**Week 6 Drilling and Scientific Report for IODP Expedition 347 Baltic Sea Paleoenvironment**

**18th October 2013 – 24th October 2013**

## 1. Hole summary

| Hole | M0063E | M0064A | M0064B | M0064C | M0064D | M0065A | M0065B |
|---|---|---|---|---|---|---|---|
| **Latitude** | 58°37.330' N | 55°43.273' N | 55°43.284' N | 55°43.262' N | 55°43.267' N | 55°28.094' N | 55°28.104' N |
| **Longitude** | 18°15.240' E | 15°13.585' E | 15°13.586' E | 15°13.584' E | 15°13.585' E | 15°28.631' E | 15°28.638' E |
| **First core** | 17th October 00:40 | 20th October 16:05 | 21st October 16:35 | 21st October 19:50 | 22nd October 16:40 | 23rd October 18:40 | 24th October 23:10 |
| **Last core** | 19th October 05:30 | 21st October 12:50 | 21st October 18:35 | 22nd October 14:50 | 23rd October 07:45 | 24th October 13:15 | 24th October 23:30 |
| **Cores recovered** | 43 | 32 | 4 | 35 | 21 | 29 | 1 |
| **Drilled length (Coring)** | 91.5m | 41.5m | 7.2m | 43m | 30.1m | 45.3m | 3.3m |
| **Drilled Length (Open Hole)** | 1.3m | N/A | 3.0m | 2.0m | 11.1m | 18.3m | 3.0m |
| **Recovered length** | 127.68m | 29.59m | 7.14m | 37.81m | 27.04m | 47.96m | 3.62m |
| **Core recovery** | 139.54% | 71.30% | 99.17% | 87.93% | 89.83% | 105.87% | 109.7% |
| **Final depth** | 92.8m | 41.5m | 10.2m | 45.0m | 41.2m | 63.6m | 6.3m |
| **Hole recovery** | 137.59% | 71.30% | 70.00% | 84.02% | 65.63% | 75.41% | 57.46% |

## 2. Science

At the start of the week we were coring Hole M0063E at Station BSB-9 in the Landsort Deep. This fifth hole at the site was a dedicated microbiology and geochemistry hole with a large and diverse sampling program due to the many requests. Due to the many different sample types and intervals the sampling was carefully pre-planned according to the lithostratigraphic and interstitial water chemistry information gained from previous holes. Once labelled, the samples were transferred from the core reception container to the microbiology container where they were further subsampled, with some transferred to gas-tight anaerobic bags, and stored at either +4°C for live samples or -80°C for frozen samples. The total number of individual samples taken from Hole M0063E for microbiology and geochemistry was about 1500 sediment samples and 50 interstitial water samples.

Down through the methane super-saturated gyttja- clay and glacial clay we had adapted a special coring strategy for the highly expanding cores so that the core liner had the capacity to retain up to 80% core expansion without loss of core material. Exactly how high the methane concentration was is not known due to partial degassing of the methane before syringe sampling. The microbiology sampling of Hole M0063E ended at 93mbsf where the transition between the glacial clay and compacted till occured. It was later realised that sediment from the upper section of cores collected in the depth interval of 40 to 70mbsf was partly contaminated with seawater. In order to ensure non-contaminated backup samples, that part of the microbiology sub-sampling scheme was repeated, with samples taken from section 2 of the affected cores.

After a day of transit we arrived at Station BSB-5 in the Hanoe Bay and started to drill the first paleoceanographic hole, Hole M0064A. In this and in the following holes at BSB-5 there was only one meter or less of Holocene sediment on top of brown, partly varved glacial clay. At 12 mbsf the clay shifted to sandy clayey diamicton and from 13 mbsf the diamicton also included some gravel and was very compacted and hard. Such a sequence is typical for the lowermost, proximal part of a glacial clay sequence. At 16 mbsf a different type of diamicton was collected which had a greenish-

gray colour and contained only metamorphic and crystalline bedrock fragments. This material continued down to about 35 mbsf below which well sorted sand or gravel was collected. The cretaceous bedrock was reached at 42-45 mbsf in the different holes and pieces of the bedrock were recovered before the drilling ended. The last hole on this station, Hole M0064D, was cored through the glacial clay followed by open holing part of the way down through the diamicton to bedrock.

Interstitial water was obtained at Station BSB-5 only in the glacial clay down to 12-15 mbsf. No IW could be drawn from the highly compacted diamicton below that depth. The IW chemistry showed a moderate salinity maximum at 6-8 mbsf, a low alkalinity that decreased with depth, and a similarly low ammonium concentration that increased with depth. The data show that organic matter mineralization proceeds only at very low rates in the organic-poor glacial clay.

