Dredge 01: Eastern Bruce Rise

Summary

Dredge 1 was deployed on March 9th at eastern edge of the Eastern Bruce Rise (63.2860 °S, 102.4949 °E).

The Eastern Bruce Rise is plateau from ~4000 m deep to a broad top around 1200-1600 m north of the Denman Glacier area. It has a steep easterly slope marked by the Vincennes Fracture Zone and is separated from the Western Bruce Rise by the ~1000 m deep Probeda Canyon. To the north it displays a faulted E-W slope. It is deeper and separate from the Antarctic continental shelf to the south.

The dredge was up the eastern SE-NW trending slope of the Eastern Bruce Rise, over 590 m between 2,207-2,655 m water depth. Two spikes of up to ~15t and two spikes to 10t were recorded before the dredge was off the bottom.

Fifty-three rocks were recovered. The local rock is lithified diamictite and most clasts are continental rocks including granite and gneiss with some dolerite. Three rocks are basalt. It is unclear if these basalts are part of the diamictite whereas dolerite clasts are present in the diamictite. Rocks are up to 80 cm long and most would appear to have been ice rafted with little rounding. Thin MnO crusts (< 1mm thick) are common.

The fine sediment catcher contained mixed sediment including MnO coated gravels as well as fine diatomaceous ooze. Foraminifera are also present as well as solitary corals, branching corals and sponges. The coarse sediment catcher contained clasts (up to 10 cm across) which are similar in composition to the larger rocks dredged. However, many small MnO coated grains have not been examined in detail. One granite clast was scrubbed and showed a golden lustre to the whole of the rock. One hypothesis is that this may be a pyrite film beneath the black outer coating. Hints of this are in other clasts but not common.

Preliminary geochemical analyses were undertaken using the pXRF on mafic portion of samples 005, 012, 034, 047 and 050. These require assessment for consistency and more work.

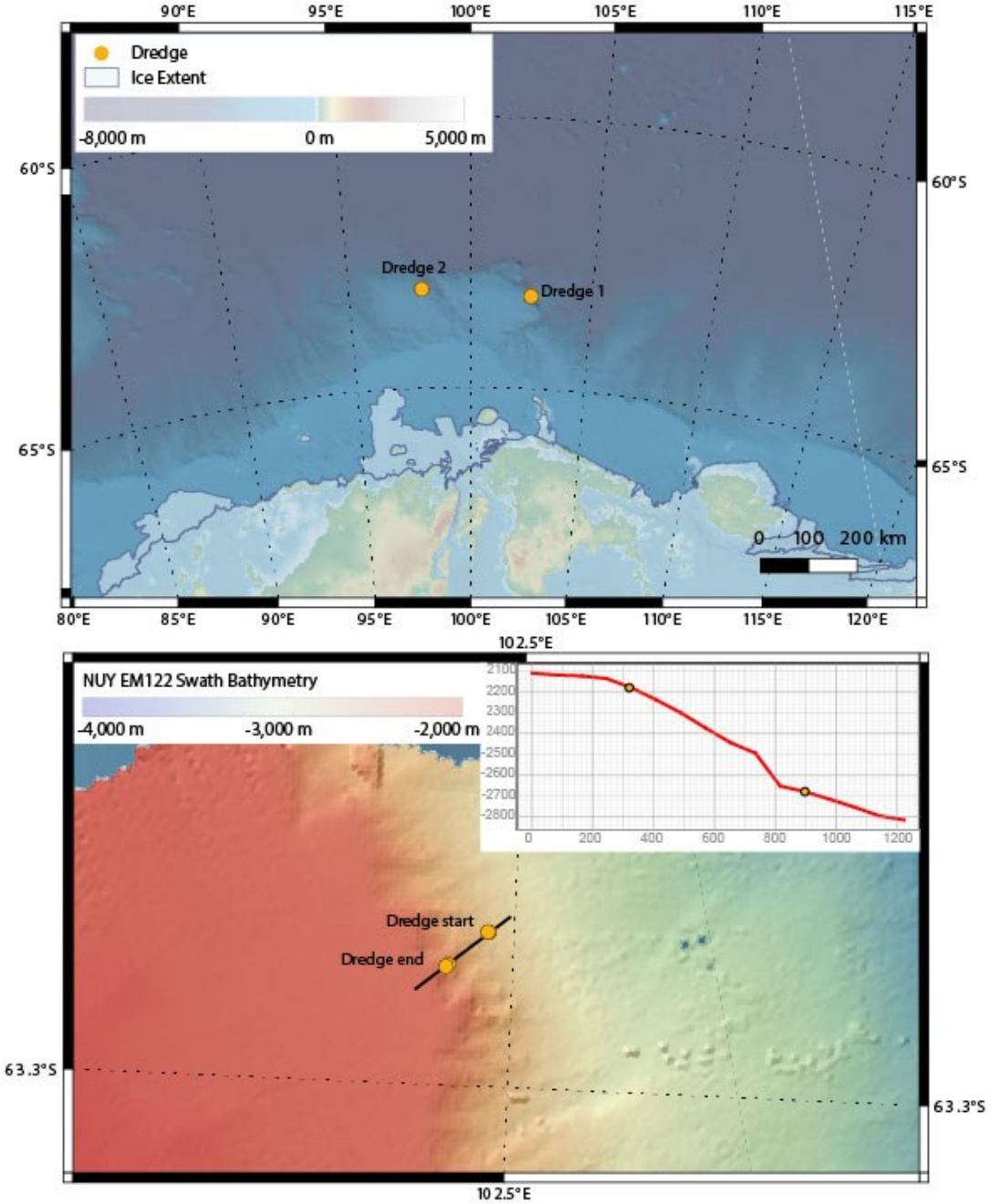


Figure 1: Top: Overview map of Denman region with ship track, and dredge sites (D01 and D02) shown over IBSCO v2 bathymetry. Bottom: Zoom in on dredge site D01, with voyage EM122 bathymetry, with inset profile of dredged slope.

Dredge 1 Log

Date and Time in UTC	Dredge Event	Latitude	Longitude	Depth (m)	Wire Out	Comment
9/03/2025 0:18	**D01**	**-63.286**	**102.495**	**2625**	0 m	Station 4. Dredge 1 in the water. Stop and drop dredge at this location. Wire out to bottom then heading to the SW.
9/03/2025 0:38	D01	-63.286030350	102.49493800	2655	0 m	100 m sacrificial line out; handshake to main winch complete
9/03/2025 1:10	D01	-63.286026350	102.49492315	2651	1000 m	1000 m wire out
9/03/2025 1:27	D01	-63.286029467	102.49493015	2647	1500 m	1500 m wire out
9/03/2025 1:37	D01	-63.285978833	102.49475553	2653	2000 m	2000 m wire out
9/03/2025 1:44	D01	-63.285980767	102.49475935	2647	2250 m	2250 m wire out
9/03/2025 1:52	D01	-63.285986000	102.49476257	2649	2400 m	2400 m wire out
9/03/2025 1:58	D01	-63.285979367	102.49475357	2651	2540 m	2540 m wire out
9/03/2025 2:12	D01	-63.289090050	102.48704900	2207	3144 m	All wire out.
9/03/2025 2:19	D01	-63.289277283	102.48659880	2170		starting to pull 1 m/min
9/03/2025 2:21	D01	-63.289281967	102.48660702	2182	3185 m	Hauling in at 1 m per minute
9/03/2025 3:59	D01	-63.289277067	102.48660530	2170	2093 m	Dredge 1 Off the bottom. Hauling in at 60 m/min

***Use the bolded values if a single point is desired for plotting the dredge location**

Dredge 01 Sediment Samples

Sediment Sub/Sample Number	Sediment sample Bucket	Name	Comments
NUY2025-V03-004_D01-001	S1	General sample of fine gravel, sand and ooze	
NUY2025-V03-004_D01-001_A	S1	5 solitary corals	
NUY2025-V03-004_D01-001_B	S1	Branching corals	
NUY2025-V03-004_D01-001_C	S1	sieved 2mm to 63 microns for forams	
NUY2025-V03-004_D01-001_D	S1	gravelly fraction from >0.5 mm	
NUY2025-V03-004_D01-001_E	S1	sieved fraction >0.5 mm	
NUY2025-V03-004_D01-001_F	S1	washed sample	
NUY2025-V03-004_D01-002	S1	Grab scoop of the whole sample from gridded coarser sediment catcher	
NUY2025-V03-004_D01-002_A	S1	sorted, <2 cm clasts	
NUY2025-V03-004_D01-002_B	S1	sorted, 2-3 cm clasts	
NUY2025-V03-004_D01-002_C	S1	sorted, 3 - 3.5 cm clasts	
NUY2025-V03-004_D01-002_D	S1	sorted, 3.5-4 cm clasts	
NUY2025-V03-004_D01-002_E	S1	sorted, 4-5 cm clasts	
NUY2025-V03-004_D01-002_F	S1	sorted, 5-10 cm clasts	Contains sample with thin gold sheen on the outside

