

***BREA Project***  
***Regional Assessment of Deep***  
***Water Seabed Geohazards for***  
***Oil Spill Prevention Research***  
***Canadian Beaufort Sea***

**Steve Blasco**  
**Geological Survey of Canada**

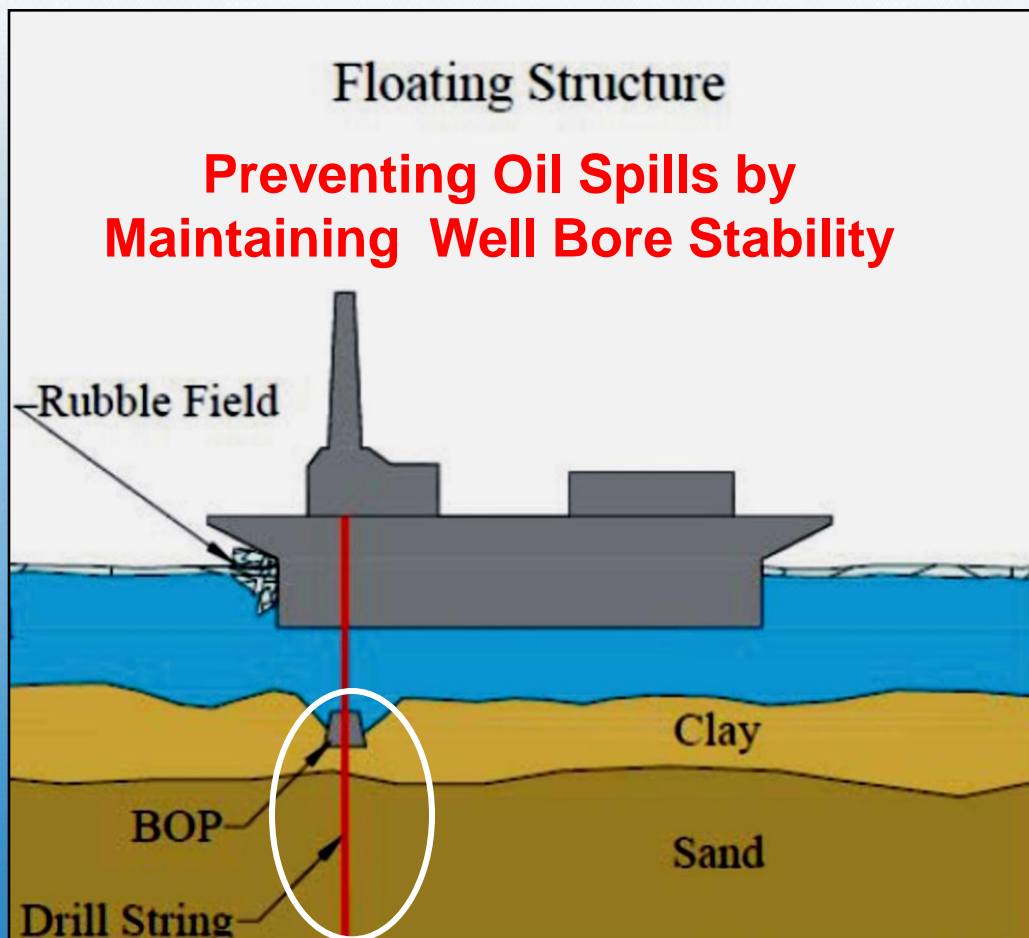


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# Objectives



**Provide the Geoscience  
Knowledge to Feed  
The Regional  
Environmental  
Impact Assessment  
Deep Water  
Hydrocarbon  
Exploration**

**BSTRIPA  
Recommendation**



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# **Seabed Geohazards That Can Contribute to Exploration Well Instability**

- **Foundation Conditions**
- **Submarine landslides**
- **Subsea Permafrost**
- **Gas Hydrates**
- **Shallow Gas**
- **Mud Volcanoes**
- **ice Scour**
- **Faulting**
- **Seabed Dynamics**



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**4 Year Project @ \$354K per Year**



# ***Collaborators 2011-14***

2012/13

- **BREA: data acquisition, processing**
- **NRCan: scientific/technical expertise**
- **PERD: Shallow data analysis**
- **ESRF: Deeper data analysis**
- **IOL/BP/Chevron/ION: seabed data**
- **ArcticNet: survey technology**



