megaslides (Storegga) on local deposits.

Proposed Sites (Continued; total proposed sites: 59; pri: 33; alt: 26; N/S: 0)

Site Name	Position (Lat, Lon)	Water Depth (m)	Penetration (m)			Brief Site-specific Objectives
			Sed	Bsm	Total	
NOR-04B (Alternate)	61.82558 6.39682	442	82	0	82	• Construction of a continuous, high resolution, composite post-glacial climate record from dominantly acoustically laminated sediments: paleoenvironmental and paleoclimatological conditions at times (Bölling-Allerød) of initial retreat of the western sector of the FIS; high resolution paleocirculation of the Norwegian Coastal Current and Norwegian Atlantic Current off south-western Norway and relation to the initial melting of the western sector of the FIS and to the Holocene climate changes in the NE Atlantic region. • Chronology and frequency of post-YD mass failure events; regional seismicity and climate preconditioning. • Impacts of Holocene offshore megaslides (Storegga) on local deposits.
NOR-05A (Primary)	61.91366 5.53327	580	70	0	70	• Construction of a continuous, high resolution, composite post-glacial climate record from dominantly acoustically laminated sediments: paleoenvironmental and paleoclimatological conditions at times (Bölling-Allerød) of initial retreat of the western sector of the FIS; high resolution paleocirculation of the Norwegian Coastal Current and Norwegian Atlantic Current off south-western Norway and relation to the initial melting of the western sector of the FIS and to the Holocene climate changes in the NE Atlantic region. • Chronology and frequency of post-YD mass failure events; regional seismicity and climate preconditioning. • Impacts of Holocene offshore megaslides (Storegga) on local deposits.
NOR-06A (Alternate)	61.91477 5.51733	580	70	0	70	• Construction of a continuous, high resolution, composite post-glacial climate record from dominantly acoustically laminated sediments: paleoenvironmental and paleoclimatological conditions at times (Bölling-Allerød) of initial retreat of the western sector of the FIS; high resolution paleocirculation of the Norwegian Coastal Current and Norwegian Atlantic Current off south-western Norway and relation to the initial melting of the western sector of the FIS and to the Holocene climate changes in the NE Atlantic region. • Chronology and frequency of post-YD mass failure events; regional seismicity and climate preconditioning. • Impacts of Holocene offshore megaslides (Storegga) on local deposits.
NOR-07A (Primary)	61.91485 5.09468	253	62	0	62	• Construction of a continuous, high resolution, composite post-glacial climate record from dominantly acoustically laminated sediments: paleoenvironmental and paleoclimatological conditions at times (Bölling-Allerød) of initial retreat of the western sector of the FIS; high resolution paleocirculation of the Norwegian Coastal Current and Norwegian Atlantic Current off south-western Norway and relation to the initial melting of the western sector of the FIS and to the Holocene climate changes in the NE Atlantic region. • Chronology and frequency of post-YD mass failure events; regional seismicity and climate preconditioning. • Impacts of Holocene offshore megaslides (Storegga) on local deposits.
NOR-08A (Alternate)	61.89839 5.13608	286	47	0	47	• Construction of a continuous, high resolution, composite post-glacial climate record from dominantly acoustically laminated sediments: paleoenvironmental and paleoclimatological conditions at times (Bölling-Allerød) of initial retreat of the western sector of the FIS; high resolution paleocirculation of the Norwegian Coastal Current and Norwegian Atlantic Current off south-western Norway and relation to the initial melting of the western sector of the FIS and to the Holocene climate changes in the NE Atlantic region. • Chronology and frequency of post-YD mass failure events; regional seismicity and climate preconditioning. • Impacts of Holocene offshore megaslides (Storegga) on local deposits.
TRO-01B (Primary)	63.73619 11.05444	424	68	0	68	• Construction of a continuous, high resolution, composite post-glacial climate record for central Norway from sediment archives largely unaffected by massive mass wasting events. • Decadal to sub-decadal scale variations of the marine and continental climates of western Norway with special reference to oceanic (Norwegian Atlantic Current and Norwegian Coastal Current) and NAO-controlled atmospheric circulation changes. • Impacts of Holocene offshore megaslide-triggered tsunami (Storegga & Traenadjupet) on local deposits. • Modern changes in environmental conditions and sedimentary budget with regard to present global climate change and local human activity. Comparing proxy-records with instrumental time-series.

