

19<sup>th</sup> September 2013 – 26<sup>th</sup> September 2013

## 1. Hole summary

Hole	M0059C	M0060A
Latitude	55° 0.2898' N	56° 37.211' N
Longitude	10° 6.4697' E	11° 40.243' E
First core	19/09/2013	23/09/2012
Last core	22/09/2013	N/A
Cores recovered	45	64
Drilled length (Coring)	58.95 m	163.7 m
Drilled Length (Open Hole)	52.91 m	13.6 m
Recovered length	57.94 m	138.83 m
Core recovery	98.3 %	84.8 %
Final depth	154.05 m	175.4 m (Midnight on the 26 <sup>th</sup> )
Hole recovery	67.7 %	N/A

## 2. Science

At the start of the week Expedition 347 was drilling down through glacial till at Site BSB-3 in Hole M0059C. The upper part of this hole, down to 83 mbsf, consisted of Holocene mud and post-glacial clay and had been used for microbiology and geochemistry sampling. The deeper part of the hole was not useable for this purpose due to the lithology and drilling disturbance of the mixed sand and gravel. In order to retrieve samples in the harder parts of this diamicton, large intervals were sampled by alternating hammer coring and down holing at 1.5 m or 3 m intervals. Softer layers of sand and silty clay were piston cored.

In conclusion for this station, we had a highly resolved record of the Holocene mud that extended down to almost 50 mbsf. Below that depth followed 5 m of postglacial clay on top of a 25 m thick unit of glacial clay, partly varved, and then till. The occurrence of varved glacial clay indicates that the Lille Bælt area has at some stage experienced fresh or just slightly brackish water conditions during late glacial. The slow but consistent sampling of the diamictic layers resulted in a >50 m deep highly resolved sequence of glacial till alternating with well sorted sand and gravel, with sampling for OSL dating at regular depth intervals. The till continued down to the basement of limestone at 169 mbsf. As the following 35 m of drilling returned only limestone it was decided not to go deeper although the planned depth was 275 mbsf. It can be concluded from the recovered sediment sequence between c. 83 mbsf and basement that the different till beds interlayered with sand and gravel indicates that the area has alternated between being covered by glaciers or acting as a pathway for running water.

The Greatship Manisha left Station BSB-3 on September 21<sup>st</sup> and started the transit to BSB-1 in the Kattegat, southeast of Anholt. Upon arrival in the early morning of September 22<sup>nd</sup> a video survey was first made of the seafloor at the three potential coring sites in order to check for potentially hazardous objects. The first two piston cores in Hole M0060A returned well sorted sand. Below that depth followed a deep sequence of rather stiff Holocene marine clay. The colour changed with depth from lighter to darker gray with mottled black at intervals around 60 mbsf where a dropstone was found. More sandy layers started to occur within the clay between 80 and 95 mbsf, below which depth the clay continued with a higher diversity of foraminifera and shells and shell fragments, e.g. of the gastropod, *Turritella*, and the bivalve *Portlandia arctica*. The occurrence of the latter indicates an Early to Mid Weichselian age of the sediment

sequence, probably deposited in a high energy environment possibly in shallow waters close to the shoreline. The sand layers had high hydraulic pressure and formation water with suspended sand was pushed up through the drill pipe. Altogether, this was a difficult sequence to drill. Hammer coring was tried with little return. A large granite stone was finally broken at 114 mbsf where the deposit was estimated to be of Early Weichselian age based on shell fragments and other evidence.

From 118 mbsf down to 185 mbsf the sediment recorded was a silty sand - pure sand - silty or sandy clay - clayey sand. This grain size succession, together with the composition of the fossil findings of both foraminifers and mollusks indicates that the depositional environment went from shallow water to deeper water conditions and then back to more shallow waters. Preliminary analyses of interstitial water chemistry indicates a minimum salinity of 9‰ in the middle of an interval of well-sorted sand at 100-145 mbsf. Below that salinity increased again, reaching a maximum of c. 20‰ in the interval between 155-175 mbsf. From there the salinity shows a decreasing trend.

### **3. HSE and Environmental Activities**

On Saturday 21<sup>st</sup> 2 journalists joined the *Manisha* for the day, accompanied by an ESO representative.

### **4. Figures**

Figure 1 – Recovery and depth versus time plot at Hole M0059C (up to conclusion of hole).

Figure 2– Recovery and depth versus time plot at Hole M0060A (Up to 24:00 on 26<sup>th</sup> September)

Figure 3. Breakdown of hours, up to 24:00 hrs on 26<sup>th</sup> September.

Photos of the week.