During the drilling at Station BSB-5, the quantification of microbial cells in samples taken at former sites progressed. The first data on cell numbers were available for Station BSB-1 south of Anholt. These data were based on two independent sets of samples and were quantified by two different approaches, both based on fluorescent DNA staining of the cells. One set of samples was stained with acridine orange and cells were counted under the fluorescence microscope. Another set of samples was stained with SYBR Green and cells were counted by flow cytometry. The two approaches yielded very similar data. Cell numbers were very low in the top six meters of well sorted sand while cell numbers were very high in the Holocene and glacial clay below that depth and down to the sand layers starting at 85 mbsf. We believe that this is the first time that such a comparison of cell numbers is made on an IODP expedition and find the results very promising for future offshore routine cell counts.

After Station BSB-5, the *Greatship Manisha* made the transit to Station BSB-7 northeast of the island Bornholm to drill Holocene and late Weichselian sediment. In hole M0065A, the sediment below 2 mbsf consisted of homogenous greenish-gray Holocene gyttja-clay containing fragments of bivalve shells, abundant benthic foraminifera, and organic remnants. At 13-14 mbsf the sediment changed from gray to light-brown homogenous clay. Further down, at 16 mbsf, a small portion of sand was recorded in the clay. The clay remained relatively soft and uniform down to 40 mbsf where a hard layer was encountered for the first time. The following six meters consisted of clay with varying amounts of sand below which the sediment changed to well sorted sand. We cored down through sand to 68 mbsf where the sediment changed to sandy silt and became more like a diamicton. At 74 mbsf the cretaceous bedrock was reached. Coring continues on this station with a Hole M0065B for paleoceanography and a Hole M0065C for microbiology.

**3. HSE and Environmental Activities**
N/A

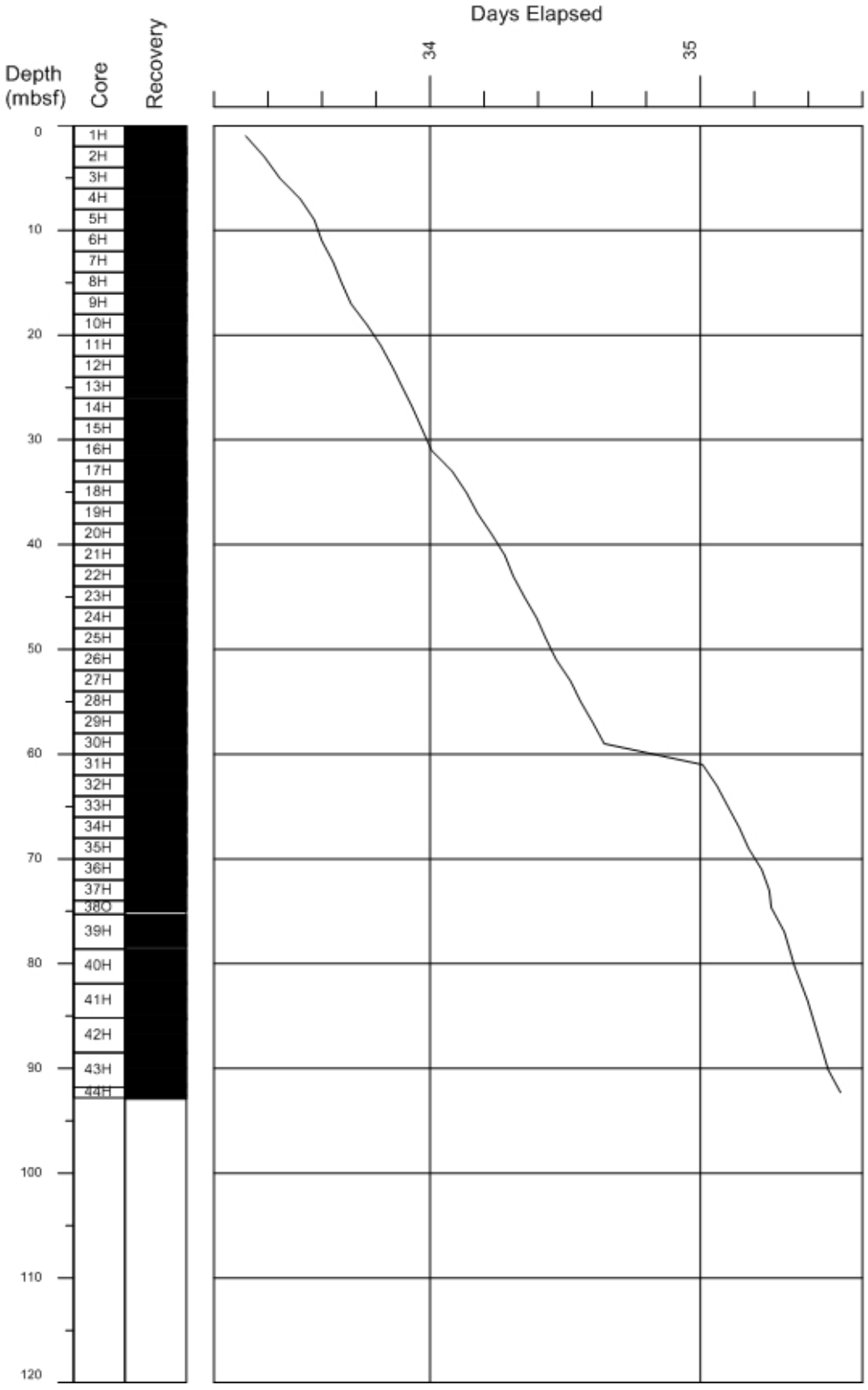
**4. Figures**
Figure 1 – Recovery and depth versus time plot at Hole M0063E
Figure 2 – Recovery and depth versus time plot at Hole M0064A
Figure 3 – Recovery and depth versus time plot at Hole M0064B
Figure 4 – Recovery and depth versus time plot at Hole M0064C
Figure 5 – Recovery and depth versus time plot at Hole M0064D
Figure 6 – Recovery and depth versus time plot at Hole M0065A
Figure 7 – Recovery and depth versus time plot at Hole M0065B
Figure 8 – Breakdown of hours, up to 24:00 hrs on the 24$^{th}$ October.