Proposed Sites (Continued; total proposed sites: 59; pri: 33; alt: 26; N/S: 0)

Site Name	Position (Lat, Lon)	Water Depth (m)	Penetration (m)			Brief Site-specific Objectives
			Sed	Bsm	Total	
TRO-02B (Alternate)	63.72633 10.98089	422	53	0	53	• Construction of a continuous, high resolution, composite post-glacial climate record for central Norway from sediment archives largely unaffected by massive mass wasting events. • Decadal to sub-decadal scale variations of the marine and continental climates of western Norway with special reference to oceanic (Norwegian Atlantic Current and Norwegian Coastal Current) and NAO-controlled atmospheric circulation changes. • Impacts of Holocene offshore megaslide-triggered tsunami (Storegga & Traenadjupet) on local deposits. • Modern changes in environmental conditions and sedimentary budget with regard to present global climate change and local human activity. Comparing proxy-records with instrumental time-series.
TRO-03B (Primary)	63.47074 10.12599	499	640	0	640	• Construction of a continuous, high resolution, composite post-glacial climate record for central Norway from sediment archives largely unaffected by massive mass wasting events. • Decadal to sub-decadal scale variations of the marine and continental climates of western Norway with special reference to oceanic (Norwegian Atlantic Current and Norwegian Coastal Current) and NAO-controlled atmospheric circulation changes. • Impacts of Holocene offshore megaslide-triggered tsunami (Storegga & Traenadjupet) on local deposits. • Modern changes in environmental conditions and sedimentary budget with regard to present global climate change and local human activity. Comparing proxy-records with instrumental time-series.
TRO-04A (Alternate)	63.48538 10.18646	499	435	0	435	• Construction of a continuous, high resolution, composite post-glacial climate record for central Norway from sediment archives largely unaffected by massive mass wasting events. • Decadal to sub-decadal scale variations of the marine and continental climates of western Norway with special reference to oceanic (Norwegian Atlantic Current and Norwegian Coastal Current) and NAO-controlled atmospheric circulation changes. • Impacts of Holocene offshore megaslide-triggered tsunami (Storegga & Traenadjupet) on local deposits. • Modern changes in environmental conditions and sedimentary budget with regard to present global climate change and local human activity. Comparing proxy-records with instrumental time-series.
TRO-05A (Primary)	63.71387 9.88546	229	117	0	117	• Construction of a continuous, high resolution, composite post-glacial climate record for central Norway from sediment archives largely unaffected by massive mass wasting events. • Decadal to sub-decadal scale variations of the marine and continental climates of western Norway with special reference to oceanic (Norwegian Atlantic Current and Norwegian Coastal Current) and NAO-controlled atmospheric circulation changes. • Impacts of Holocene offshore megaslide-triggered tsunami (Storegga & Traenadjupet) on local deposits. • Modern changes in environmental conditions and sedimentary budget with regard to present global climate change and local human activity. Comparing proxy-records with instrumental time-series.
TRO-06A (Alternate)	63.71233 9.88001	243	103	0	103	• Construction of a continuous, high resolution, composite post-glacial climate record for central Norway from sediment archives largely unaffected by massive mass wasting events. • Decadal to sub-decadal scale variations of the marine and continental climates of western Norway with special reference to oceanic (Norwegian Atlantic Current and Norwegian Coastal Current) and NAO-controlled atmospheric circulation changes. • Impacts of Holocene offshore megaslide-triggered tsunami (Storegga & Traenadjupet) on local deposits. • Modern changes in environmental conditions and sedimentary budget with regard to present global climate change and local human activity. Comparing proxy-records with instrumental time-series.
RAN-01B (Primary)	66.23270 13.37732	291	42	0	42	• Construction of a continuous, high resolution, composite post-glacial climate record from sediment archives strongly influenced by post-YD mass movement events; paleoenvironmental and paleoclimatological conditions with special reference to earliest Holocene (Preboreal) standstills/slight readvances of the western sector of the Fennoscandian ice-sheet (FIS). • Chronology and frequency of post-YD mass failure events; regional seismicity and climate preconditioning. • Impacts of Holocene offshore megaslides (Storegga and Traenadjupet) on local deposits.

