

# Sedimentary changes in Baffin Bay since the last glaciation: the case of the Home Bay trough mouth fan

Yan Lévesque<sup>1</sup>, Guillaume St-Onge<sup>1</sup>, Patrick Lajeunesse<sup>2</sup>

<sup>1</sup> Institut des sciences de la mer de Rimouski (ISMER), Canada Research Chair in Marine Geology, Université du Québec à Rimouski and GEOTOP

<sup>2</sup> Département de géographie and Centre d'études Nordiques, Université Laval



## Introduction

Baffin Bay is an oceanic basin located between Baffin Island and Greenland. It is about 1400 km long and 550 km wide with a depth of up to 2300 m. It is located at the margin of the former Laurentide Ice Sheet (LIS), which covered a vast area of North America during the last glaciation. In this study, we measure the physical, magnetic and sedimentological properties of tree cores collected at 1220 m (AMD16-LGM-09), 1076 m (AMD0217-01) and 1153 m (HU2013-029-077) in Baffin Bay on board of the CCGS Amundsen and Hudson in order to determine the stratigraphy and sedimentary processes linked to the dynamics of the last glaciation and deglaciation. Sedimentary record in these TMFs, is of great interest to reconstruct advances and retreats of LIS and if the later has reached the shelf edge during the last glaciation.

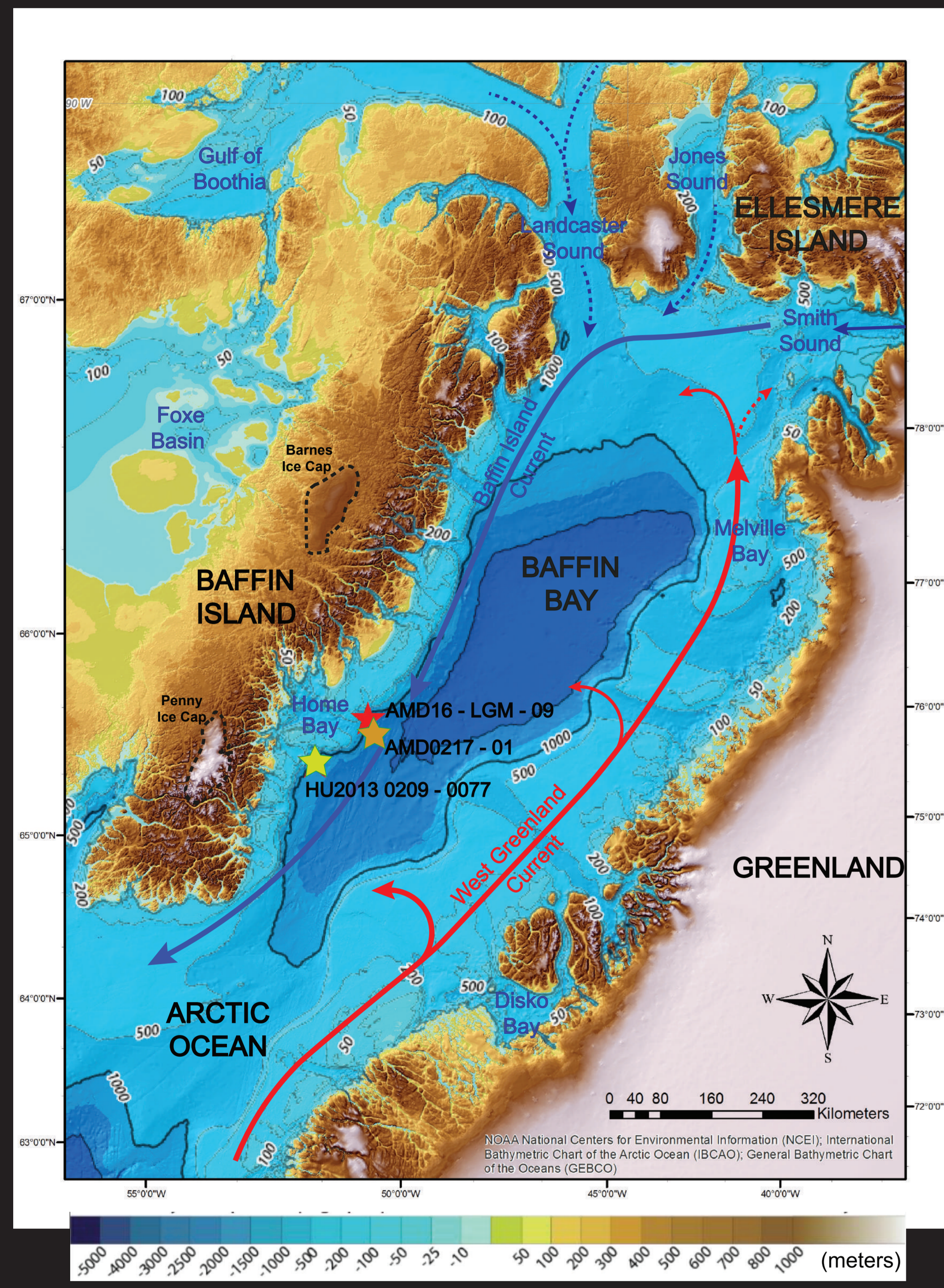


Figure 1 : Map of Baffin Bay and 3 cores taken from the continental rise of the coast of Baffin Island