Photos of the week.

# IODP Expedition 347

# Hole 63E progress summary

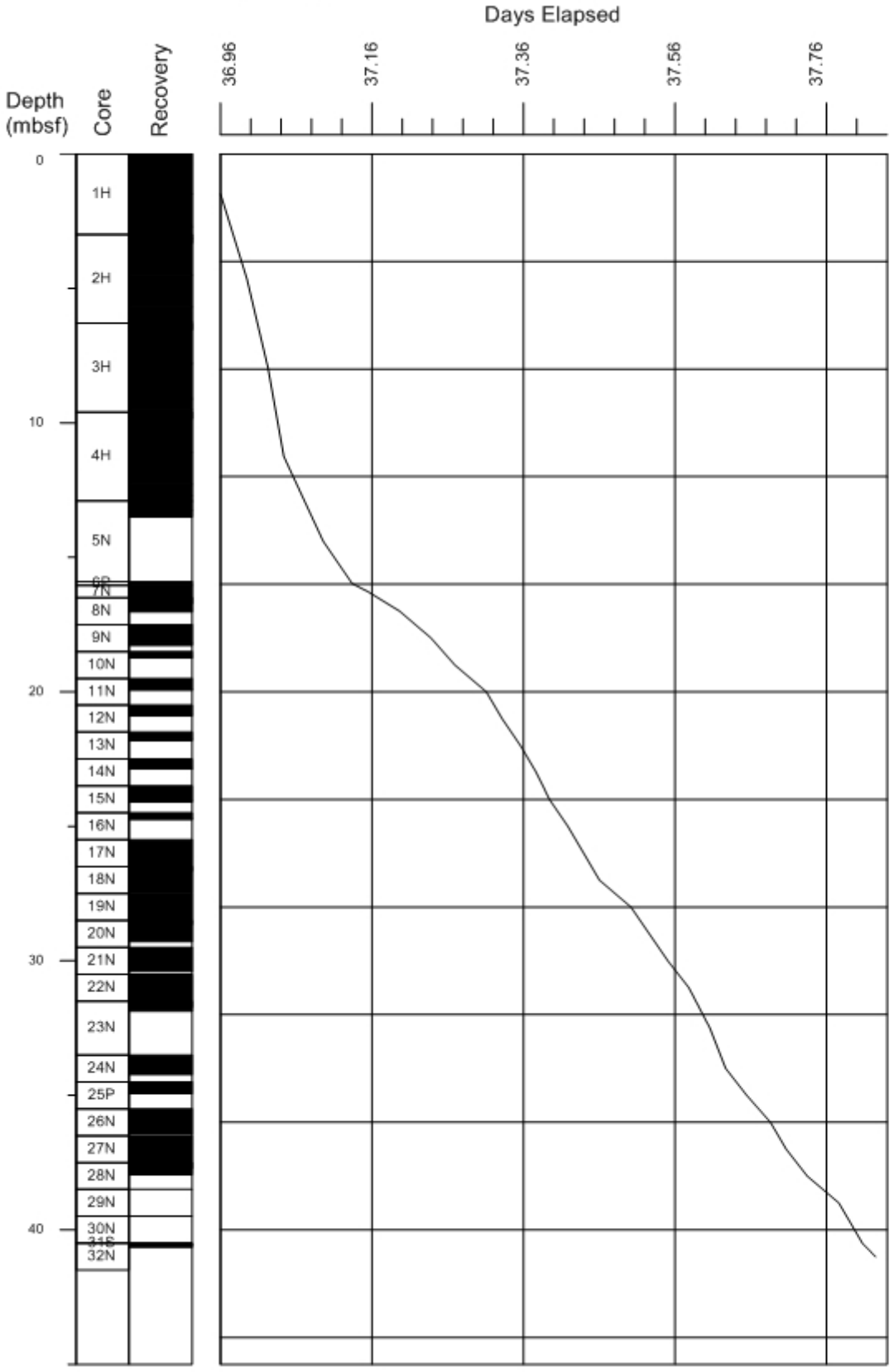
Latitude: 58° 37.330 N
Longitude: 18° 15.240E
Water depth: 437.1 m