Proposed Sites (Continued; total proposed sites: 59; pri: 33; alt: 26; N/S: 0)

Site Name	Position (Lat, Lon)	Water Depth (m)	Penetration (m)			Brief Site-specific Objectives
			Sed	Bsm	Total	
RAN-02B (Alternate)	66.23688 13.31625	322	52	0	52	• Construction of a continuous, high resolution, composite post-glacial climate record from sediment archives strongly influenced by post-YD mass movement events; paleoenvironmental and paleoclimatological conditions with special reference to earliest Holocene (Preboreal) standstills/slight readvances of the western sector of the Fennoscandian ice-sheet (FIS). • Chronology and frequency of post-YD mass failure events; regional seismicity and climate preconditioning. • Impacts of Holocene offshore megaslides (Storegga and Traenadjupet) on local deposits.
RAN-03A (Primary)	66.16739 13.05589	460	42	0	42	• Construction of a continuous, high resolution, composite post-glacial climate record from sediment archives strongly influenced by post-YD mass movement events; paleoenvironmental and paleoclimatological conditions with special reference to earliest Holocene (Preboreal) standstills/slight readvances of the western sector of the Fennoscandian ice-sheet (FIS). • Chronology and frequency of post-YD mass failure events; regional seismicity and climate preconditioning. • Impacts of Holocene offshore megaslides (Storegga and Traenadjupet) on local deposits.
RAN-04A (Alternate)	66.15504 12.97260	455	39	0	39	• Construction of a continuous, high resolution, composite post-glacial climate record from sediment archives strongly influenced by post-YD mass movement events; paleoenvironmental and paleoclimatological conditions with special reference to earliest Holocene (Preboreal) standstills/slight readvances of the western sector of the Fennoscandian ice-sheet (FIS). • Chronology and frequency of post-YD mass failure events; regional seismicity and climate preconditioning. • Impacts of Holocene offshore megaslides (Storegga and Traenadjupet) on local deposits.
RAN-05A (Primary)	66.09417 12.71694	245	64	0	64	• Construction of a continuous, high resolution, composite post-glacial climate record from sediment archives strongly influenced by post-YD mass movement events; paleoenvironmental and paleoclimatological conditions with special reference to earliest Holocene (Preboreal) standstills/slight readvances of the western sector of the Fennoscandian ice-sheet (FIS). • Chronology and frequency of post-YD mass failure events; regional seismicity and climate preconditioning. • Impacts of Holocene offshore megaslides (Storegga and Traenadjupet) on local deposits.
RAN-06A (Alternate)	66.09672 12.71355	247	62	0	62	• Construction of a continuous, high resolution, composite post-glacial climate record from sediment archives strongly influenced by post-YD mass movement events; paleoenvironmental and paleoclimatological conditions with special reference to earliest Holocene (Preboreal) standstills/slight readvances of the western sector of the Fennoscandian ice-sheet (FIS). • Chronology and frequency of post-YD mass failure events; regional seismicity and climate preconditioning. • Impacts of Holocene offshore megaslides (Storegga and Traenadjupet) on local deposits.
RAN-07A (Primary)	66.09454 12.68638	212	38	0	38	• Construction of a continuous, high resolution, composite post-glacial climate record from sediment archives strongly influenced by post-YD mass movement events; paleoenvironmental and paleoclimatological conditions with special reference to earliest Holocene (Preboreal) standstills/slight readvances of the western sector of the Fennoscandian ice-sheet (FIS). • Chronology and frequency of post-YD mass failure events; regional seismicity and climate preconditioning. • Impacts of Holocene offshore megaslides (Storegga and Traenadjupet) on local deposits.
AND-01A (Primary)	68.69183 15.99329	198	63	0	63	• Construction of a continuous, high resolution, composite post-glacial climate record for northwestern Norway; paleoenvironmental and paleoclimatological conditions with special reference to the YD and earliest Holocene (Preboreal) standstills/minor readvances of the western sector of the Fennoscandian ice-sheet (FIS), and the initiation of the modern circulation over the nearby continental shelf. • Chronology and frequency of post-YD mass failure events; regional seismicity and climate preconditioning.