## Methodology

**MSCL**

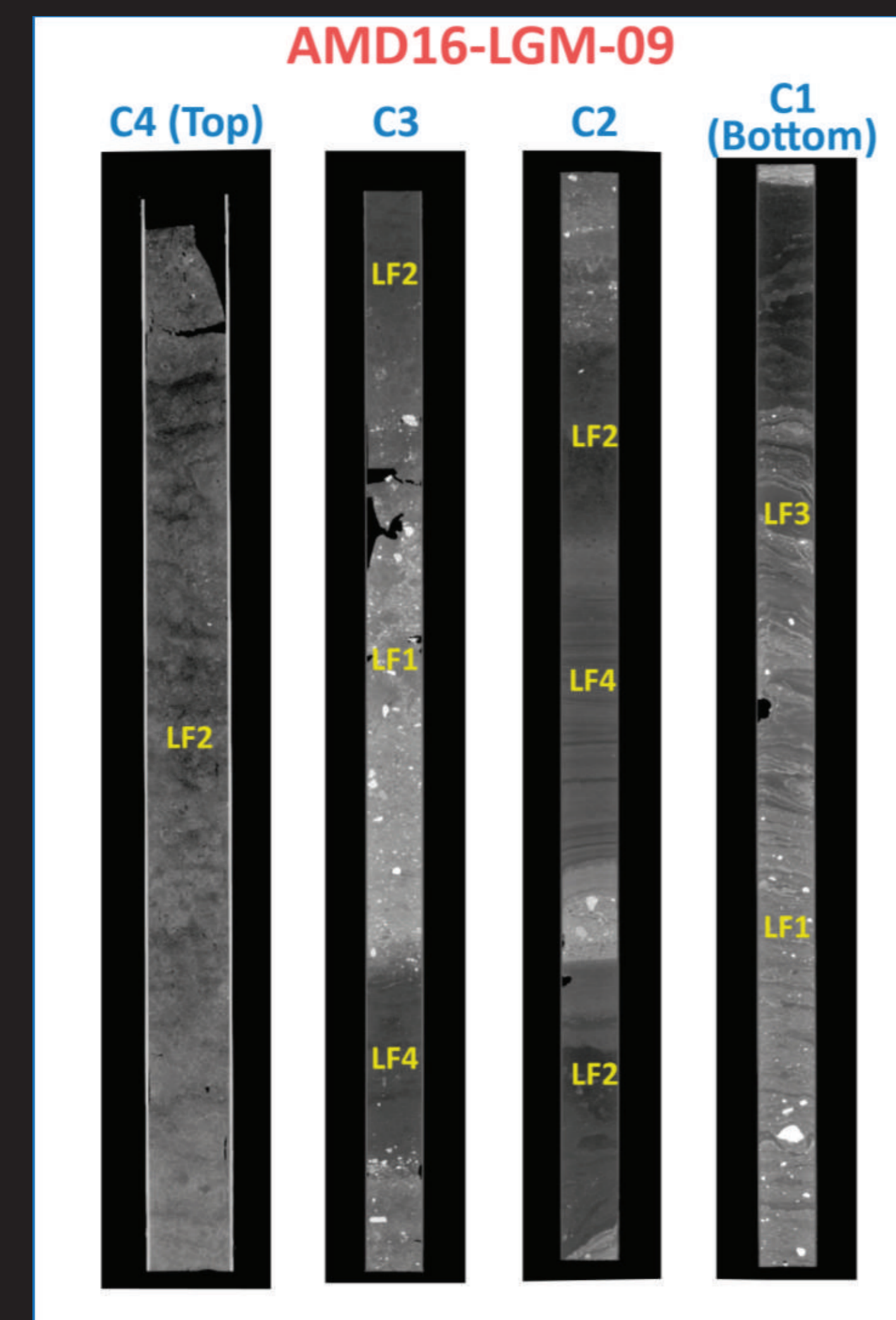
**Cryogenic magnetometer**

**Grain size analysis**

**Sediments cores**

Magnetic susceptibility and density were measured using a GEOTEK Multi Sensor Core Logger. CT scanning of u-channel samples allowed visualization of sedimentary structures. The particle size analysis was performed by laser diffraction using a Beckman Coulter LS-13320, while the paleomagnetic data was acquired with a 2G Enterprises u-channel cryogenic magnetometer.

## Lithofacies of a TMF



**Lithofacies 1 :** Massive, matrix-supported diamict facies → Glaciogenic debris flows (Glacial environment)  
**Lithofacies 2 :** Bioturbated mud with occasional scattered clasts → Hemipelagic sedimentation (deglacial/postglacial)  
**Lithofacies 3 :** Stratified pebbly mud → Hemipelagic sedimentation with frequent IRD (deglacial/postglacial)  
**Lithofacies 4 :** Laminated mud → Hemipelagic sedimentation (postglacial)

## Results

**• Paleomagnetic results**  
 Preliminary paleomagnetic results from u-channel samples reveal that the sediments from Home Bay are composed of a strong, well-defined (MAD <5°), single component magnetization characterized by median destructive fields varying between 20-30 mT, indicating that the magnetization is carried by low coercivity minerals such as magnetite. In addition, except in coarse intervals or intervals rich in detrital carbonates, the inclination records calculated from principal component analysis are oscillating around the expected value (GAD) for the latitude of the site and indicate that paleomagnetic secular variation (inclination, declination) and relative paleointensity can be reconstructed for the different cores.