# IODP Expedition 347

## Hole 64A progress summary

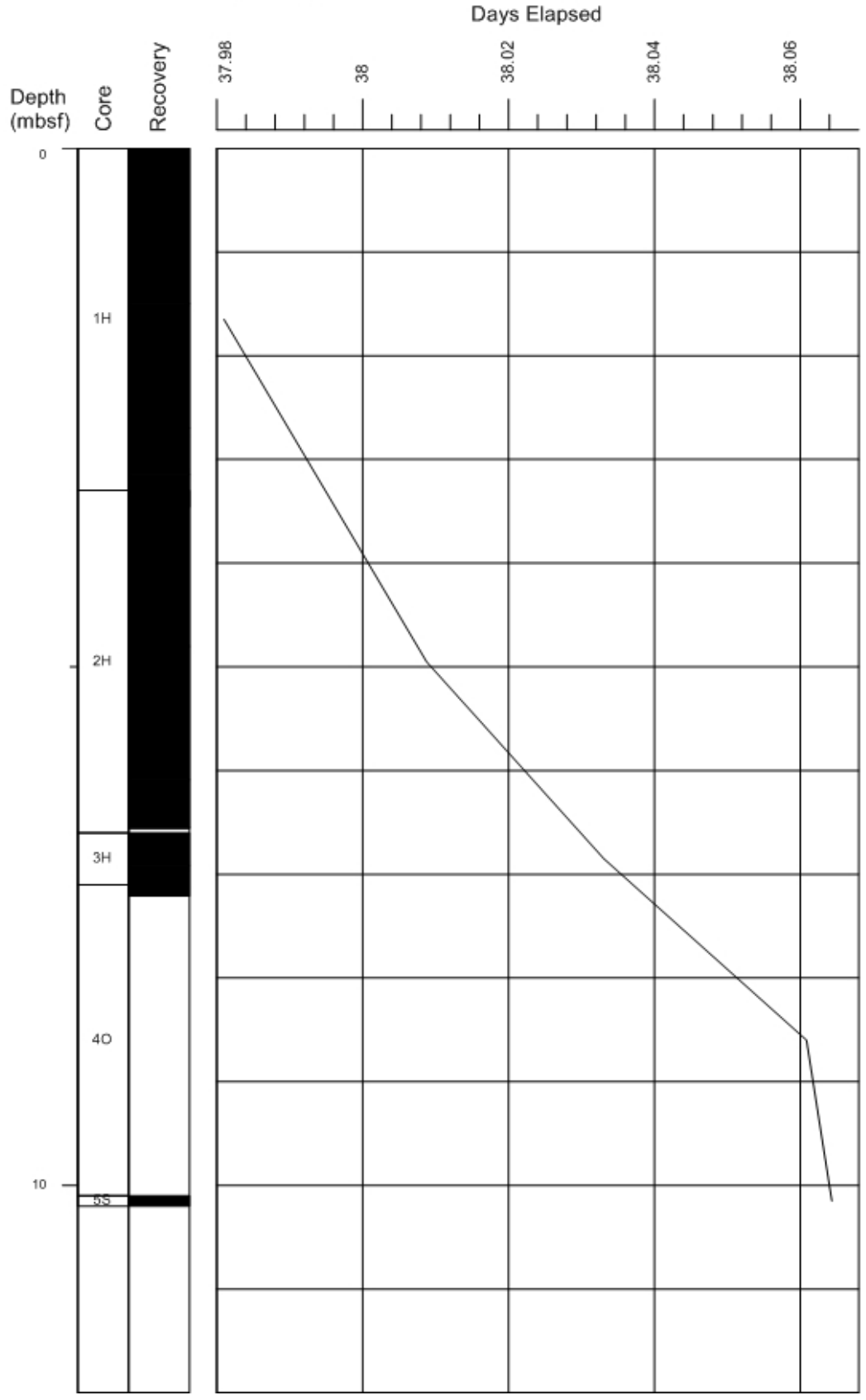
Latitude: 55° 43.273 N
Longitude: 15° 13.585 E
Water depth: 60.5 m