Proposed Sites (Continued; total proposed sites: 59; pri: 33; alt: 26; N/S: 0)

Site Name	Position (Lat, Lon)	Water Depth (m)	Penetration (m)			Brief Site-specific Objectives
			Sed	Bsm	Total	
AND-02A (Alternate)	68.79586 16.03284	158	34	0	34	• Construction of a continuous, high resolution, composite post-glacial climate record for northwestern Norway; paleoenvironmental and paleoclimatological conditions with special reference to the YD and earliest Holocene (Preboreal) standstills/minor readvances of the western sector of the Fennoscandian ice-sheet (FIS), and the initiation of the modern circulation over the nearby continental shelf. • Chronology and frequency of post-YD mass failure events; regional seismicity and climate preconditioning.
AND-03A (Primary)	69.11950 16.34705	472	25	0	25	• Construction of a continuous, high resolution, composite post-glacial climate record for northwestern Norway; paleoenvironmental and paleoclimatological conditions with special reference to the YD and earliest Holocene (Preboreal) standstills/minor readvances of the western sector of the Fennoscandian ice-sheet (FIS), and the initiation of the modern circulation over the nearby continental shelf. • Chronology and frequency of post-YD mass failure events; regional seismicity and climate preconditioning.
AND-04A (Primary)	69.15677 16.25139	433	33	0	33	• Construction of a continuous, high resolution, composite post-glacial climate record for northwestern Norway; paleoenvironmental and paleoclimatological conditions with special reference to the YD and earliest Holocene (Preboreal) standstills/minor readvances of the western sector of the Fennoscandian ice-sheet (FIS), and the initiation of the modern circulation over the nearby continental shelf. • Chronology and frequency of post-YD mass failure events; regional seismicity and climate preconditioning.
AND-05A (Alternate)	69.24510 16.46579	445	45	0	45	• Construction of a continuous, high resolution, composite post-glacial climate record for northwestern Norway; paleoenvironmental and paleoclimatological conditions with special reference to the YD and earliest Holocene (Preboreal) standstills/minor readvances of the western sector of the Fennoscandian ice-sheet (FIS), and the initiation of the modern circulation over the nearby continental shelf. • Chronology and frequency of post-YD mass failure events; regional seismicity and climate preconditioning.
AND-06A (Primary)	69.41074 16.35529	463	31	0	31	• Construction of a continuous, high resolution, composite post-glacial climate record for northwestern Norway; paleoenvironmental and paleoclimatological conditions with special reference to the YD and earliest Holocene (Preboreal) standstills/minor readvances of the western sector of the Fennoscandian ice-sheet (FIS), and the initiation of the modern circulation over the nearby continental shelf. • Chronology and frequency of post-YD mass failure events; regional seismicity and climate preconditioning.
AND-07A (Alternate)	69.39579 16.41920	451	25	0	25	• Construction of a continuous, high resolution, composite post-glacial climate record for northwestern Norway; paleoenvironmental and paleoclimatological conditions with special reference to the YD and earliest Holocene (Preboreal) standstills/minor readvances of the western sector of the Fennoscandian ice-sheet (FIS), and the initiation of the modern circulation over the nearby continental shelf. • Chronology and frequency of post-YD mass failure events; regional seismicity and climate preconditioning.
AND-08A (Primary)	69.36620 16.39007	476	19	0	19	• Construction of a continuous, high resolution, composite post-glacial climate record for northwestern Norway; paleoenvironmental and paleoclimatological conditions with special reference to the YD and earliest Holocene (Preboreal) standstills/minor readvances of the western sector of the Fennoscandian ice-sheet (FIS), and the initiation of the modern circulation over the nearby continental shelf. • Chronology and frequency of post-YD mass failure events; regional seismicity and climate preconditioning.
LYN-01B (Primary)	69.62014 20.40417	256	163	0	163	• Construction of the first complete, composite, high-resolution post-glacial climate and environmental record for northern Norway, with a special focus on the dynamics of the retreating northern Norwegian ice margin at the confluence zone of the FIS and Southern Barents Sea ice sheets. • Erosion rates of the Lyngenfjorden catchment during last deglaciation based on sediment-flux estimates. • Paleocirculation of the Norwegian Coastal Current and North Cape Current in the southern Barents Sea and relation with the final melting of the northern FIS and the Holocene paleoclimatological history of northern Norway. • Chronology and frequency of post-YD MTDs; regional seismicity and climate preconditioning.