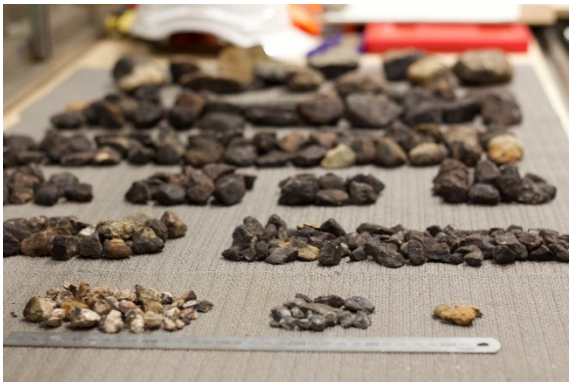
Dredge 01 Rock Samples

Sample Number	Bucket Number	Rock Name
NUY2025-V03-004_D01-003	1	porphyritic K-feldspar granite
NUY2025-V03-004_D01-004	1	microgranite
NUY2025-V03-004_D01-005	1	basalt
NUY2025-V03-004_D01-006	1	porphyritic K-feldspar granite
NUY2025-V03-004_D01-007	1	Rapakivi granite
NUY2025-V03-004_D01-008	1	aplite (?)
NUY2025-V03-004_D01-009	1	banded gneiss with epidote+calcite vein
NUY2025-V03-004_D01-010	1	K-feldspar +quartz+biotite+garnet gneiss
NUY2025-V03-004_D01-011	1	plagioclase+quartz+(chlorite(?) gneiss
NUY2025-V03-004_D01-012	2	dolerite
NUY2025-V03-004_D01-013	2	alkali granite
NUY2025-V03-004_D01-014	2	granite
NUY2025-V03-004_D01-015	2	quartz syenite with cataclasite
NUY2025-V03-004_D01-016	2	feldspar+quartz+biotite+ amphibole+garnet gneiss
NUY2025-V03-004_D01-017	2	anorthosite

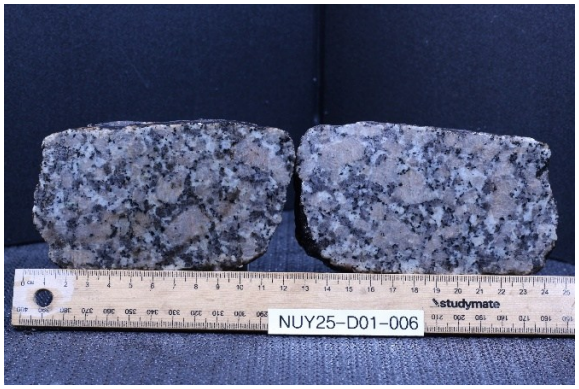
NUY2025-V03-004_D01-018	2	granodiorite
NUY2025-V03-004_D01-019	2	feldspar+quartz+biotite+ amphibole+garnet gneiss
NUY2025-V03-004_D01-020	2	plagioclase+biotite+ amphibole+chlorite gneiss
NUY2025-V03-004_D01-021	2	feldspar+biotite+ amphibole gneiss
NUY2025-V03-004_D01-022	2	feldspar+biotite+ garnet gneiss
NUY2025-V03-004_D01-023	2	microgranite
NUY2025-V03-004_D01-024	2	porphyritic granite
NUY2025-V03-004_D01-025	3	dolerite
NUY2025-V03-004_D01-026	3	porphyroblastic feldspar gneiss
NUY2025-V03-004_D01-027	3	quartz syenite
NUY2025-V03-004_D01-028	3	quartz syenite
NUY2025-V03-004_D01-029	3	granite
NUY2025-V03-004_D01-030	3	silty sandstone
NUY2025-V03-004_D01-031	3	granitic gneiss
NUY2025-V03-004_D01-032	3	granite
NUY2025-V03-004_D01-033	3	garnet rich gneiss
NUY2025-V03-004_D01-034	3	diamictite with dolerite clasts
NUY2025-V03-004_D01-035	3	gneiss (similar to sample 9)
NUY2025-V03-004_D01-036	3	porphyritic plagioclase gneiss
NUY2025-V03-004_D01-037	3	banded gneiss
NUY2025-V03-004_D01-038	3	banded gneiss
NUY2025-V03-004_D01-039	3	diamictite
NUY2025-V03-004_D01-040	4	alkali granite
NUY2025-V03-004_D01-041	4	K-feldspar rich gneiss
NUY2025-V03-004_D01-042	4	monzogranite
NUY2025-V03-004_D01-043	4	K-feldspar rich gneiss
NUY2025-V03-004_D01-044	4	granitic gneiss
NUY2025-V03-004_D01-045	4	plagioclase+quartz+biotite+ amphibole+garnet gneiss
NUY2025-V03-004_D01-046	4	granitic gneiss
NUY2025-V03-004_D01-047	4	diamictite with mafic clasts
NUY2025-V03-004_D01-048	4	granitic gneiss
NUY2025-V03-004_D01-049	5	granitic gneiss
NUY2025-V03-004_D01-050	5	basalt
NUY2025-V03-004_D01-051	6	granitic gneiss
NUY2025-V03-004_D01-052	6	pegmatite
NUY2025-V03-004_D01-053	7	gneiss with metasandstone bands

Dredge 1 Representative Samples

Gravel fraction in all sediment catcher

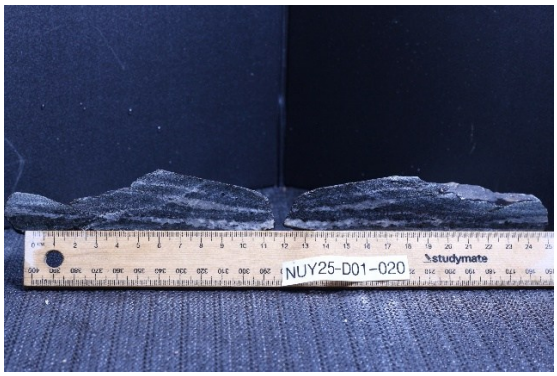


Range of pebbles from coarse sediment catcher



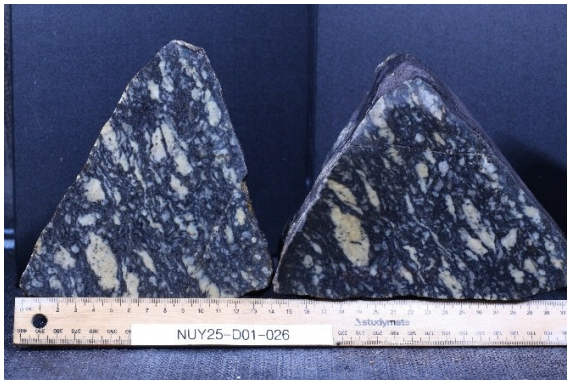
Porphyritic K-feldspar granite (sample 006)

Cataclasite in pink granite (015)



Banded plagioclase+biotite+ amphibole+chlorite gneiss (sample 020)

Very large pebble of feldspar+biotite+ garnet gneiss in diamictite (arrowed) (sample 022)



Porphyroblastic plagioclase gneiss (sample 026)

Basalt (sample 050)

Pegmatite (sample 052)

Banded gneiss (sample 053)

Dredge 02: Western Bruce Rise

Summary

Dredge 2 was deployed on March 12th at eastern edge of the Western Bruce Rise (63° 9.68’ S, 97° 59.34' E).

The Western Bruce Rise is a plateau with the base at 3500 m deep and a broad top around 1200 - 1600 m. It is north of the Denman Glacier area and is separated from the Eastern Bruce Rise by the 1000 m deep Probeda Canyon. To the north it displays a faulted E-W slope. It is deeper and separate from the Antarctic continental shelf to the south which is less than 1000 m deep (Stagg et al, 2006).

The dredge was up the northern slope of the Western Bruce Rise, over a distance of 590 m between 2560 - 2270 m water depth. The ‘stop and drop’ technique was used, where the dredge was lowered in place and the winch let out to full water depth, then the ship moved to the end location and the winch was hauled in.

Eleven rocks were recovered. One was basalt and the rest were all various plutonic igneous and metamorphic rocks. Thin MnO crusts (< 1mm thick) are common. Preliminary geochemistry using a pXRF was undertaken on the basalt sample.