IODP Expedition 347

Hole 59C progress summary

Latitude: 55° 0.2898 N  
Longitude: 10° 6.4697 W  
Water depth: 31.2 m

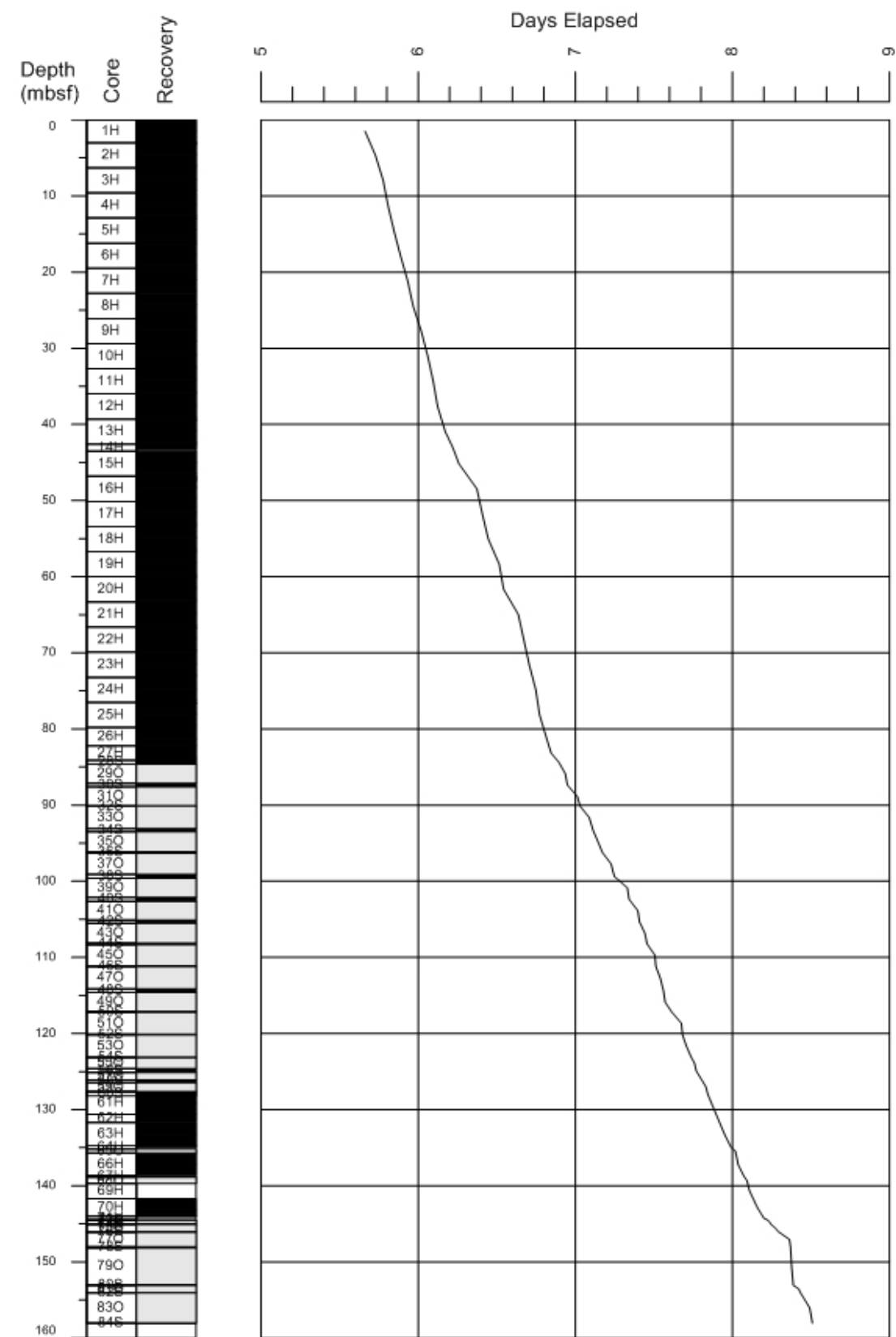


Figure 1 Recovery and depth versus time plot at Hole M0059C