Proposed Sites (Continued; total proposed sites: 59; pri: 33; alt: 26; N/S: 0)

Site Name	Position (Lat, Lon)	Water Depth (m)	Penetration (m)			Brief Site-specific Objectives
			Sed	Bsm	Total	
LYN-02B (Alternate)	69.64635 20.40965	263	176	0	176	• Construction of the first complete, composite, high-resolution post-glacial climate and environmental record for northern Norway, with a special focus on the dynamics of the retreating northern Norwegian ice margin at the confluence zone of the FIS and Southern Barents Sea ice sheets. • Erosion rates of the Lyngenfjorden catchment during last deglaciation based on sediment-flux estimates. • Paleocirculation of the Norwegian Coastal Current and North Cape Current in the southern Barents Sea and relation with the final melting of the northern FIS and the Holocene paleoclimatological history of northern Norway. • Chronology and frequency of post-YD MTDs; regional seismicity and climate preconditioning.
LYN-03B (Primary)	69.91538 20.42878	326	72	0	72	• Construction of the first complete, composite, high-resolution post-glacial climate and environmental record for northern Norway, with a special focus on the dynamics of the retreating northern Norwegian ice margin at the confluence zone of the FIS and Southern Barents Sea ice sheets. • Erosion rates of the Lyngenfjorden catchment during last deglaciation based on sediment-flux estimates. • Paleocirculation of the Norwegian Coastal Current and North Cape Current in the southern Barents Sea and relation with the final melting of the northern FIS and the Holocene paleoclimatological history of northern Norway. • Chronology and frequency of post-YD MTDs; regional seismicity and climate preconditioning.
LYN-04B (Alternate)	69.92517 20.41602	325	47	0	47	• Construction of the first complete, composite, high-resolution post-glacial climate and environmental record for northern Norway, with a special focus on the dynamics of the retreating northern Norwegian ice margin at the confluence zone of the FIS and Southern Barents Sea ice sheets. • Erosion rates of the Lyngenfjorden catchment during last deglaciation based on sediment-flux estimates. • Paleocirculation of the Norwegian Coastal Current and North Cape Current in the southern Barents Sea and relation with the final melting of the northern FIS and the Holocene paleoclimatological history of northern Norway. • Chronology and frequency of post-YD MTDs; regional seismicity and climate preconditioning.
LYN-05A (Primary)	70.21190 20.33475	367	52	0	52	• Construction of the first complete, composite, high-resolution post-glacial climate and environmental record for northern Norway, with a special focus on the dynamics of the retreating northern Norwegian ice margin at the confluence zone of the FIS and Southern Barents Sea ice sheets. • Erosion rates of the Lyngenfjorden catchment during last deglaciation based on sediment-flux estimates. • Paleocirculation of the Norwegian Coastal Current and North Cape Current in the southern Barents Sea and relation with the final melting of the northern FIS and the Holocene paleoclimatological history of northern Norway. • Chronology and frequency of post-YD MTDs; regional seismicity and climate preconditioning.
LYN-06A (Alternate)	70.21657 20.33792	381	30	0	30	• Construction of the first complete, composite, high-resolution post-glacial climate and environmental record for northern Norway, with a special focus on the dynamics of the retreating northern Norwegian ice margin at the confluence zone of the FIS and Southern Barents Sea ice sheets. • Erosion rates of the Lyngenfjorden catchment during last deglaciation based on sediment-flux estimates. • Paleocirculation of the Norwegian Coastal Current and North Cape Current in the southern Barents Sea and relation with the final melting of the northern FIS and the Holocene paleoclimatological history of northern Norway. • Chronology and frequency of post-YD MTDs; regional seismicity and climate preconditioning.