The fine sediment catcher contained mixed sediment chocolate brown clay-rich mud with diatoms and forams as well as some green portions. Reddish brown clay balls were recovered from the dredge and have been added to the 001. MnFeO coated rock fragments form the gravel fraction as part of the sieved sample (001A). The coarse sediment catcher also contained brown mud, green clay, abundant foraminifera and contained some dropstones (002). Larger clasts (up to 2.5 cm across) were sieved from the mud and include granite and gneiss clasts. Only some are MnFeO coated grains as the coating may have been abraded off in the sediment catcher.

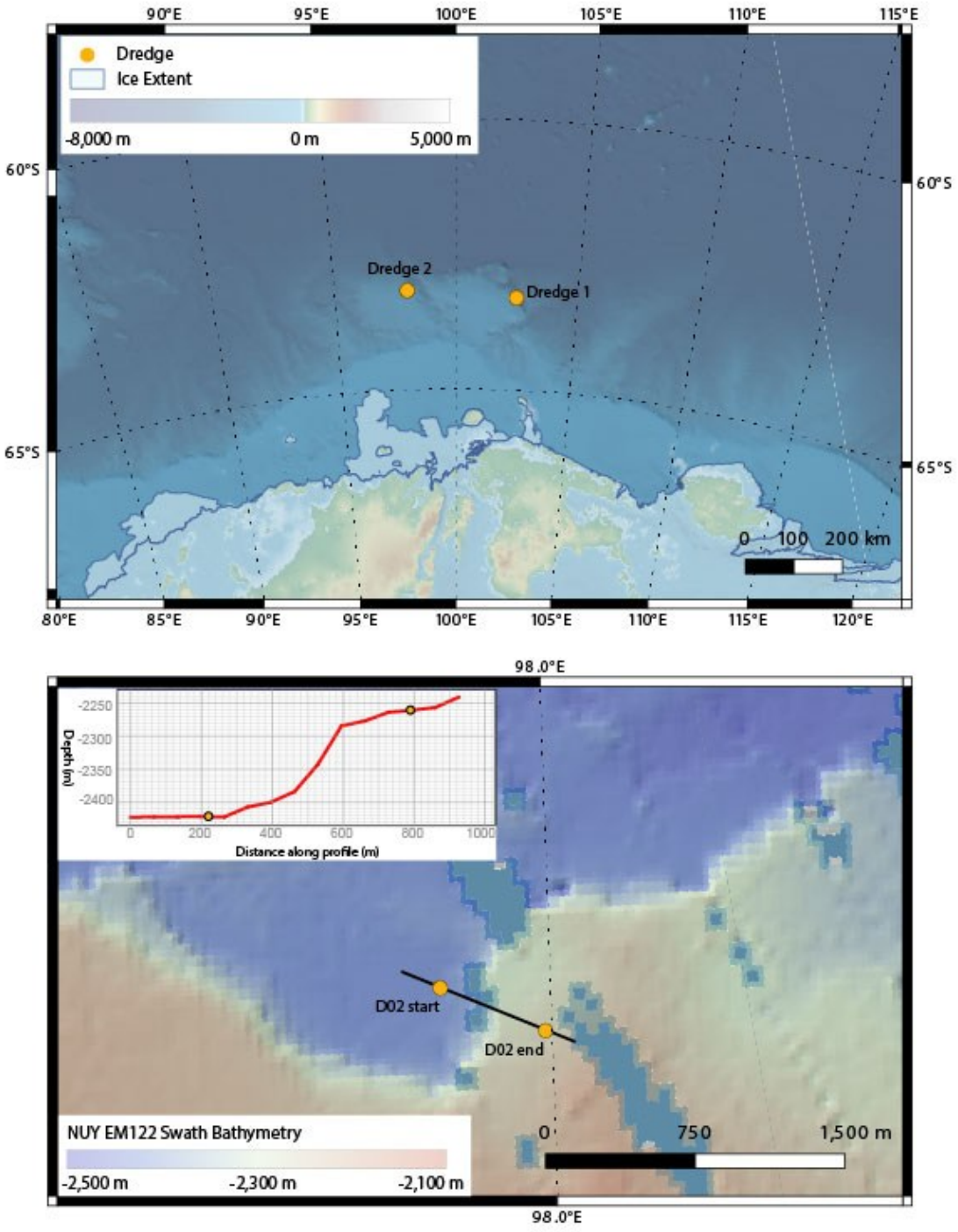


Figure 2: Top: Overview map of Denman region with ship track, and dredge sites (D01 and D02) shown over IBSCO v2 bathymetry. Bottom: Zoom in on dredge site D02, with voyage EM122 bathymetry, with inset profile of dredged slope.

Dredge 2 Log

Date and Time in UTC	Latitude	Longitude	Depth (m)	Wire Out	Comment
12/03/2025 9:52	**-63.16138840**	**97.98901983**	**2405**	0 m	In the water
12/03/2025 10:38	-63.16142325	97.98906542	2406	2200 m	All wire out for the drop part of stop and drop
12/03/2025 10:59	-63.16345560	97.99909232	2253	2777 m	Dredge 2. All wire out Ready to commence hauling in. Ship stationary again.
12/03/2025 12:20	-63.16349657	97.99936768	2254	0 m	Dredge 2 on deck.

***Use the bolded values if a single point is desired for plotting the dredge location**

Dredge 02 Sediment Samples

Sediment Sub/Sample Number	Sediment sample Bucket	Name	Comments
NUY2025-V03-004_D02-001	S2	General sample of dropstones, sand brown and green clays, mud and ooze	
NUY2025-V03-004_D02-001_A	S2	Sieved > 5 mm fraction up to 3 cm with some MnO coating	
NUY2025-V03-004_D02-002	S2	Grab scoop of the whole sample from gridded coarser sediment catcher	
NUY2025-V03-004_D01-002_A	S2	sorted, >0.5 mm rock fragments	

Dredge 02 Rock Samples

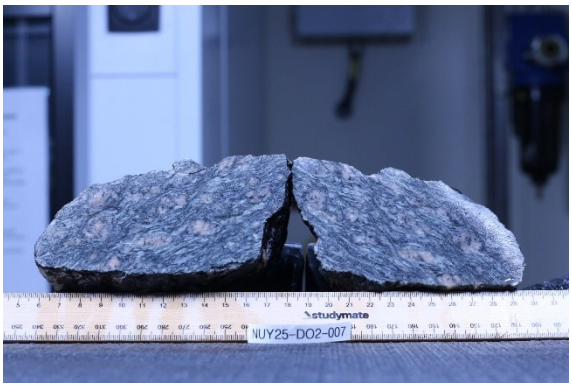
Sample Number	Bucket Number	Rock Name
NUY2025-V03-004_D02-003	7	basalt
NUY2025-V03-004_D02-004	7	K-feldspar+quartz+actinolite gneiss
NUY2025-V03-004_D02-005	7	granitic gneiss
NUY2025-V03-004_D02-006	7	quartz+feldspar+biotite gneiss
NUY2025-V03-004_D02-007	7	augen gneiss (K-feldspar porphyroblasts)
NUY2025-V03-004_D02-008	7	feldspar+quartz+biotite+actinolite gneiss
NUY2025-V03-004_D02-009	7	monzogranite
NUY2025-V03-004_D02-010	7	K-feldspar+quartz+biotite+actinolite gneiss
NUY2025-V03-004_D02-011	7	porphyroblastic K-feldspar gneiss
NUY2025-V03-004_D02-012	7	K-feldspar porphyry granite
NUY2025-V03-004_D02-013	7	amphibolite

Dredge 2 Representative Samples

Full sample in all sediment catcher

Range of pebbles from coarse sediment catcher

Basalt (sample 003)



Sillimanite garnet augen gneiss (007)

Monzogranite (sample 009)

Amphibolite (sample 013)

Citations

STAGG, H.M.J., COLWELL, J.B., BORISSOVA, I., ISHIHARA, T. & BERNARDEL, G., 2006, The Bruce Rise Area, East Antarctica: Formation of a continental margin near the greater India-Australia-Antarctic triple junction, Terra Antarctica 13, 3–22.

Dredge 04: Northern Bruce Rise

Summary

Dredge 4 was deployed on April 22nd at the northwestern edge of the Eastern Bruce Rise at Station 143 using the fly-in technique (62.8316 °S, 99.2773 °E).

The Bruce Rise is a plateau between 1200 - 1600 m deep north of the continental shelf of Antarctica in the Denman glacier area. The northern edge of the Bruce Rise is part of an extensive E-W running fault system (Stagg et al, 2006) and forms a steep dissected slope from the abyssal plain at 3500 m to the start of the flat top at 1600 m deep.