# IODP Expedition 347

## Hole 64B progress summary

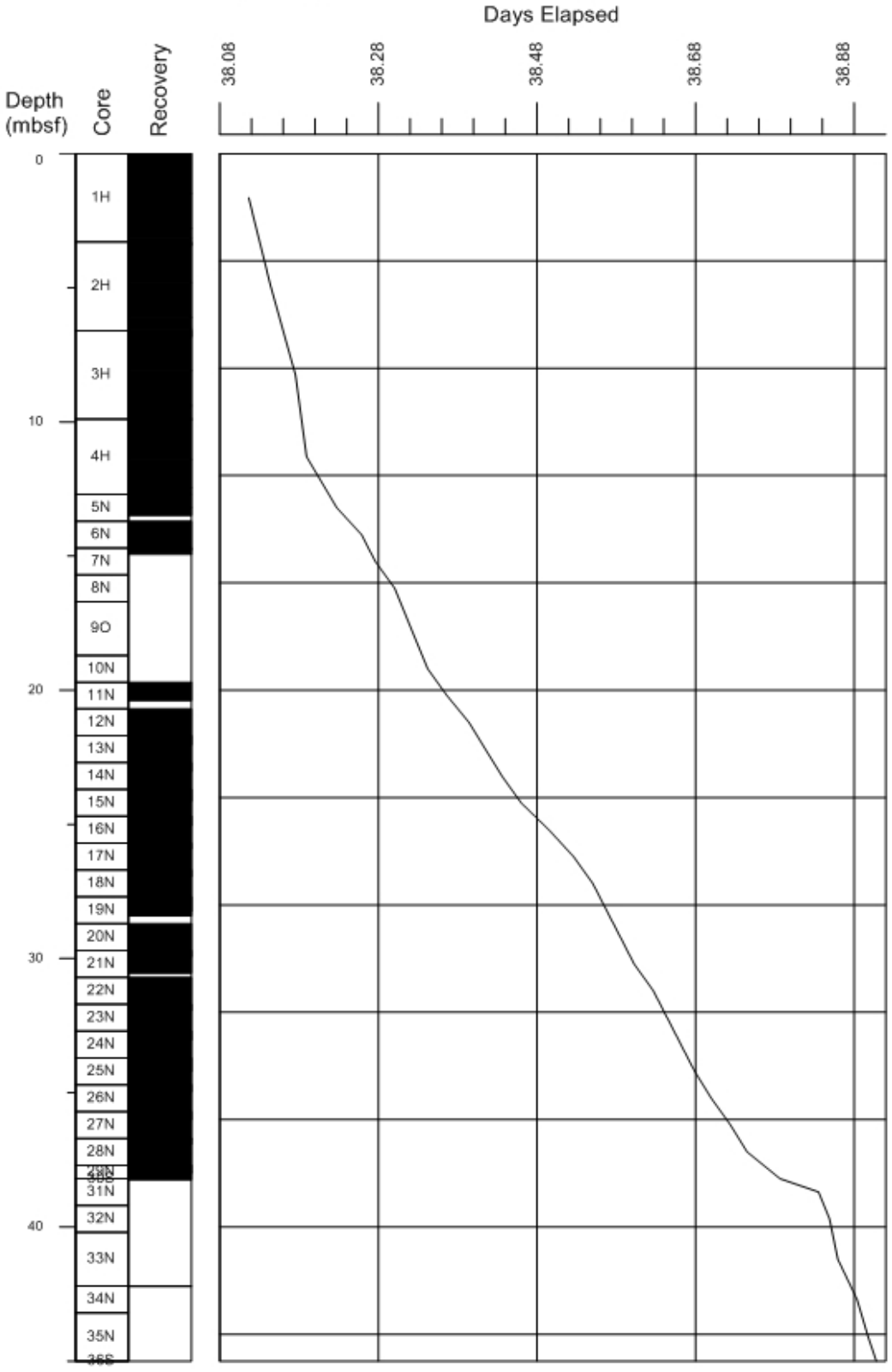
Latitude: 55° 43.284 N
Longitude: 15° 13.586 E
Water depth: 59.8 m