Proposed Sites (Continued; total proposed sites: 59; pri: 33; alt: 26; N/S: 0)

Site Name	Position (Lat, Lon)	Water Depth (m)	Penetration (m)			Brief Site-specific Objectives
			Sed	Bsm	Total	
VAN-01A (Primary)	77.54216 15.48078	103	30	0	30	• Construction of a complete post-glacial, composite high resolution climate and environmental record in outer basin of Van Keulenfjorden. • Holocene chronology of tidewater glacier (Nathorstbreen) surges and retreats. • Late Glacial to late Holocene paleocirculation changes (East Spitsbergen Current, West Spitsbergen Current) over the west Svalbard shelf and impact on the deglacial history of the southwestern sector of the Svalbard ice-sheet and on the Holocene dynamics of tidewater glaciers. • Holocene changes in fjord sea-ice coverage and impact on brine water production and export to the western Svalbard shelf and slope.
VAN-02A (Alternate)	77.55394 15.54811	92	25	0	25	• Construction of a complete post-glacial, composite high resolution climate and environmental record in outer basin of Van Keulenfjorden. • Holocene chronology of tidewater glacier (Nathorstbreen) surges and retreats. • Late Glacial to late Holocene paleocirculation changes (East Spitsbergen Current, West Spitsbergen Current) over the west Svalbard shelf and impact on the deglacial history of the southwestern sector of the Svalbard ice-sheet and on the Holocene dynamics of tidewater glaciers. • Holocene changes in fjord sea-ice coverage and impact on brine water production and export to the western Svalbard shelf and slope.
VAN-03A (Primary)	77.56783 15.30831	99	22	0	22	• Construction of a complete post-glacial, composite high resolution climate and environmental record in outer basin of Van Keulenfjorden. • Holocene chronology of tidewater glacier (Nathorstbreen) surges and retreats. • Late Glacial to late Holocene paleocirculation changes (East Spitsbergen Current, West Spitsbergen Current) over the west Svalbard shelf and impact on the deglacial history of the southwestern sector of the Svalbard ice-sheet and on the Holocene dynamics of tidewater glaciers. • Holocene changes in fjord sea-ice coverage and impact on brine water production and export to the western Svalbard shelf and slope.
VAN-04A (Alternate)	77.58888 15.19554	101	24	0	24	• Construction of a complete post-glacial, composite high resolution climate and environmental record in outer basin of Van Keulenfjorden. • Holocene chronology of tidewater glacier (Nathorstbreen) surges and retreats. • Late Glacial to late Holocene paleocirculation changes (East Spitsbergen Current, West Spitsbergen Current) over the west Svalbard shelf and impact on the deglacial history of the southwestern sector of the Svalbard ice-sheet and on the Holocene dynamics of tidewater glaciers. • Holocene changes in fjord sea-ice coverage and impact on brine water production and export to the western Svalbard shelf and slope.
VAN-05A (Primary)	77.59653 14.97564	92	13	0	13	• Construction of a complete post-glacial, composite high resolution climate and environmental record in outer basin of Van Keulenfjorden. • Holocene chronology of tidewater glacier (Nathorstbreen) surges and retreats. • Late Glacial to late Holocene paleocirculation changes (East Spitsbergen Current, West Spitsbergen Current) over the west Svalbard shelf and impact on the deglacial history of the southwestern sector of the Svalbard ice-sheet and on the Holocene dynamics of tidewater glaciers. • Holocene changes in fjord sea-ice coverage and impact on brine water production and export to the western Svalbard shelf and slope.
ISF-01A (Primary)	78.40149 16.97128	97	20	0	20	• Construction of a post-glacial composite high resolution climate and environmental record in Isfjorden. • Holocene chronology of tidewater glacier dynamics. • Late Glacial to Holocene paleocirculation changes (East Spitsbergen Current, West Spitsbergen Current) over the west Svalbard shelf and impact on the deglacial history of the western sector of the Svalbard ice-sheet and on the Holocene dynamics of tidewater glaciers. • Holocene changes in fjord sea-ice coverage and impact on brine water production and export to the western Svalbard shelf and slope. • Chronology and frequency of post-glacial mass failure events. • Proxy-validation by comparing proxy-records with local instrumental time-series (e.g. Pavlov et al., 2013).