These paleomagnetic changes and preliminary radiocarbon dating indicate that core HU2013-029-077 may span the last 41 ka cal BP, providing the initial chronostratigraphic framework.

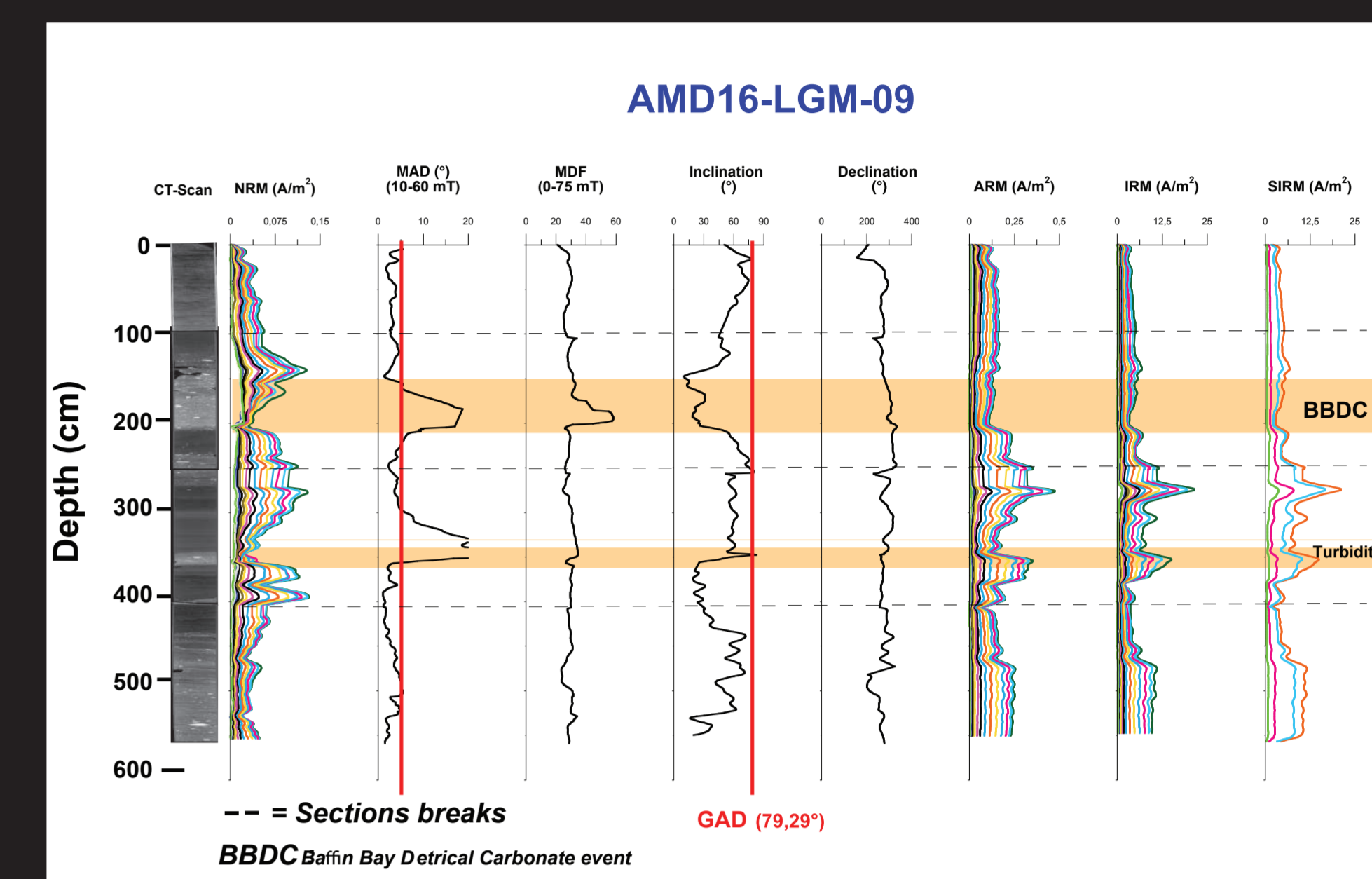
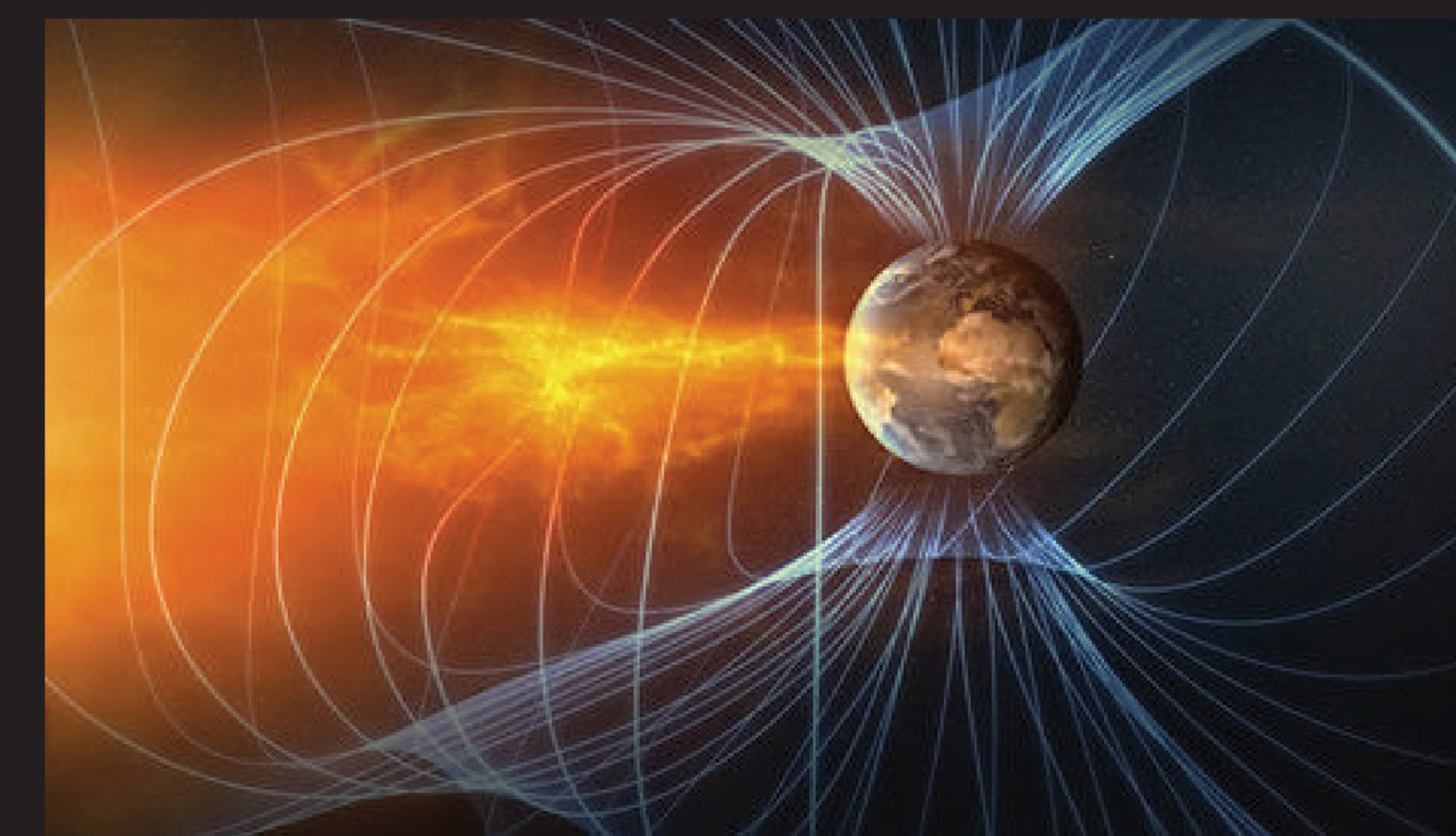