# IODP Expedition 347

# Hole 64C progress summary

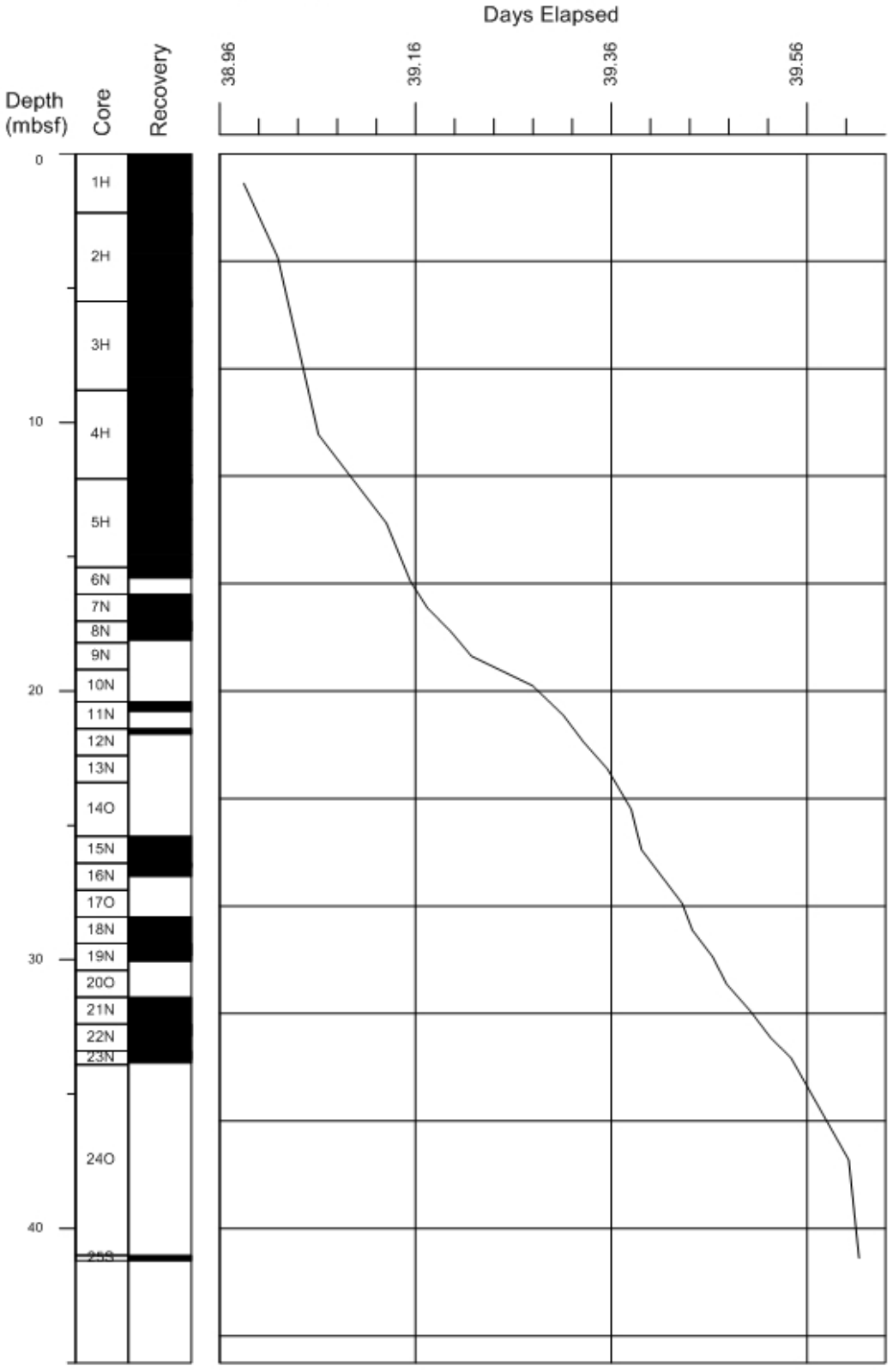
Latitude: 55° 43.262 N
Longitude: 15° 13.584 E
Water depth: 59.8 m