Proposed Sites (Continued; total proposed sites: 59; pri: 33; alt: 26; N/S: 0)

Site Name	Position (Lat, Lon)	Water Depth (m)	Penetration (m)			Brief Site-specific Objectives
			Sed	Bsm	Total	
ISF-02A (Alternate)	78.36525 16.74214	94	21	0	21	Construction of a post-glacial composite high resolution climate and environmental record in Isfjorden. • Holocene chronology of tidewater glacier dynamics. • Late Glacial to Holocene paleocirculation changes (East Spitsbergen Current, West Spitsbergen Current) over the west Svalbard shelf and impact on the deglacial history of the western sector of the Svalbard ice-sheet and on the Holocene dynamics of tidewater glaciers. • Holocene changes in fjord sea-ice coverage and impact on brine water production and export to the western Svalbard shelf and slope. • Chronology and frequency of post-glacial mass failure events. • Proxy-validation by comparing proxy-records with local instrumental time-series (e.g. Pavlov et al., 2013).
ISF-03A (Primary)	78.23699 14.28859	292	25	0	25	Construction of a post-glacial composite high resolution climate and environmental record in Isfjorden. • Holocene chronology of tidewater glacier dynamics. • Late Glacial to Holocene paleocirculation changes (East Spitsbergen Current, West Spitsbergen Current) over the west Svalbard shelf and impact on the deglacial history of the western sector of the Svalbard ice-sheet and on the Holocene dynamics of tidewater glaciers. • Holocene changes in fjord sea-ice coverage and impact on brine water production and export to the western Svalbard shelf and slope. • Chronology and frequency of post-glacial mass failure events. • Proxy-validation by comparing proxy-records with local instrumental time-series (e.g. Pavlov et al., 2013).
ISF-04A (Primary)	78.15767 13.77683	421	38	0	38	Construction of a post-glacial composite high resolution climate and environmental record in Isfjorden. • Holocene chronology of tidewater glacier dynamics. • Late Glacial to Holocene paleocirculation changes (East Spitsbergen Current, West Spitsbergen Current) over the west Svalbard shelf and impact on the deglacial history of the western sector of the Svalbard ice-sheet and on the Holocene dynamics of tidewater glaciers. • Holocene changes in fjord sea-ice coverage and impact on brine water production and export to the western Svalbard shelf and slope. • Chronology and frequency of post-glacial mass failure events. • Proxy-validation by comparing proxy-records with local instrumental time-series (e.g. Pavlov et al., 2013).
ISF-05A (Alternate)	78.14186 13.73828	416	32	0	32	Construction of a post-glacial composite high resolution climate and environmental record in Isfjorden. • Holocene chronology of tidewater glacier dynamics. • Late Glacial to Holocene paleocirculation changes (East Spitsbergen Current, West Spitsbergen Current) over the west Svalbard shelf and impact on the deglacial history of the western sector of the Svalbard ice-sheet and on the Holocene dynamics of tidewater glaciers. • Holocene changes in fjord sea-ice coverage and impact on brine water production and export to the western Svalbard shelf and slope. • Chronology and frequency of post-glacial mass failure events. • Proxy-validation by comparing proxy-records with local instrumental time-series (e.g. Pavlov et al., 2013).
KON-01B (Primary)	78.95425 11.92534	352	26	0	26	• Construction of a complete post-glacial, composite high resolution climate and environmental record in Kongsfjorden. • Holocene chronology of tidewater glacier surges and retreats. • Late Glacial to late Holocene paleocirculation changes (East Spitsbergen Current, West Spitsbergen Current) and impact on the deglacial history of the west Svalbard ice-sheet. • Holocene changes in fjord sea-ice coverage and impact on brine water production and export to the west Svalbard shelf and slope. • Recent (Anthropocene) changes in environmental conditions with regard to present global climate change. • Proxy-validation by comparing proxy-records with local instrumental time-series from Kongsfjorden (physical ocean parameters) and Ny-Alesund (atmospheric parameters).