Dredge 04 sampled an ~500 m transect at the foot of the north facing slope of the Eastern Bruce Rise, at 3,600 - 3,800 m water depth. The fly-in technique was used for this deployment.

Three rocks recovered were all less than 10 cm across. All were basalt and no continental rocks were returned on this dredge. Although all the basalts are altered, 002 may contain relatively fresh plagioclase crystals. Vesicles can be irregular and joined to form larger cavities as in 003. Some of the vesicles and cavities are lined and/or filled with a hard blue and softer green/yellow minerals. The hardness of the blue mineral suggests that it is coloured quartz. MnFeO crusts (< 10 mm thick) coat all the rocks.

The sediment catchers contained only gravel with no mud or sand. The gravel was divided into size fractions ranging from very large pebbles (<6 cm; 001A) to small pebbles (<0.8 cm; 001H). All are at least partially coated in black MnFe oxide, some of which show botryoidal textures and most of the angular clasts of 001H and G are entirely MnFeO crusts. There are some metamorphic clasts and crystals of feldspar in several samples, but most cannot be identified because of the MnFeO coating. More processing is required to determine the lithologies of these coated clasts.

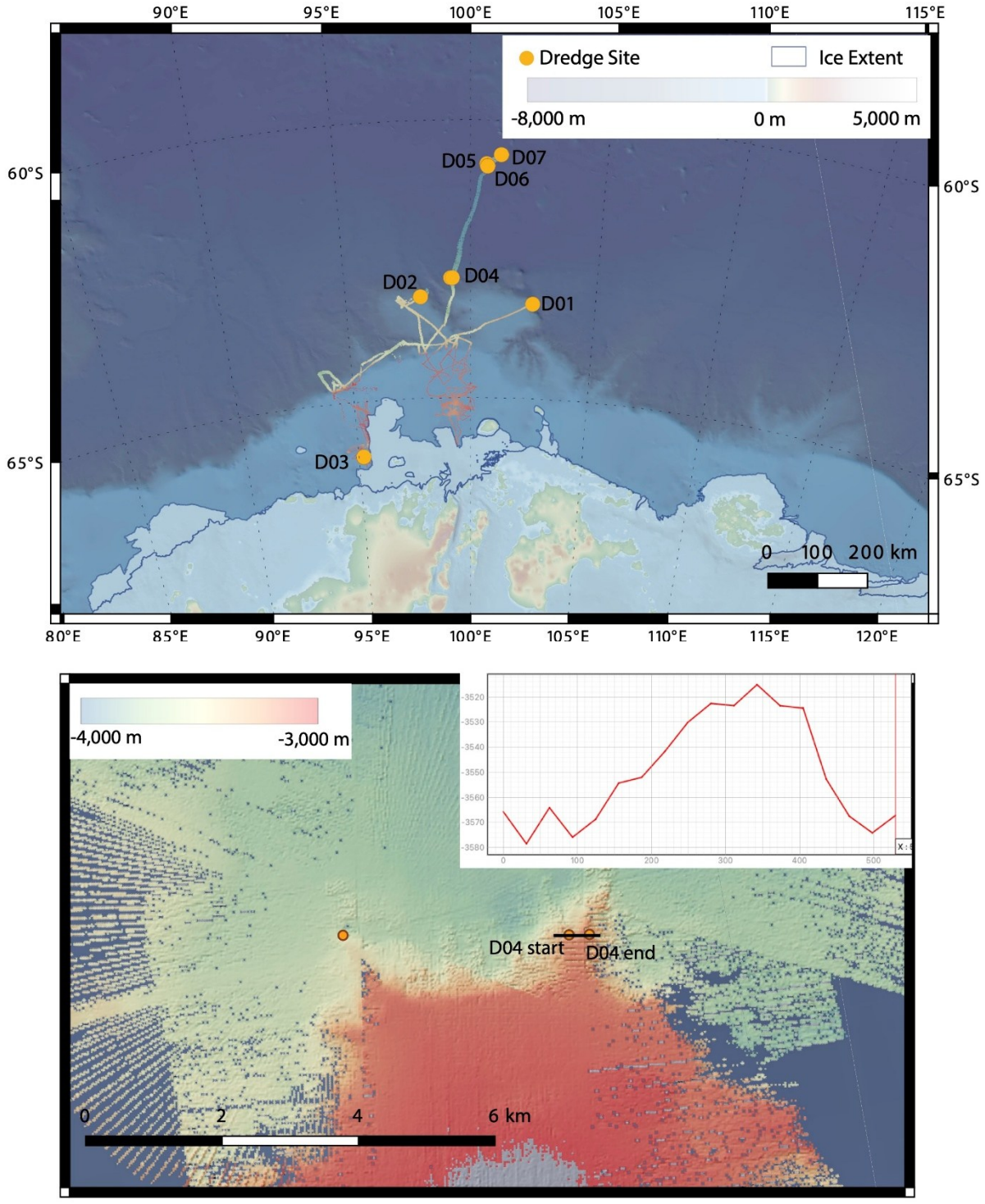


Figure 3: Top: Overview map of Denman region with ship track, and dredge sites shown over IBSCO v2 bathymetry. Bottom: Zoom in on dredge site D04, with voyage EM122 bathymetry, with inset profile of dredged slope.

Dredge 4 Log

Date and Time in UTC	Latitude	Longitude	Depth (m)	Wire Out	Comment

2025-04-22 04:19:01	-62.831334	99.2064514	3810 m	0 m	Dredge in the water
2025-04-22 05:35:43	-62.831665	99.2714821	3501 m	4500 m	All wire out. Waiting 5 mins for wire to settle
2025-04-22 05:42:46	-62.83167	99.2714779	3503 m		Hauling in 15 m/min
2025-04-22 07:18:40	-62.831641	99.2773477	3698 m		Spike to 13.7 t
2025-04-22 07:21:54	-62.831641	99.2773429	3955 m		Spike to about 14 t
2025-04-22 07:27:12	**-62.831638**	**99.2773427**	3609 m		Spike to 14 t ish

***Use the bolded values if a single point is desired for plotting the dredge location**

Dredge 04 Sediment Samples

Sediment Sub/Sample Number	Sediment sample Bucket	Name	Comments
NUY2025-V03-143_D04-001_A	S2	Very large basalt pebbles (2 - 6 cm), some have a partial MnFeO coating	Some white gypsum(?) crystals on the outside of the clasts
NUY2025-V03-143_D04-001_B	S2	Large altered angular basalt pebbles (1.5- 2 cm), some have a partial MnFeO coating	Hard greenish mineral in some vesicles
NUY2025-V03-143_D04-001_C	S2	Small quartz-bearing small pebbles (1.3 – 1.5 cm); some MnFeO coated	Some clasts metamorphic including one with garnet. Also feldspar crystals
NUY2025-V03-143_D04-001_D	S2	Small (1 – 1.3 cm) claystone pebbles.	
NUY2025-V03-143_D04-001_E	S2	Small (< 1 cm) thinly MnFeO coated pebbles ; some are partially coated crystals of feldspar	
NUY2025-V03-143_D04-001_F	S2	Smallest fraction of MnFeO coated pebbles (< 0.8); many with a botryoidal to mamillary texture	
NUY2025-V03-143_D04-001_G	S2	Angular pebbles (<2.5 cm) predominantly of MnFeO crusts	
NUY2025-V03-143_D04-001_H	S2	Mixed gravel (<1 cm) which includes rock fragments,	

		MnFeO coated clasts and MnFeO crusts	

Dredge 04 Rock Samples

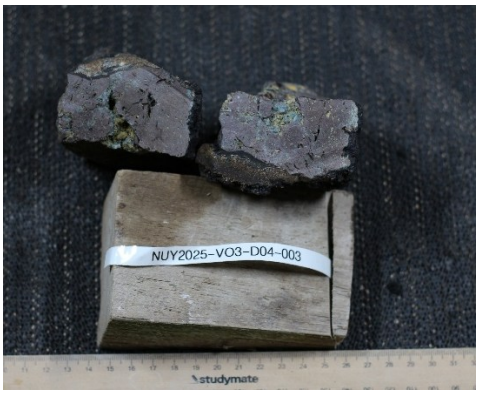
Sample Number	Bucket Number	Rock Name
NUY2025-V03-143_D04-002	8	Basalt with some fresh plagioclase; blue quartz? infill of a few larger round vesicles. MnFeO coated
NUY2025-V03-143_D04-003	8	Red-purple basalt with up to 30% vesicles some have merged to form large cavities infilled with hard blue and softer green to yellow secondary minerals. MnFeO coated
NUY2025-V03-143_D04-004	8	Brown basalt with some round vesicles. MnFeO coated

Dredge 4 Photos of Representative Samples

Variety of altered basalt clasts, some MnFeO coatings (001B)

Angular MnFeO dominated pebbles (001G)

Basalt. Note the small blue round amygdale arrowed (sample 002)



Red purple basalt with cavities filled by hard bluish quartz (?) and yellow minerals (sample 003)

Brown basalt with some larger cavities (sample 004)

Citations

STAGG, H.M.J., COLWELL, J.B., BORISSOVA, I., ISHIHARA, T. & BERNARDEL, G., 2006, The Bruce Rise Area, East Antarctica: Formation of a continental margin near the greater India-Australia-Antarctic triple junction, Terra Antarctica 13, 3–22.