Figure 2 : Paleomagnetic results for core AMD16-LGM-09

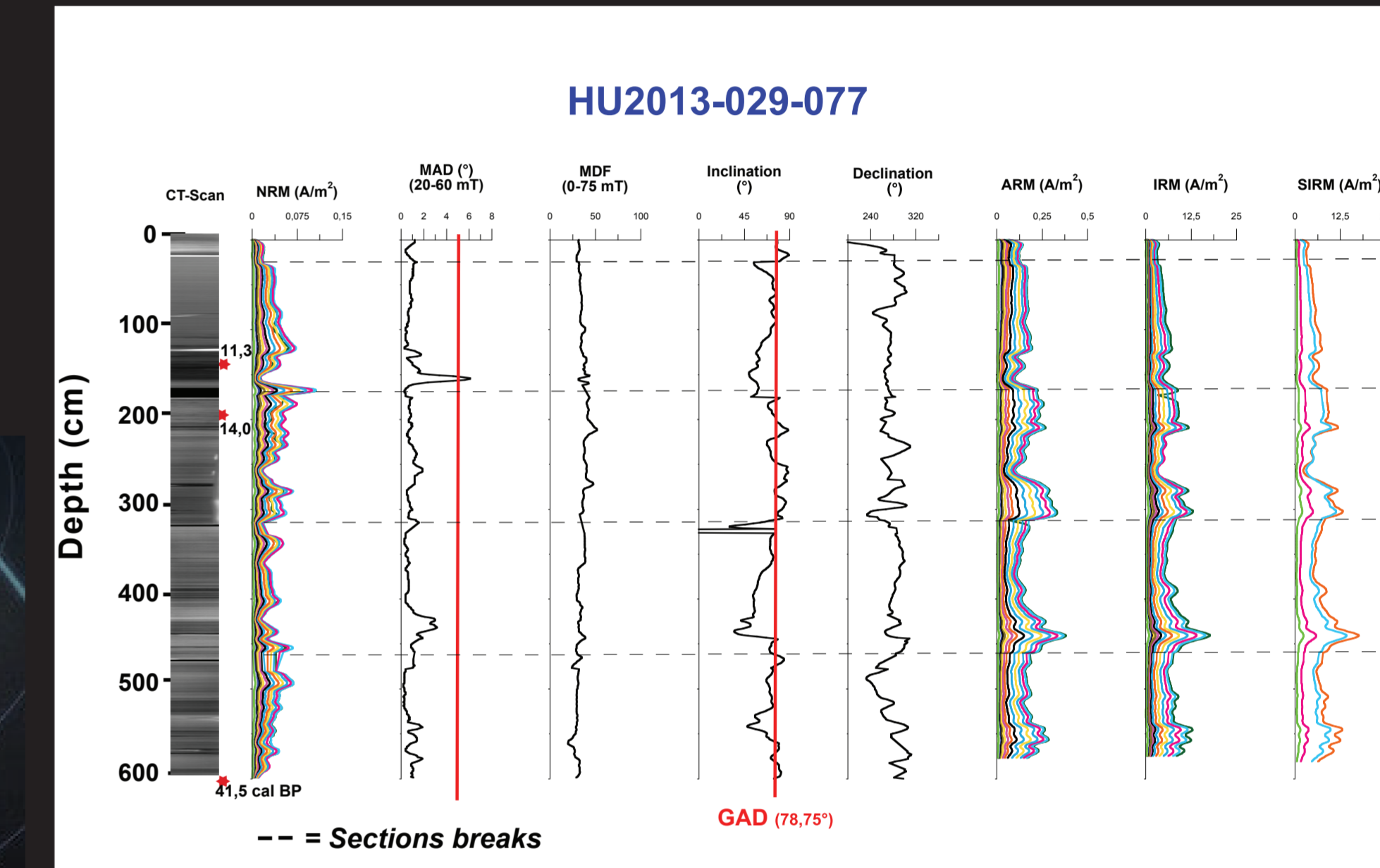


Figure 3 : Paleomagnetic results for core HU2013-029-077

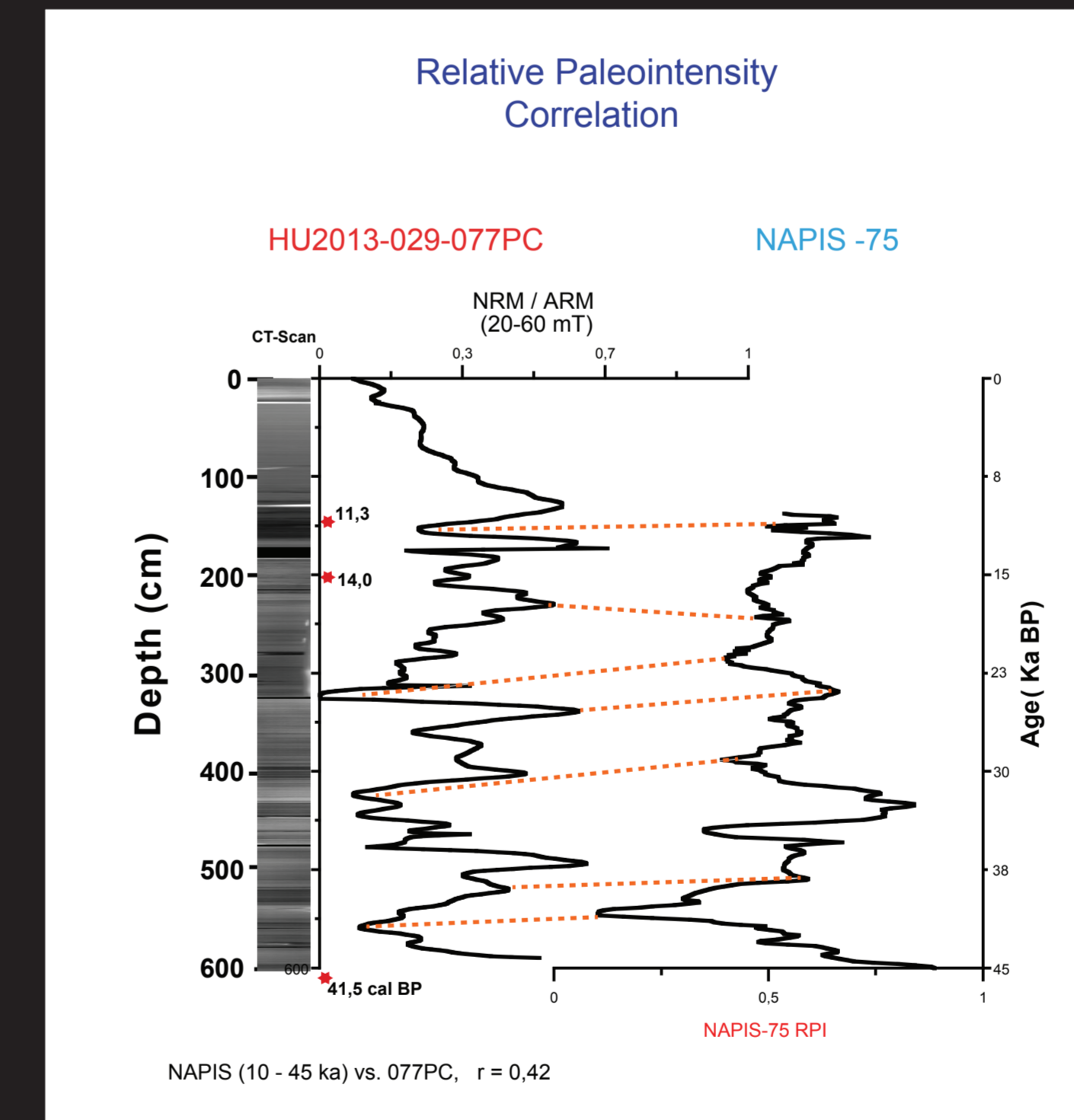


Figure 5 : RPI correlation. Relative paleointensity inter-comparison between core HU2013-029-077 and RPI reference curves from the NAPIS-75 (stack of six RPI records from the North Atlantic Ocean)