# IODP Expedition 347

## Hole 60A progress summary

Latitude: 56° 37.211 N  
Longitude: 11° 40.257 W  
Water depth: 31.2 m

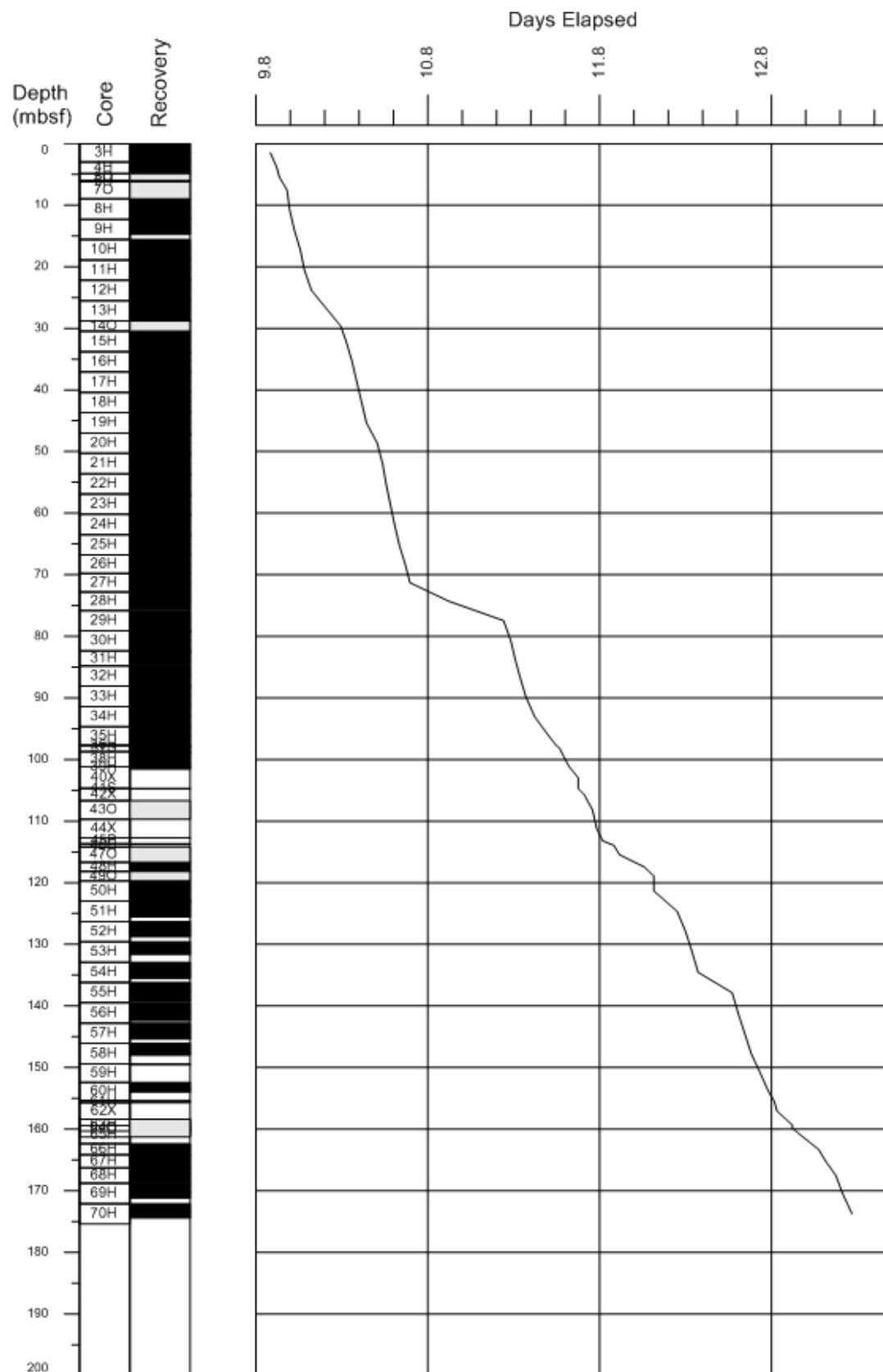


Figure 2 Recovery and depth versus time plot at Hole M0060A

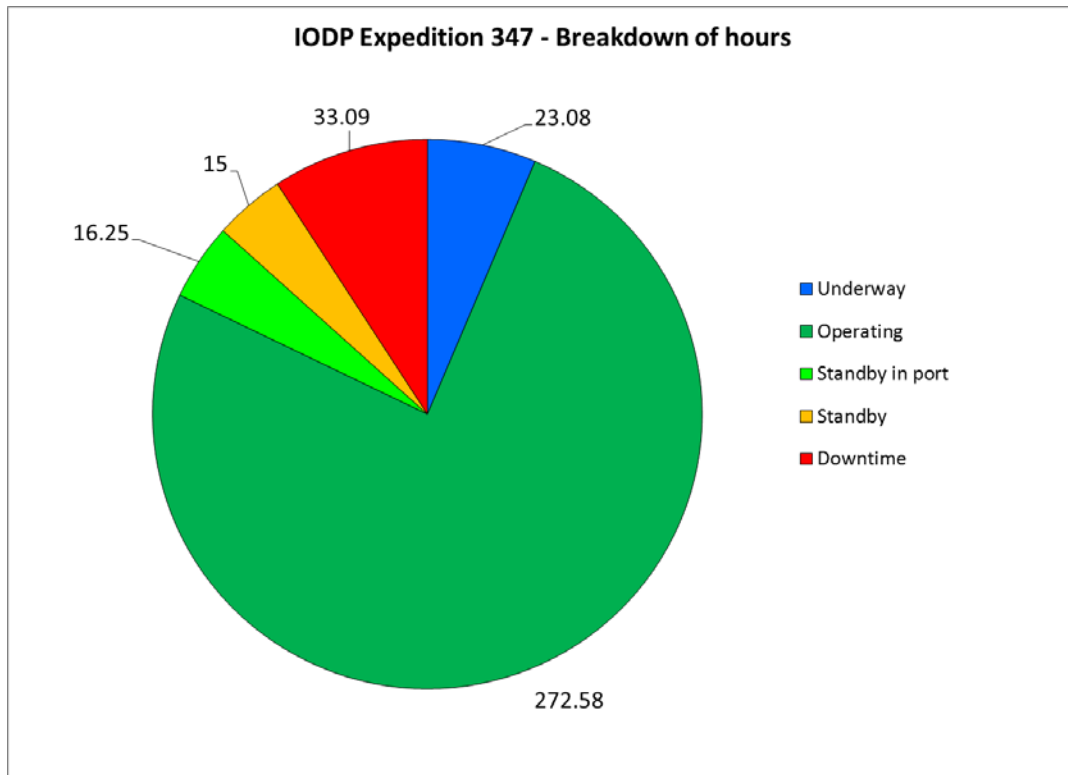