Dredge 05: Doris Seamount

Summary

Dredge 5 was deployed on April 23rd on an unnamed seamount at (**60.8218 °S, 100.6053 °E)**. Station 144.

The seamount is 235 km north of the Bruce Rise. It is 8 - 10 km across at a depth of 3,200 m at the top and drops to the abyssal plain at 4,500 m. Seismic data suggests that this extinct volcano uplifted an apron of sediment during its growth (Figure 4).

The seamount is not a guyot but a series of small (~0.7 - 1 km) rounded features with intervening valleys suggesting an amalgamation of several different volcanic centres which retained integrity when the volcano sunk.

The dredge was along the top of the seamount from a NW to SE direction, over 800 m between 3,400 – 3,600 m water depth. The dredge was undertaken using a fly-in technique.

Twenty-eight rocks were recovered and cut including several very large rocks up to 0.5 m across. Nearly all the rocks consisted of continental rocks including a variety of plutonic igneous and metamorphic rocks. Only thin MnFeO crusts (< 1mm thick) coated most of the clasts. The variety, size and shape of the rocks indicate that these are all dropstones that rained onto the seamount from melting icebergs. No basalt was identified on this dredge. The lack of mafic volcanic rocks informed the decision to dredge this seamount a second time with D06.

The sediment catchers contained only gravel with no mud or sand. The gravel was divided into four size fractions ranging from very large pebbles (<6 cm; 001A) to small pebbles (<2 cm; 001D). Most clasts are at least partially coated in black MnFe oxide, some of which show botryoidal textures. Small nodules and coated grains are stuck to the outside of some of the larger clasts. More processing is required to determine the lithologies of the larger coated clasts.

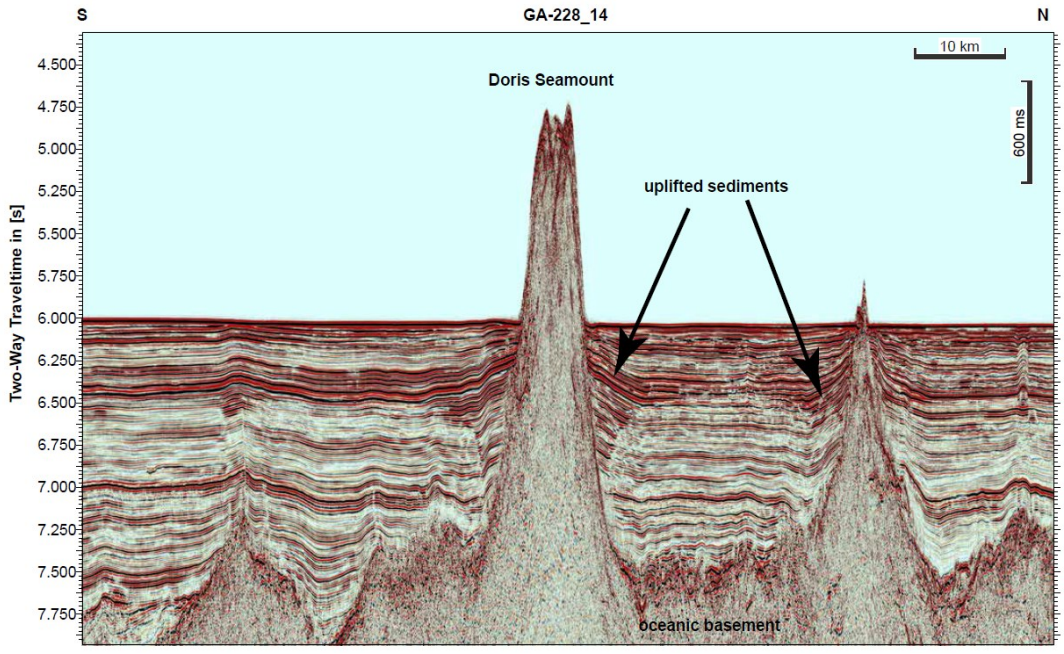


Figure 4: Seismic profile of Doris Seamount

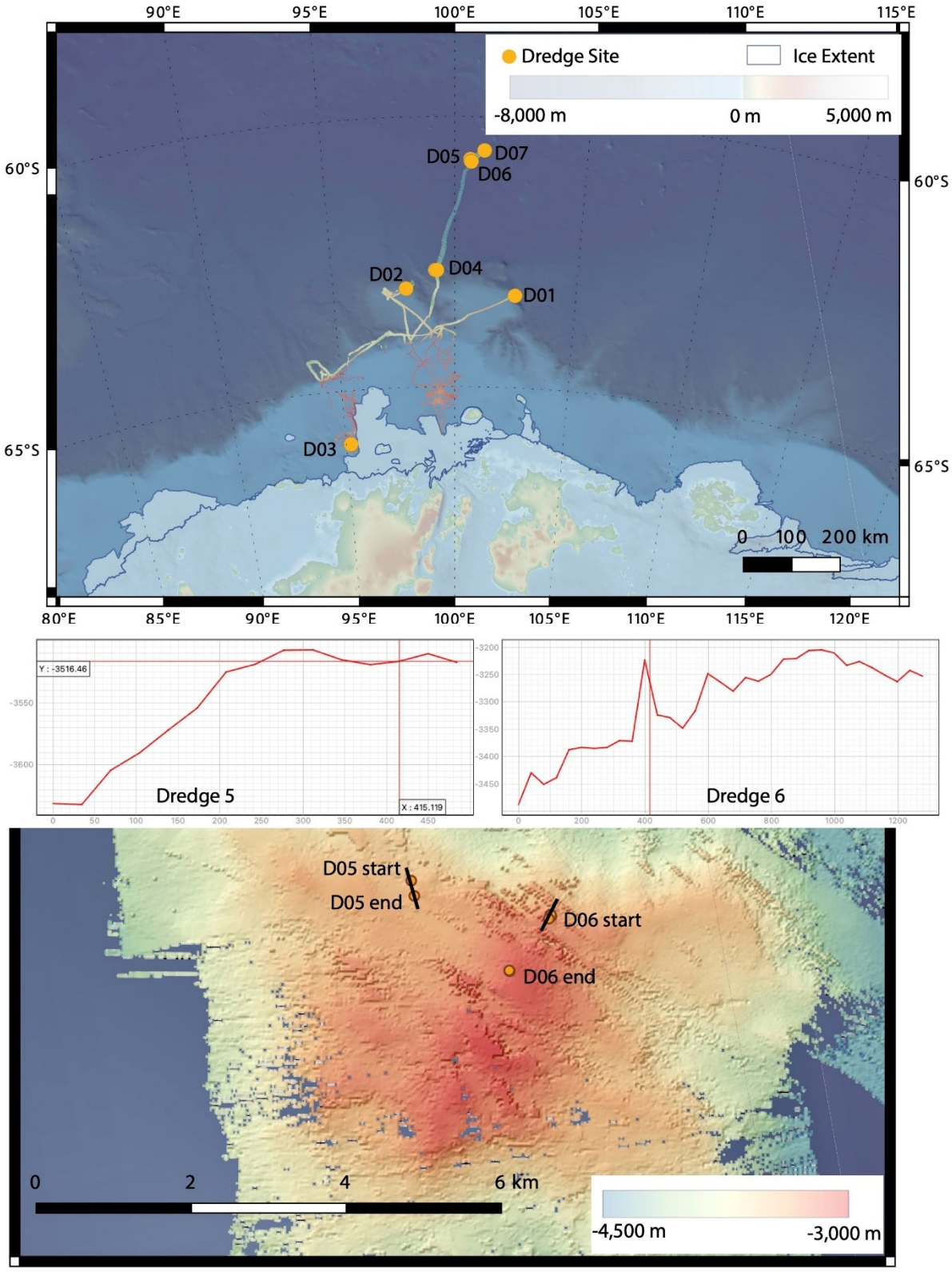


Figure 5: Top: Overview map of Denman region with ship track, and dredge sites shown over IBSCO v2 bathymetry. Bottom: Zoom in on dredge site D05 and D06, with voyage EM122 bathymetry, with inset profile of dredged slope (D05 and D06).