# IODP Expedition 347

## Hole 64D progress summary

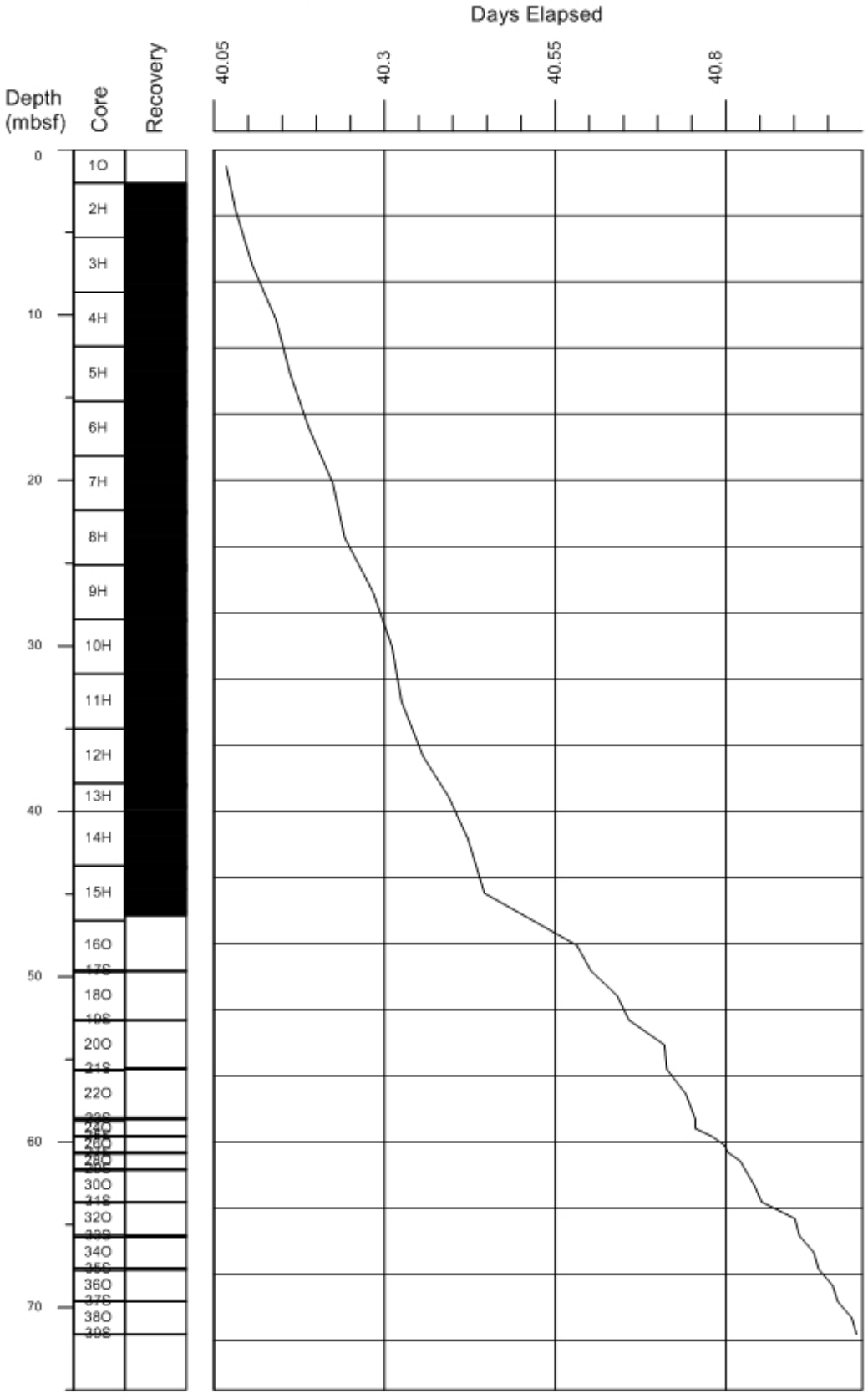
Latitude: 55° 43.267 N
Longitude: 15° 13.585 E
Water depth: 59.8 m