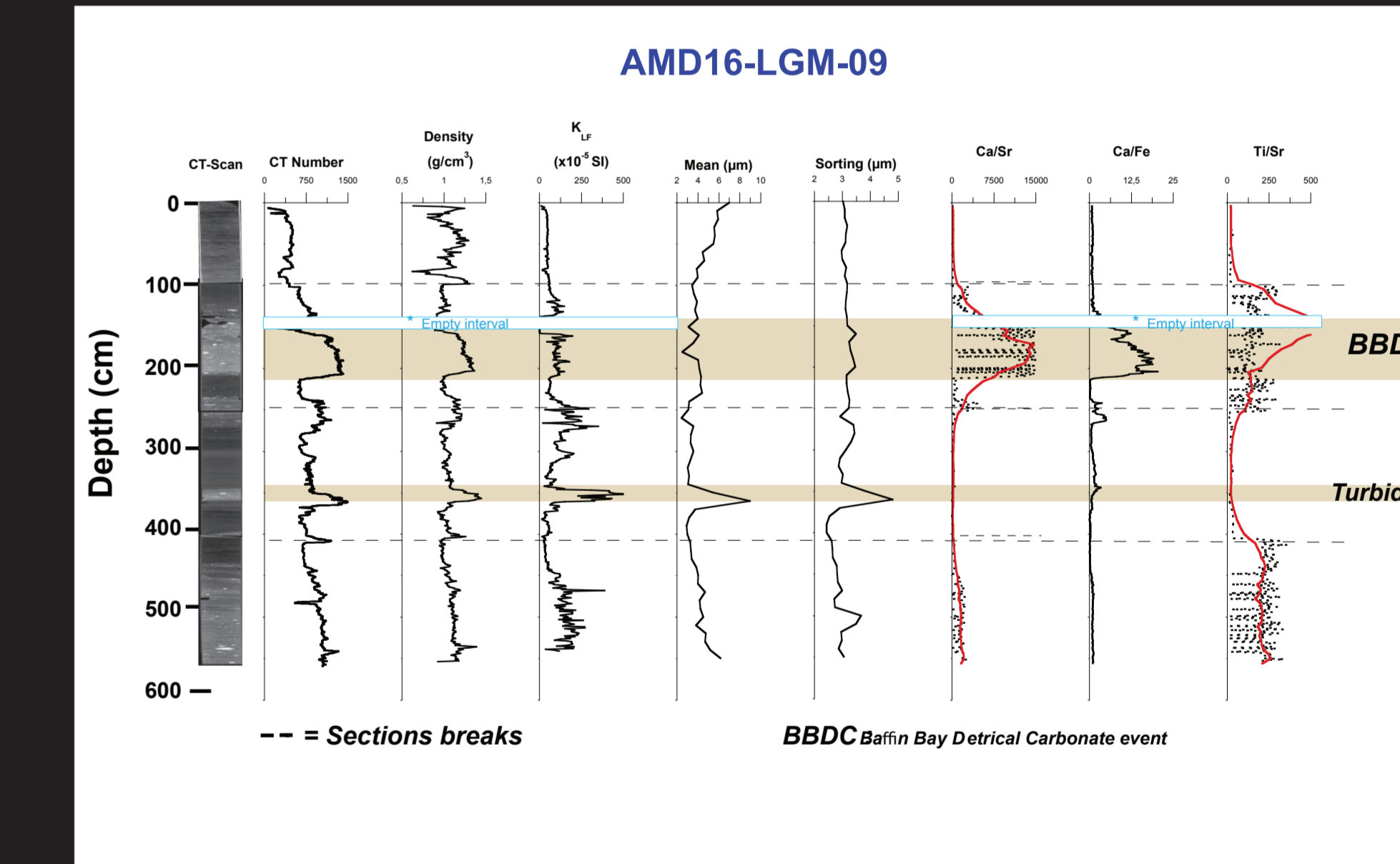


Figure 4 : Physical and geochemical results for core AMD16-LGM-09

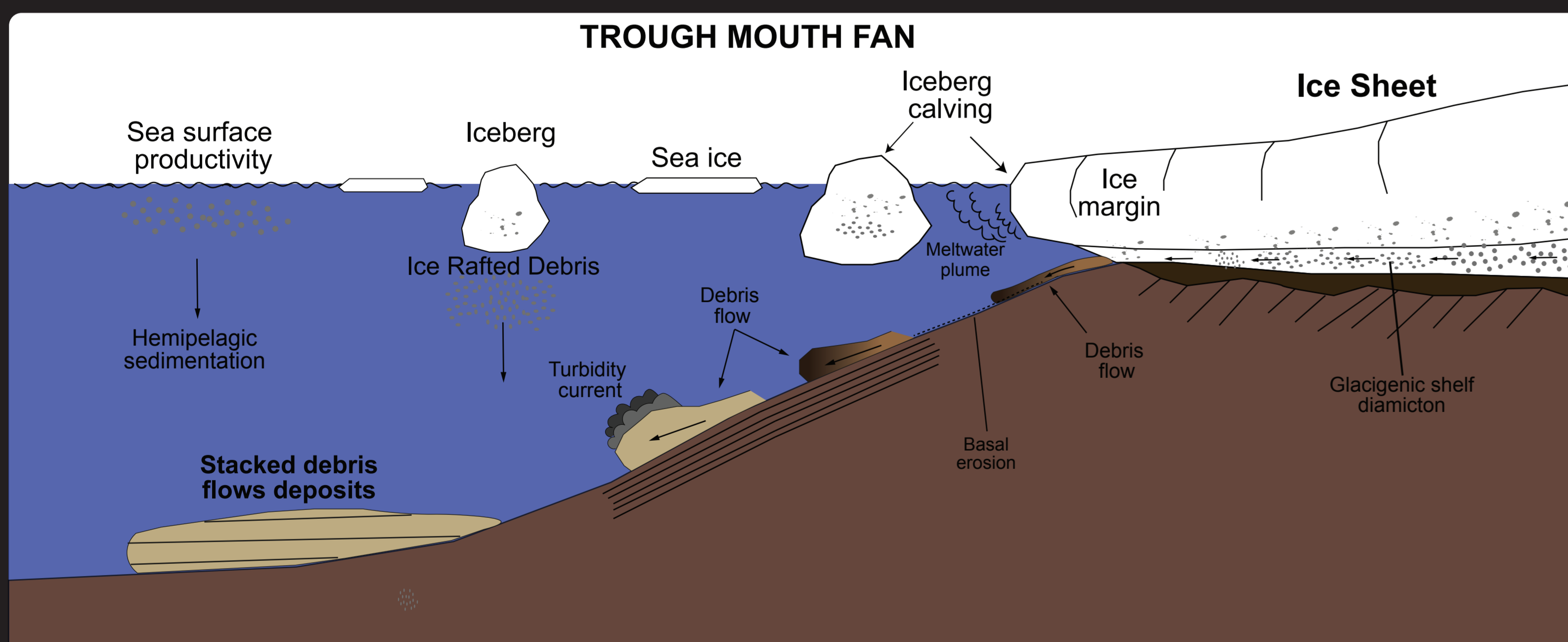


Figure 7 : Sedimentary process that determines the dynamics of the Laurentide Ice Sheet (LIS) since the last glaciation in a "Trough-Mouth fan"

## Seismo-stratigraphy

Subbottom profiles (3.5 kHz) in conjunction with the different analyses allowed establishing three lithofacies which varies from from a mixture of diamict and mud representing a glacial environment at the base of the core (380 to 550 cm) to massive, matrix-supported diamict with alternation of mud and IRD, representing a deglacial environment (120 to 380 cm) and finally, postglacial hemipelagic sediments at the top (0 to 120 cm).