Dredge 5 Log

Date and Time in UTC	Latitude	Longitude	Depth (m)	Wire Out	Comment
2025-04-23T02:50:52+00:00	-60.785422	100.590728	4479.74	0 m	In the water
2025-04-23T04:30:08+00:00	-60.820031	100.604531	3571.4		Start hauling in at 15 m/min
2025-04-23T05:58:02+00:00	**-60.821789**	**100.605301**	3519.91		Off the bottom

***Use the bolded location if a single dredge location is desired for plotting**

Dredge 05 Sediment Samples

Sediment Sub/Sample Number	Sediment sample Bucket	Name	Comments
NUY2025-V03-144_D05-001_A	S2	Very large pebbles (<6 cm) of MnFeO coated gravel	
NUY2025-V03-144_D05-001_B	S2	Very large pebbles (<4 cm) of MnFeO coated clasts	
NUY2025-V03-144_D05-001_C	S2	<2.5 cm large pebble gravel	
NUY2025-V03-144_D05-001_D	S2	<2 cm pebble gravel	

Dredge 05 Rock Samples

Sample Number	Bucket Number	Rock Name
NUY2025-V03-144_D05-002	8	K-feldspar quartz gneiss
NUY2025-V03-144_D05-003	8	K-feldspar porphyritic granite
NUY2025-V03-144_D05-004	8	altered orthogneiss
NUY2025-V03-144_D05-005	8	felsic gneiss
NUY2025-V03-144_D05-006	8	granite
NUY2025-V03-144_D05-007	9	foliated grey granite
NUY2025-V03-144_D05-008	9	pegmatite with graphic K-feldspar & quartz
NUY2025-V03-144_D05-009	9	K-feldspar granite

NUY2025-V03-144_D05-010	10	amphibolite
NUY2025-V03-144_D05-011	10	granitic gneiss
NUY2025-V03-144_D05-012	10	granitic gneiss
NUY2025-V03-144_D05-013	10	altered leucogranite
NUY2025-V03-144_D05-014	10	amphibolite
NUY2025-V03-144_D05-015	10	diorite
NUY2025-V03-144_D05-016	10	granitic gneiss
NUY2025-V03-144_D05-017	10	monzonite (granite)
NUY2025-V03-144_D05-018	10	K-feldspar+ actinolite qtz biotite chlorite magnetite gneiss
NUY2025-V03-144_D05-019	10	feldspar + qtz rich fels
NUY2025-V03-144_D05-020	10	amphibolite
NUY2025-V03-144_D05-021	10	leucocratic gneiss
NUY2025-V03-144_D05-022	10	metasandstone
NUY2025-V03-144_D05-023	10	light pink granite
NUY2025-V03-144_D05-024	10	amphibolite medium grained
NUY2025-V03-144_D05-025	11	diorite
NUY2025-V03-144_D05-026	11	equigranular granite
NUY2025-V03-144_D05-027	11	red granite gneiss
NUY2025-V03-144_D05-028	11	plagiogabbro
NUY2025-V03-144_D05-029	11	granitic gneiss

Dredge 5 Representative Samples

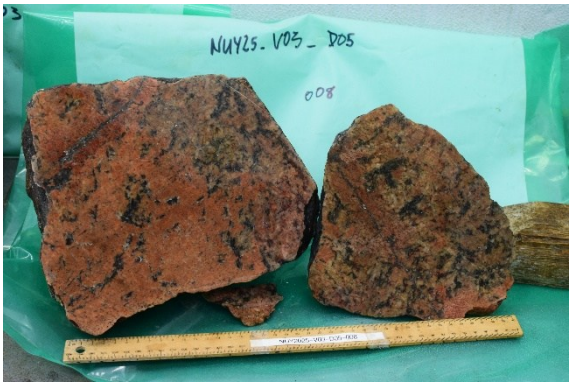
Very large pebble fraction (sample 001A)

Range of smaller pebbles from sediment catcher (001D)

K-feldspar quartz gneiss (sample 002)

Felsic gneiss (005)

Granite (sample 006)



Pegmatite with graphic K-feldspar and quartz (sample 008)

Diorite (sample 015)

K-feldspar+actinolite+quartz+biotite gneiss (sample 018)

Sandstone coated with MnFeO (sample 022)

Amphibolite (sample 024)

Dredge 06: Doris Seamount

Summary

Dredge 6 was deployed on April 23rd higher on the slopes of Doris Seamount at 60.830347 °S, 100.6281 ° E. Station 145.

The seamount is 235 km north of the Bruce Rise. It is 8 - 10 km across at a depth of 3,200 m at the top and drops to the abyssal plain at 4,500 m.

The seamount is not a guyot but a series of small (~0.7 - 1 km) rounded features with intervening valleys suggesting an amalgamation of several different volcanic centres which retained integrity when the volcano sunk.

The dredge was along the top of the seamount from a NE to SW direction, over 900 m between 3,200 – 3,400 m water depth. The dredge was undertaken using a stop and drop technique.

Thirteen rocks were recovered and one example of an MnFeO nodule was retained from this dredge. Eight of these rocks were red to brown feldspar-phyric basalt. Many of the large crystals of feldspar are associated with pyroxene and appear to be glomerophorphyroclasts. A few clasts also contained independent pyroxene phenocrysts but most are altered. The rest of the rocks are a range of continental granitoids and gneisses with one dark magnetite-rich banded iron formation. MnFeO crusts coat all the basalt clasts up to 10 mm thick but are thin (<1 mm) on the continental rocks. The basalts are the volcanic rocks of the seamount and the continental rocks are ice rafted debris. Limited pXRF was undertaken on basalt sample 006 but this is unprocessed.

The sediment catchers contained only gravel with no mud or sand. The gravel was divided into size fractions ranging from cobbles and very large pebbles (6-9 cm; 001A) to small pebbles (<1.5 cm; 001H). Most are at least partially coated in black MnFe oxide, some of which show botryoidal textures. Sample 001G contains angular clasts that are not coated in MnFeO. There are some basalt and metamorphic clasts. More processing is required to determine the lithologies of the coated clasts.