Proposed Sites (Continued; total proposed sites: 59; pri: 33; alt: 26; N/S: 0)

Site Name	Position (Lat, Lon)	Water Depth (m)	Penetration (m)			Brief Site-specific Objectives
			Sed	Bsm	Total	
KON-02B (Alternate)	78.95697 11.94289	341	26	0	26	• Construction of a complete post-glacial, composite high resolution climate and environmental record in Kongsfjorden. • Holocene chronology of tidewater glacier surges and retreats. • Late Glacial to late Holocene paleocirculation changes (East Spitsbergen Current, West Spitsbergen Current) and impact on the deglacial history of the west Svalbard ice-sheet. • Holocene changes in fjord sea-ice coverage and impact on brine water production and export to the west Svalbard shelf and slope. • Recent (Anthropocene) changes in environmental conditions with regard to present global climate change. • Proxy-validation by comparing proxy-records with local instrumental time-series from Kongsfjorden (physical ocean parameters) and Ny-Alesund (atmospheric parameters).
KON-03B (Primary)	79.04845 11.10132	329	23	0	23	• Construction of a complete post-glacial, composite high resolution climate and environmental record in Kongsfjorden. • Holocene chronology of tidewater glacier surges and retreats. • Late Glacial to late Holocene paleocirculation changes (East Spitsbergen Current, West Spitsbergen Current) and impact on the deglacial history of the west Svalbard ice-sheet. • Holocene changes in fjord sea-ice coverage and impact on brine water production and export to the west Svalbard shelf and slope. • Recent (Anthropocene) changes in environmental conditions with regard to present global climate change. • Proxy-validation by comparing proxy-records with local instrumental time-series from Kongsfjorden (physical ocean parameters) and Ny-Alesund (atmospheric parameters).
KON-04A (Alternate)	79.05130 11.08940	331	30	0	30	• Construction of a complete post-glacial, composite high resolution climate and environmental record in Kongsfjorden. • Holocene chronology of tidewater glacier surges and retreats. • Late Glacial to late Holocene paleocirculation changes (East Spitsbergen Current, West Spitsbergen Current) and impact on the deglacial history of the west Svalbard ice-sheet. • Holocene changes in fjord sea-ice coverage and impact on brine water production and export to the west Svalbard shelf and slope. • Recent (Anthropocene) changes in environmental conditions with regard to present global climate change. • Proxy-validation by comparing proxy-records with local instrumental time-series from Kongsfjorden (physical ocean parameters) and Ny-Alesund (atmospheric parameters).
KON-05A (Primary)	79.03220 10.80595	326	20	0	20	• Construction of a complete post-glacial, composite high resolution climate and environmental record in Kongsfjorden. • Holocene chronology of tidewater glacier surges and retreats. • Late Glacial to late Holocene paleocirculation changes (East Spitsbergen Current, West Spitsbergen Current) and impact on the deglacial history of the west Svalbard ice-sheet. • Holocene changes in fjord sea-ice coverage and impact on brine water production and export to the west Svalbard shelf and slope. • Recent (Anthropocene) changes in environmental conditions with regard to present global climate change. • Proxy-validation by comparing proxy-records with local instrumental time-series from Kongsfjorden (physical ocean parameters) and Ny-Alesund (atmospheric parameters).