# IODP Expedition 347

## Hole 65A progress summary

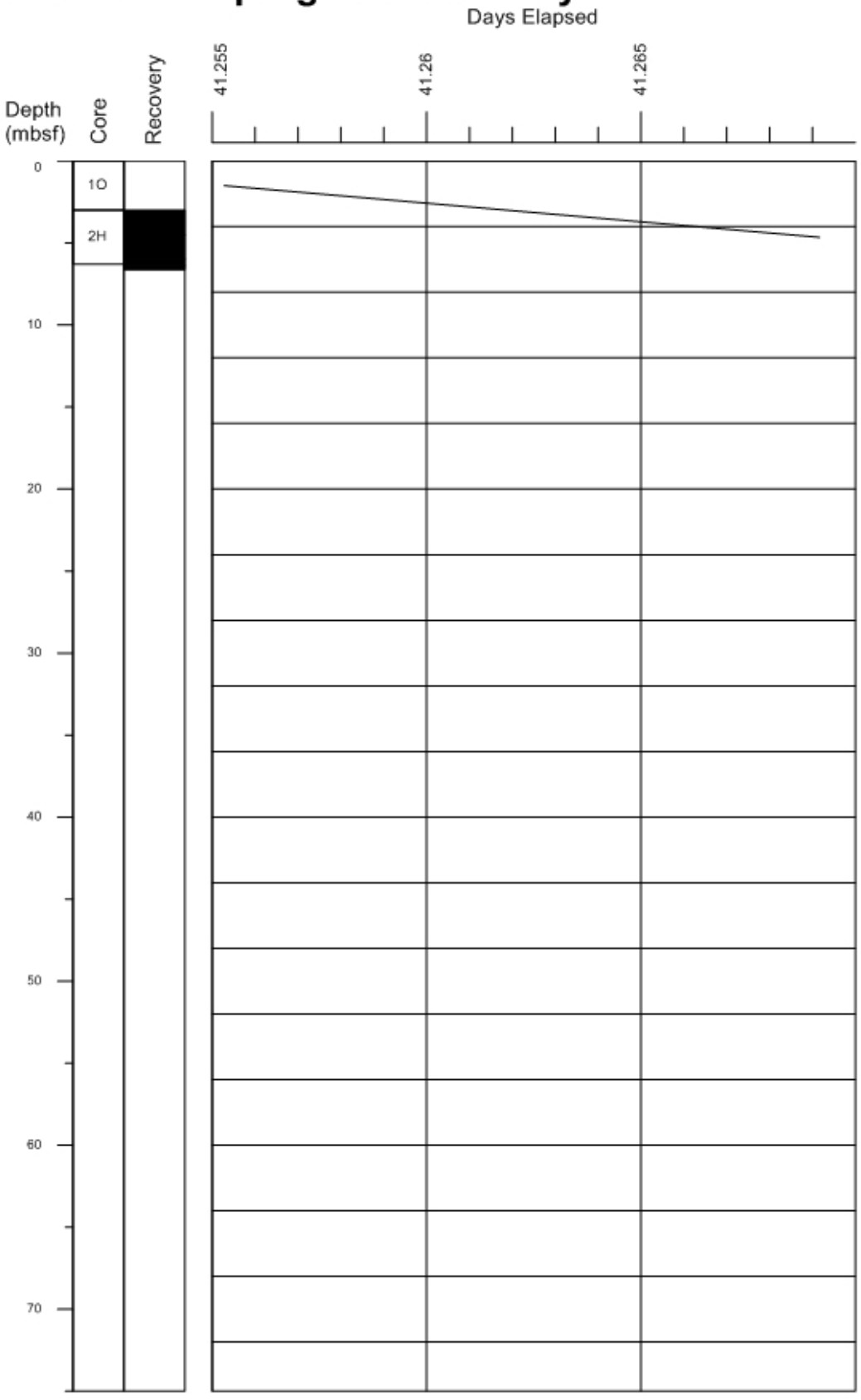
Latitude: 55° 28.094 N
Longitude: 15° 28.631 E
Water depth: 84.3 m

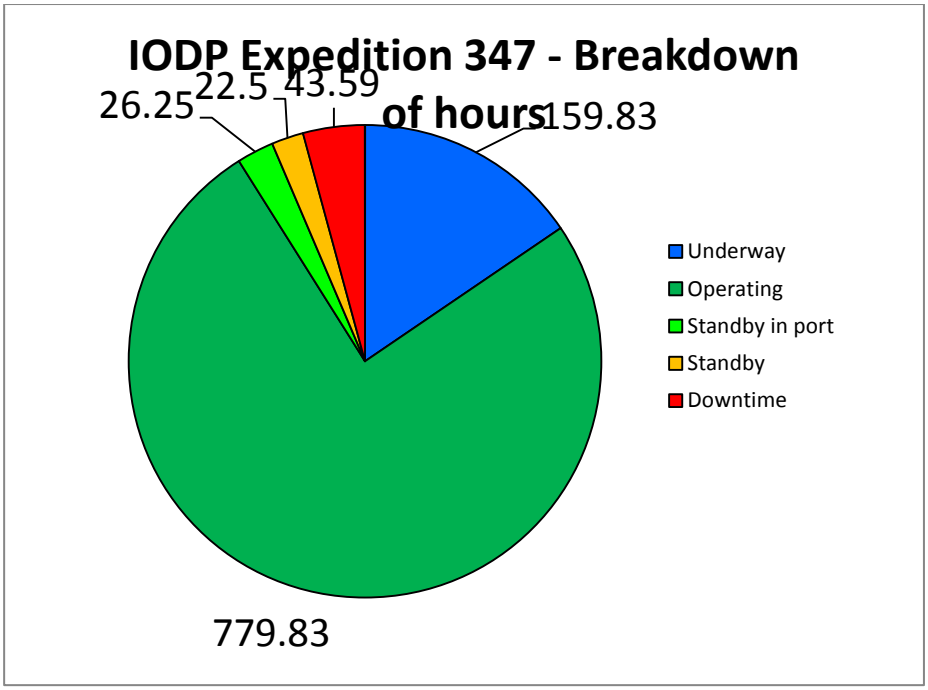


# IODP Expedition 347

## Hole 65B progress summary

Latitude: 55° 28.2094 N
Longitude: 15° 28.631 E
Water depth: 84.3 m






Photos of the week

Nadine Quintana Krupinski©ECORD_IODP

Recovery of granite fragments and chalk bedrock. David Smith©ECORD_IODP

ROV survey observers. Carol Cotterill©ECORD_IODP

Carol Cotterill©ECORD_IODP