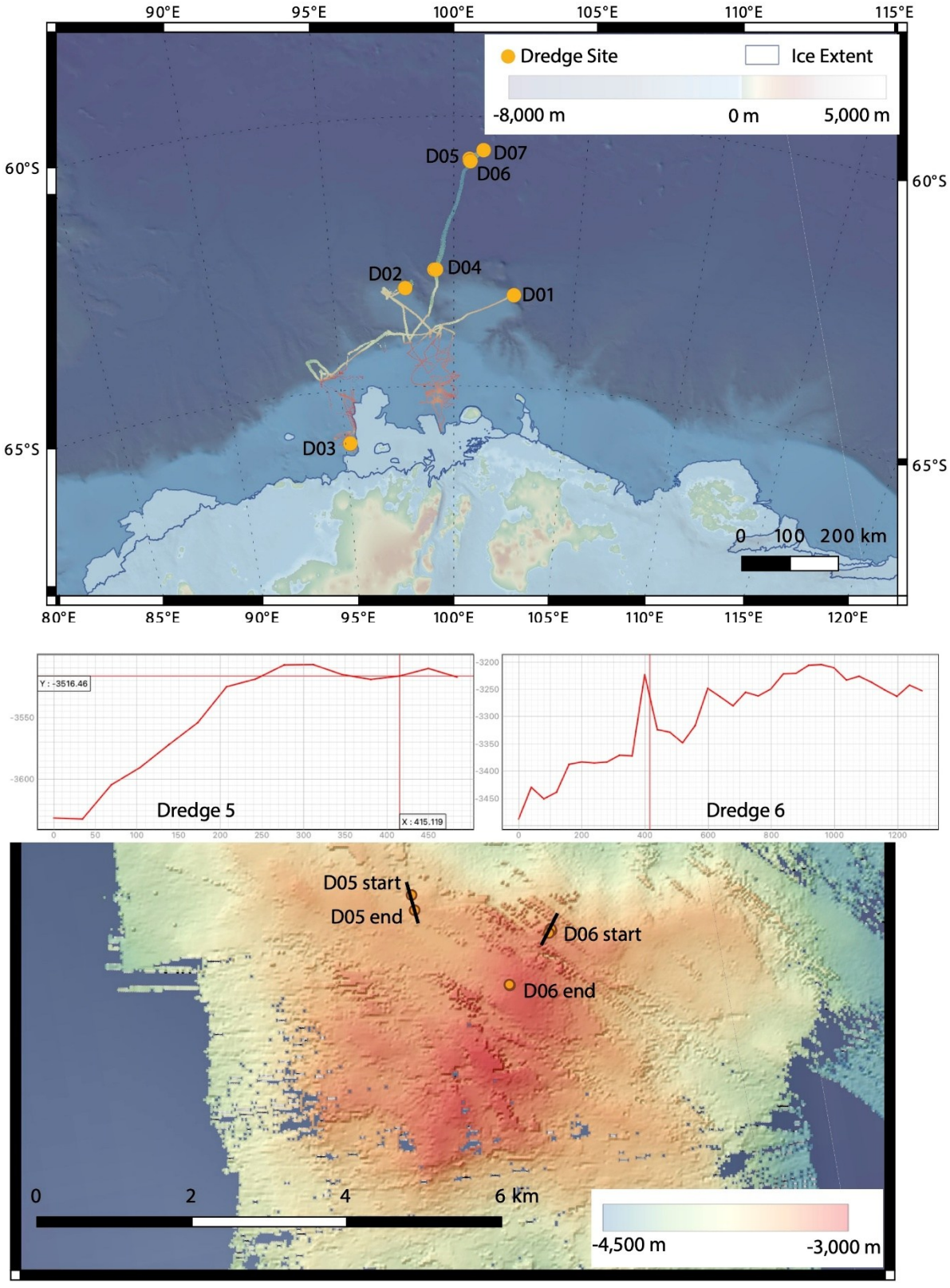


Figure 6: Top: Overview map of Denman region with ship track, and dredge sites shown over IBSCO v2 bathymetry. Bottom: Zoom in on dredge site D05 and D06, with voyage EM122 bathymetry, with inset profile of dredged slope (D05 and D06).

Dredge 6 Log

Date and Time in UTC	Latitude	Longitude	Depth (m)	Wire Out	Comment
2025-04-23 11:42:49	-60.823974	100.637869	3281.21	0 m	RD06 in water
2025-04-23 11:48:19	-60.823888	100.63764	3292.26	150 m	
2025-04-23 12:23:07	-60.823773	100.63764	3356.32	2000 m	
2025-04-23 12:50:15	-60.823808	100.637749	3359.26	3330 m	RD06 on bottom
2025-04-23 12:53:49	-60.824257	100.637237	3366.15	3400 m	start laying cable 2 kt
2025-04-23 13:10:25	-60.830348	100.628091	3250.11	4329 m	stopped at end point
2025-04-23 13:13:36	-60.830357	100.628076	3252.32	4320 m	start hauling 15 m/min
2025-04-23 13:17:32	-60.830347	100.628091	3251.54	4264 m	11.6 kt
2025-04-23 13:30:55	-60.830341	100.628085	3252.68		10.6 t peak
2025-04-23 13:32:06	-60.830355	100.628099	3249.65		10.4 t
2025-04-23 13:33:38	-60.83034	100.628075	3359.84		10.7 t
2025-04-23 13:34:23	-60.830349	100.628101	3251.47		11.7 t
2025-04-23 13:34:43	-60.830345	100.628093	3354.44		11.7 t
2025-04-23 14:11:25	-60.830335	100.628077	3254.99		multiple shortpeaks around 11 t
2025-04-23 14:19:14	-60.830345	100.628112	3266.26		13.5 14.63
2025-04-23 14:20:25	**-60.830347**	**100.628095**	3264.3		16.11 t stopped pulling i
2025-04-23 14:22:05	-60.830343	100.628072	3259.81		paying out 15 m/min for 10 m
2025-04-23 14:29:10	-60.830346	100.628057	3347.87		back to auto at 15 m/min
2025-04-23 14:45:49	-60.830343	100.628098	3252.13		off bottom
2025-04-23 15:44:47	-60.830277	100.627993	3265.08		on deck

***Use the bold location if a single dredge location is required**

Dredge 06 Sediment Samples

Sediment Sub/Sample Number	Sediment sample Bucket	Name	Comments
NUY2025-V03-145_D06-001_A	S2	gravely mud	
NUY2025-V03-145_D06-001_B	S2	5-9 cm MnFeO coated pebbles	
NUY2025-V03-145_D06-001_C	S2	3-5 cm pebbles mainly MnFeO nodules and coating but some uncoated basalt	
NUY2025-V03-145_D06-001_D	S2	2-4 cm large pebbles	
NUY2025-V03-145_D06-001_E	S2	1-3 cm MnFeO coated medium pebbles	
NUY2025-V03-145_D06-001_F	S2	1-2.5 cm pebbles	
NUY2025-V03-145_D06-001_G	S2	pebbles include angular clasts without MnFeO coatings	
NUY2025-V03-145_D06-001_H	S2	<1.5 cm gravel	

Dredge 06 Rock Samples

Sample Number	Bucket Number	Rock Name
NUY2025_V03_145_D06_002	12	red-brown altered feld+px phyric basalt
NUY2025_V03_145_D06_003	12	feldspar phyric basalt
NUY2025_V03_145_D06_004	12	large feldspar phyric basalt
NUY2025_V03_145_D06_005	12	red-brown feld phyric basalt
NUY2025_V03_145_D06_006	12	feldspar-phyric basalt
NUY2025_V03_145_D06_007	13	feld + bio +chl +qtz gneiss
NUY2025_V03_145_D06_008	13	coarse grained hornblende granodiorite
NUY2025_V03_145_D06_009	13	banded iron formation
NUY2025_V03_145_D06_010	13	K-feld + qtz + biotite + garnet gneiss
NUY2025_V03_145_D06_011	14	granitic gneiss
NUY2025_V03_145_D06_012	14	basalt
NUY2025_V03_145_D06_013	15	basalt
NUY2025_V03_145_D06_014	15	red feldspar phyric basalt
NUY2025_V03_145_D06_015	15	MnFeOxide

Dredge 6 Representative Samples

3-5 cm sized pebbles; most are coated by MnFeO (sample 001C).

Mainly uncoated angular pebble clasts from sediment catcher (sample 001_G)

Feldspar-phyric basalt (sample 002)

Feldspar+biotite+chlorite+quartz gneiss (007)

Coarse grained hornblende granodiorite (sample 008)

Banded Iron Formation (sample 009)

K-feldspar+quartz+biotite+garnet gneiss (sample 010)

Feldspar-phyric basalt (sample 014)

Dredge 07: Guyot north of Denman region

Summary

Dredge 7 was deployed on April 23rd on the northeastern flank of an un-named guyot located north of the Denman region on oceanic crust (60.6235 °S, 101.1161 °E). Station 146.

The seamount is 268 km north of the Bruce Rise. It is 6.5 km across at a depth of 2,275 m at the top and drops to the abyssal plain at 2,500 m. The seamount is a guyot with a distinctive flat top at 2,275 m. It is elongated on a N-S axis and has classic steep seamount slopes.

The dredge was up the eastern flank of the guyot over 800 m between 2,500 - 2,900 m water depth. The dredge was undertaken using a stop and drop technique, with ~1.2 x the target water depth of wire let out.

Sixteen rocks were recovered in D07. Most were basalt with one basalt breccia (011) and one sample (003) comprising a basalt clast cemented to fossiliferous limestone. Four samples are probably ice rafted debris. These include granitoids and gneiss. The basalt clasts are variably altered but feldspar phenocrysts are fresh in some. Thin MnO crusts (< 1 mm thick) are common. Very limited pXRF analysis was undertaken on basalt sample 015.

The sediment catcher contained gravel a portion of which was retained and had a size ranging from very large to small pebbles. Most are coated in some MnFe oxides.