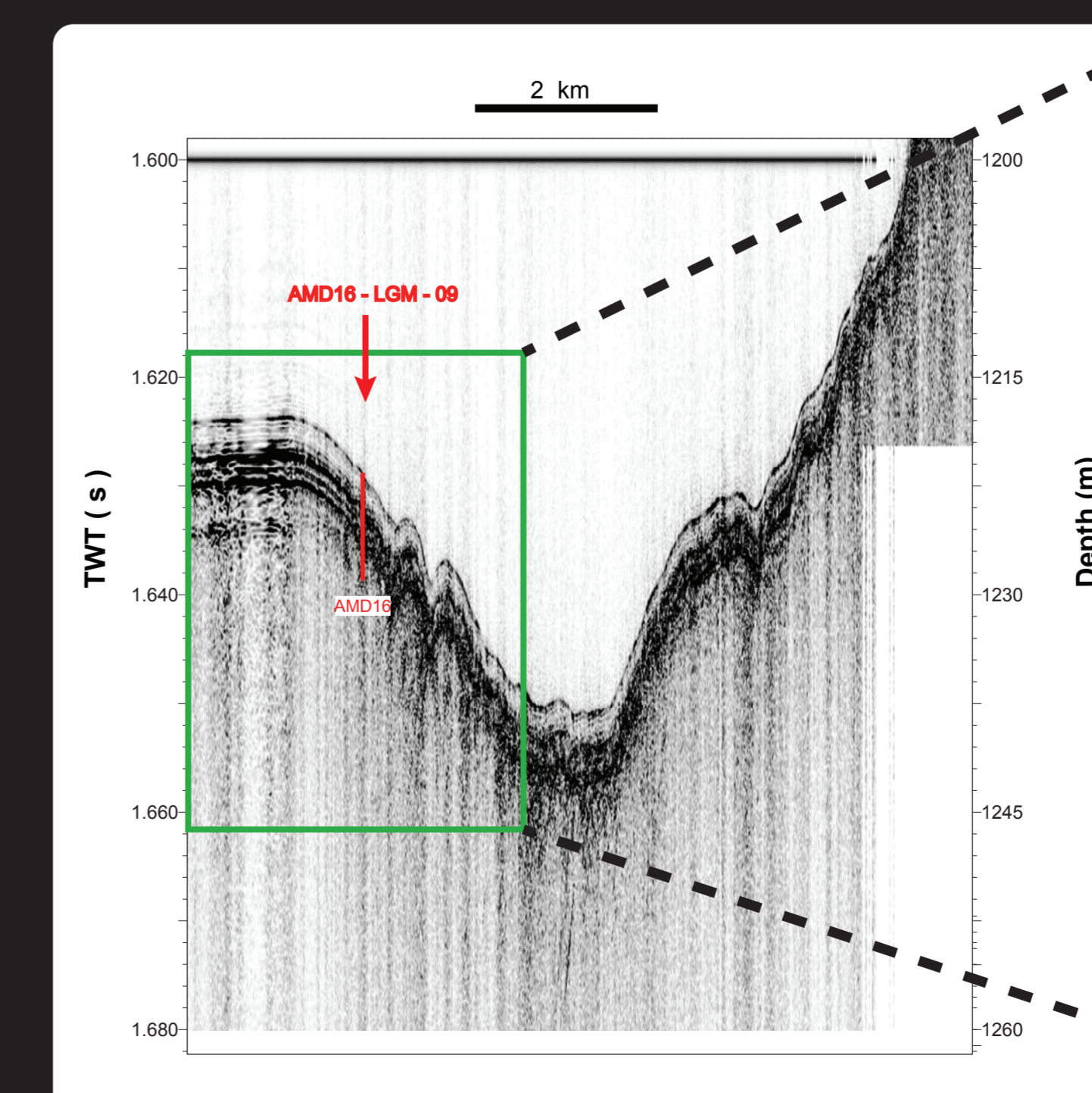
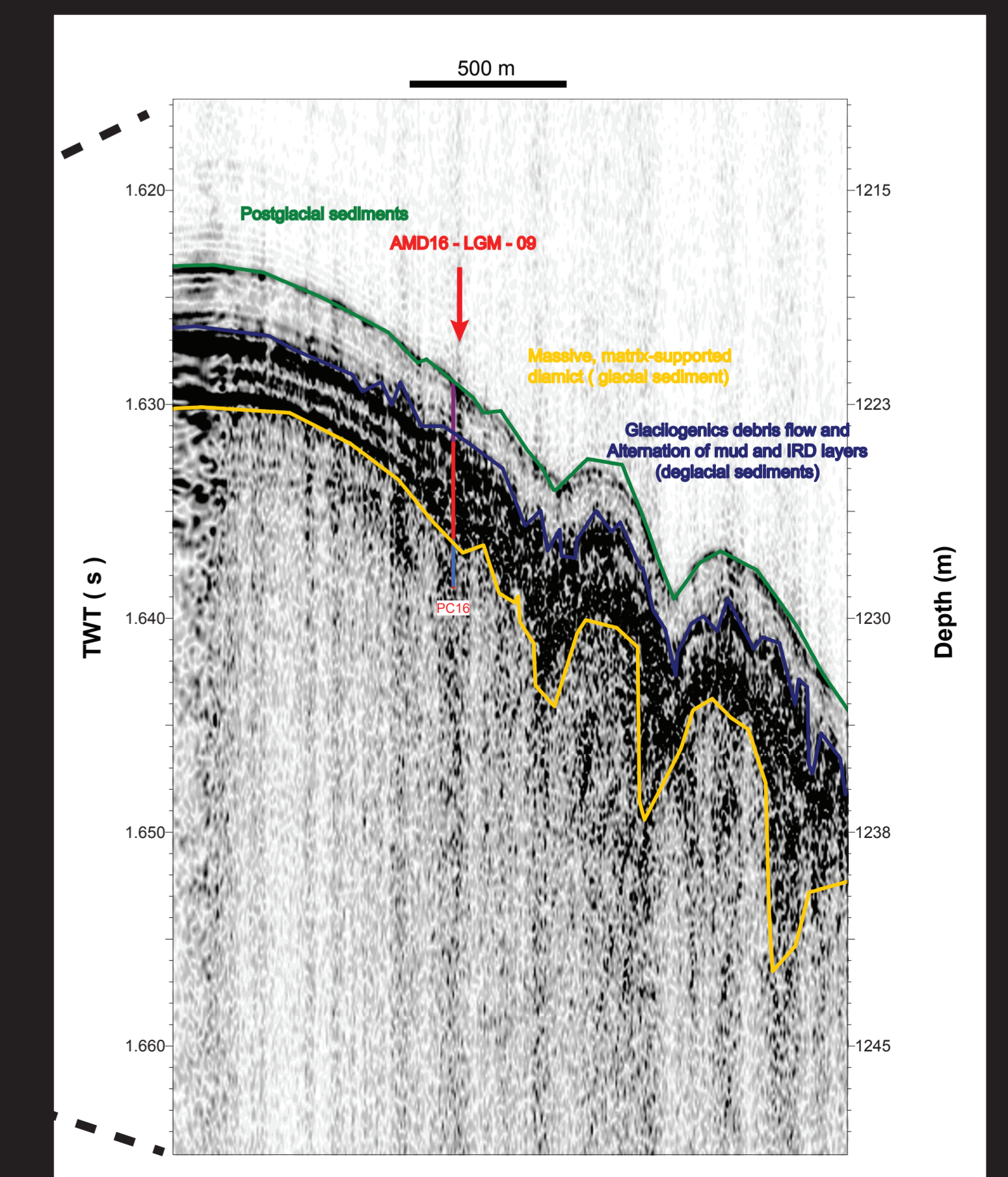


Figure 6 : Sediments architecture on seismic reflection (3.5 kHz) profiles on the TMF of Home Bay



## Conclusions

- Preliminary paleomagnetic changes and radiocarbon dating indicate that core HU2013-029-077 may span the last 41 ka cal BP, providing the initial chronostratigraphic framework for the area.
- The paleomagnetic data from the two others cores will be compared with previously dated records from Baffin Bay to establish the chronostratigraphy of these cores.
- These results indicate that a series of debris flows and turbidites were generated during the last glaciation, suggesting that the LIS margin reached the shelf edge, while postglacial sedimentation led to the deposition of mostly hemipelagic bioturbated and/or laminated pebbly mud.