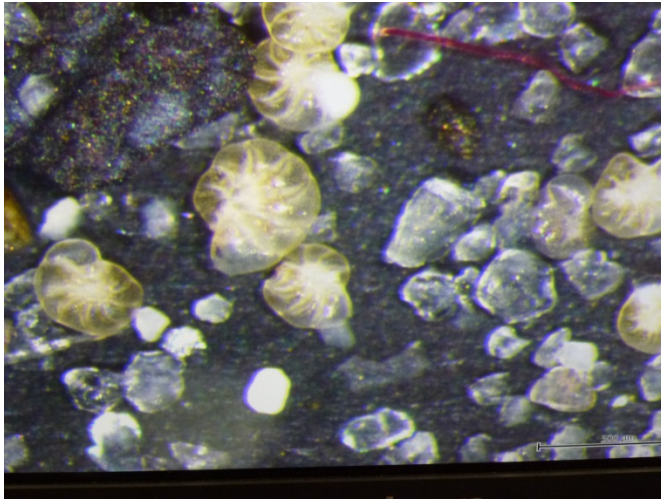


Figure 3 Breakdown of hours, up to 24:00 hrs on 26<sup>th</sup> September.



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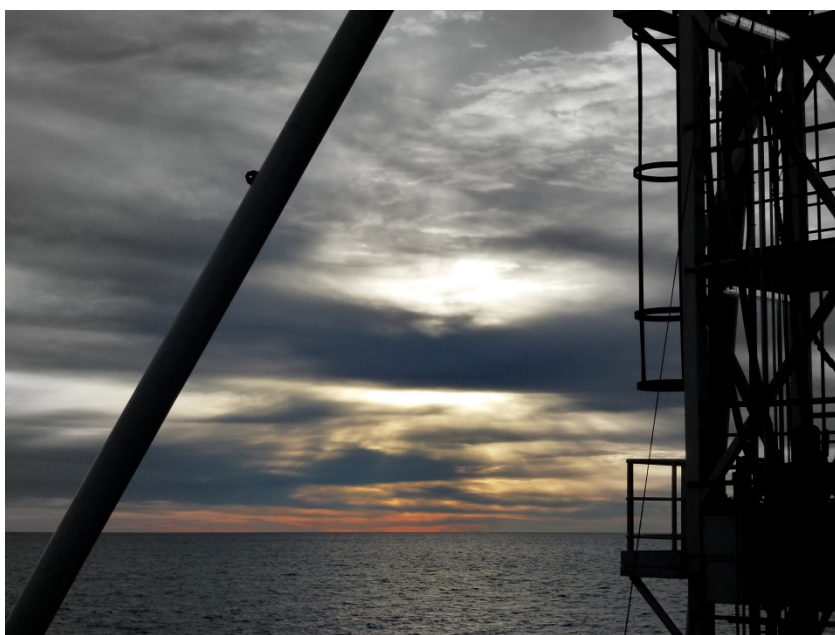


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