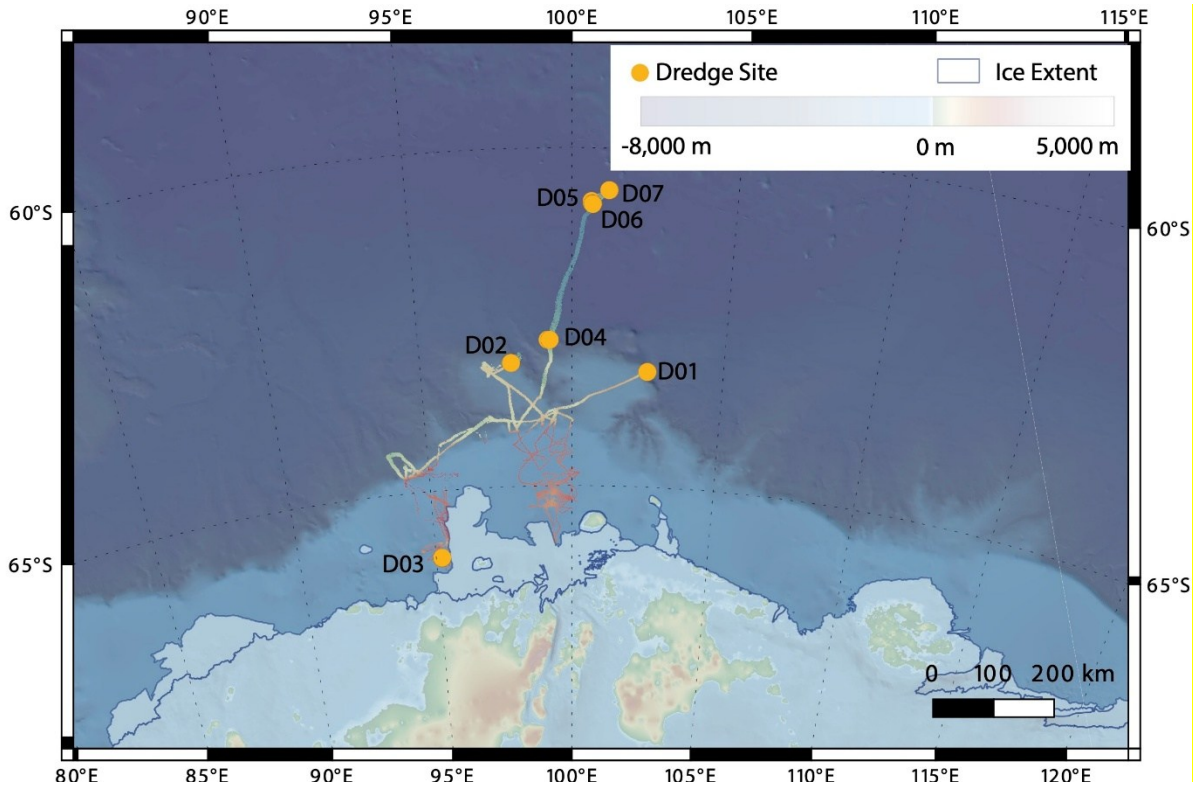


Figure 7: Overview map of Denman region with ship track, and dredge sites shown over IBSCO v2 bathymetry.

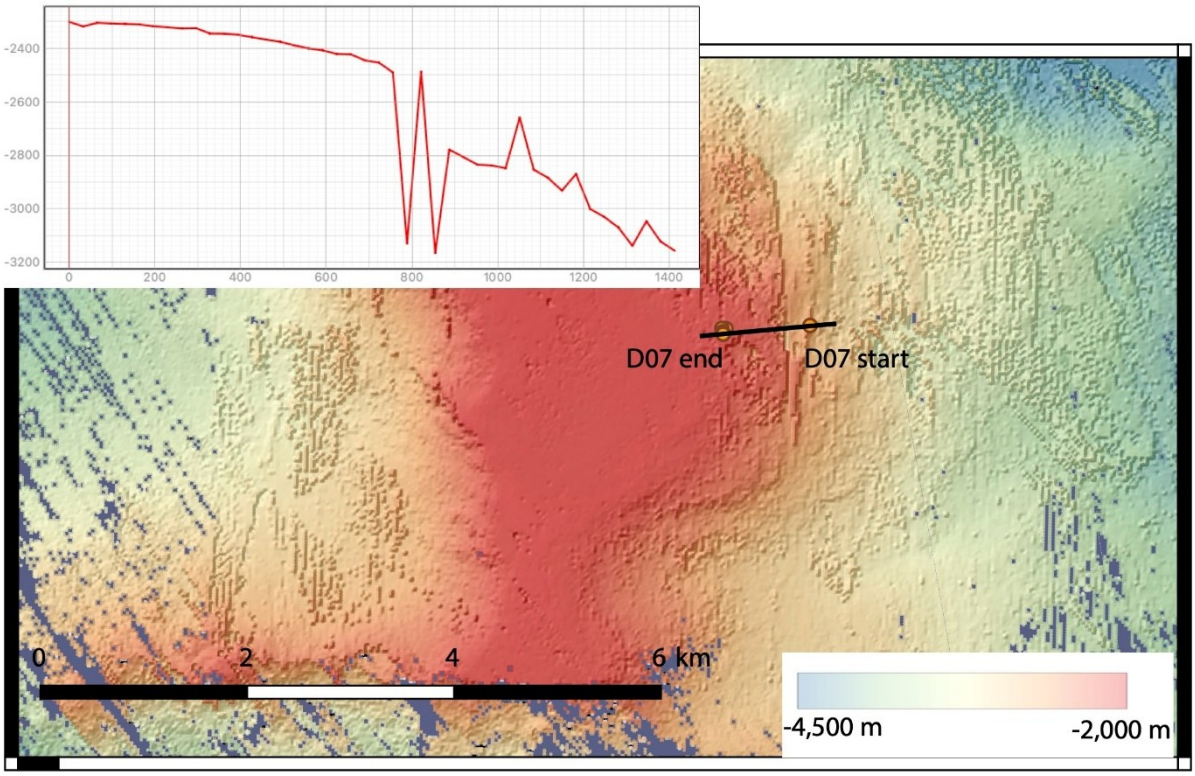


Figure 8: Zoom in on dredge site D07 with voyage EM122 bathymetry, with inset profile of D07 dredged slope.

Dredge 7 Log

Date and Time in UTC	Latitude	Longitude	Depth (m)	Wire Out	Comment
2025-04-23 22:13:33	-60.622645	101.131364	2810.57	0 m	Dredge in the water
2025-04-23 22:18:23	-60.622648	101.13133	2775.26		Handshake to sacrificial completed
2025-04-23 23:34:34	-60.623064	101.11652	2612.1	3632 m	All wire out. At pull in point.
2025-04-24 00:13:57	-60.623074	101.115811	2330.06		Spike to 10 t
2025-04-24 00:27:43	-60.623055	101.115788	2610.95		A couple of small spikes up to 10 t
2025-04-24 00:35:29	-60.623344	101.115958	2632.91		Cluster of spikes to 10.5 t
2025-04-24 00:36:53	-60.623485	101.116037	2995.7		12 t
2025-04-24 00:41:33	-60.623547	101.116067	2573.9		Build u to 15 t

2025-04-24 00:45:27	-60.623542	101.116078	2579.21		Spike to 13 t
2025-04-24 00:50:37	-60.623547	101.116127	2352.55		Spikes to 10 t
2025-04-24 00:52:57	**-60.623556**	**101.116092**	2358.09		Spikes to 15 t
2025-04-24 01:14:18	-60.623536	101.116032	2576.33		Wire out = water depth. Was probably off at the last spike

Use the bolded values if a single point is desired for plotting the dredge location

Dredge 07 Sediment Samples

Sediment Sub/Sample Number	Sediment sample Bucket	Name	Comments
NUY2025-V03-146_D07-001	S2	Grab sample of the gravel from the sediment catcher include basalt, granite and gneiss. All coated with some MnFeO.	

Dredge 07 Rock Samples

Sample Number	Bucket Number	Rock Name
NUY2025_V03_146_D07_002	15	reddish purple altered basalt
NUY2025_V03_146_D07_003	15	limestone basalt clast
NUY2025_V03_146_D07_004	15	altered basalt
NUY2025_V03_146_D07_005	15	basalt
NUY2025_V03_146_D07_006	15	px-phyric basalt
NUY2025_V03_146_D07_007	15	pink alkali feldspar granite
NUY2025_V03_146_D07_008	15	px-phyric basalt
NUY2025_V03_146_D07_009	15	basalt
NUY2025_V03_146_D07_010	15	chl+ser altered pyroxene phyric basalt
NUY2025_V03_146_D07_011	16	scoriaceous basalt breccia
NUY2025_V03_146_D07_012	16	basalt
NUY2025_V03_146_D07_013	16	hornblende granodiorite
NUY2025_V03_146_D07_014	16	basalt
NUY2025_V03_146_D07_015	16	basalt
NUY2025_V03_146_D07_016	16	granitic gneiss
NUY2025_V03_146_D07_017	16	foliated diorite

Dredge 7 Representative Samples

Sediment catcher sample (001)

Limestone with basalt clasts (003)

Basalt (sample 012)

Granitic gneiss (sample 016)