# ***Oil Spill Prevention Research Canadian Beaufort Sea Methodology***



**BREA  
Data Acquisition  
CCGS Amundsen**

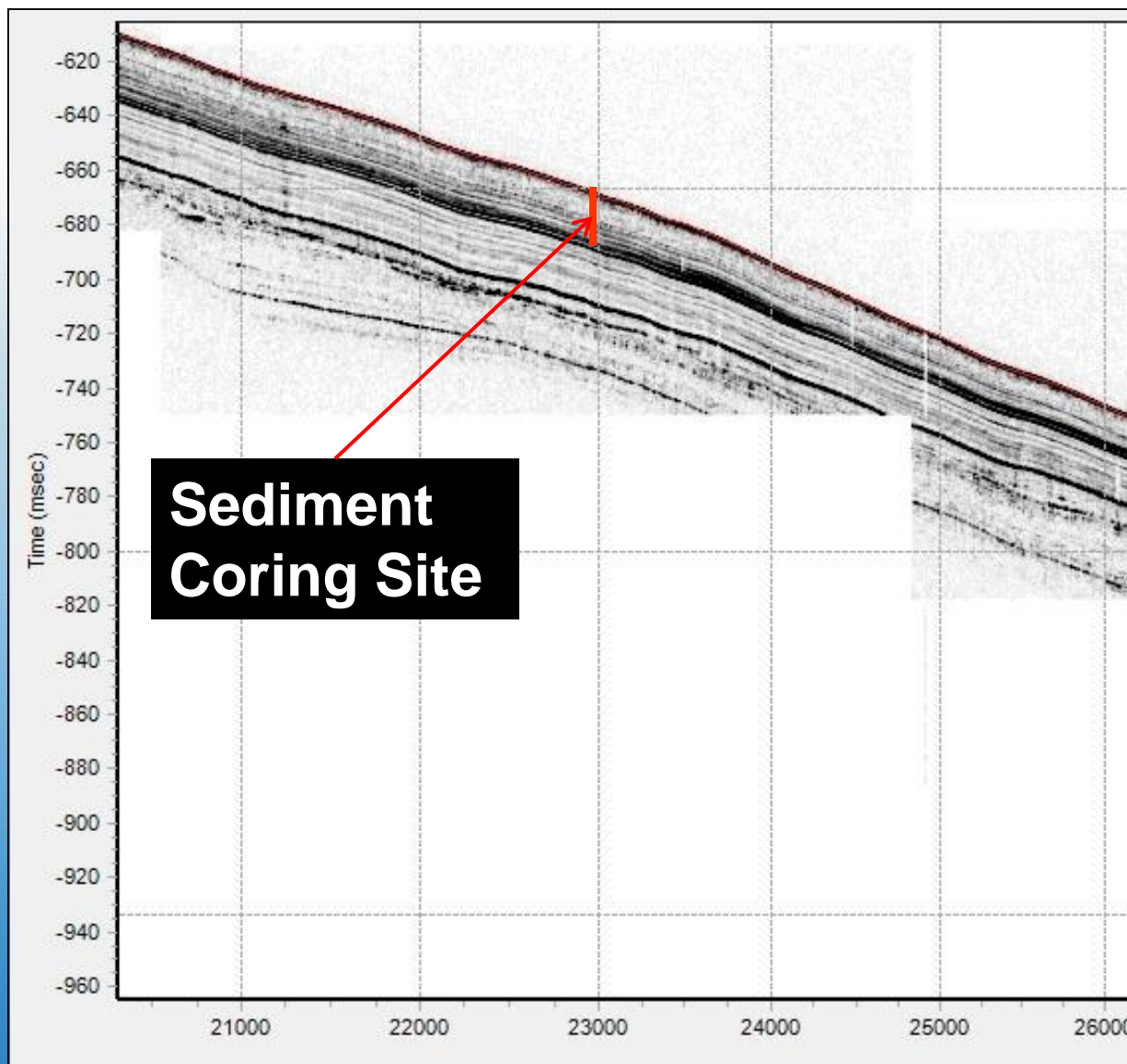
**Seabed Sampling  
Seabed Profiling**



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**Outer Shelf  
and Upper Slope**

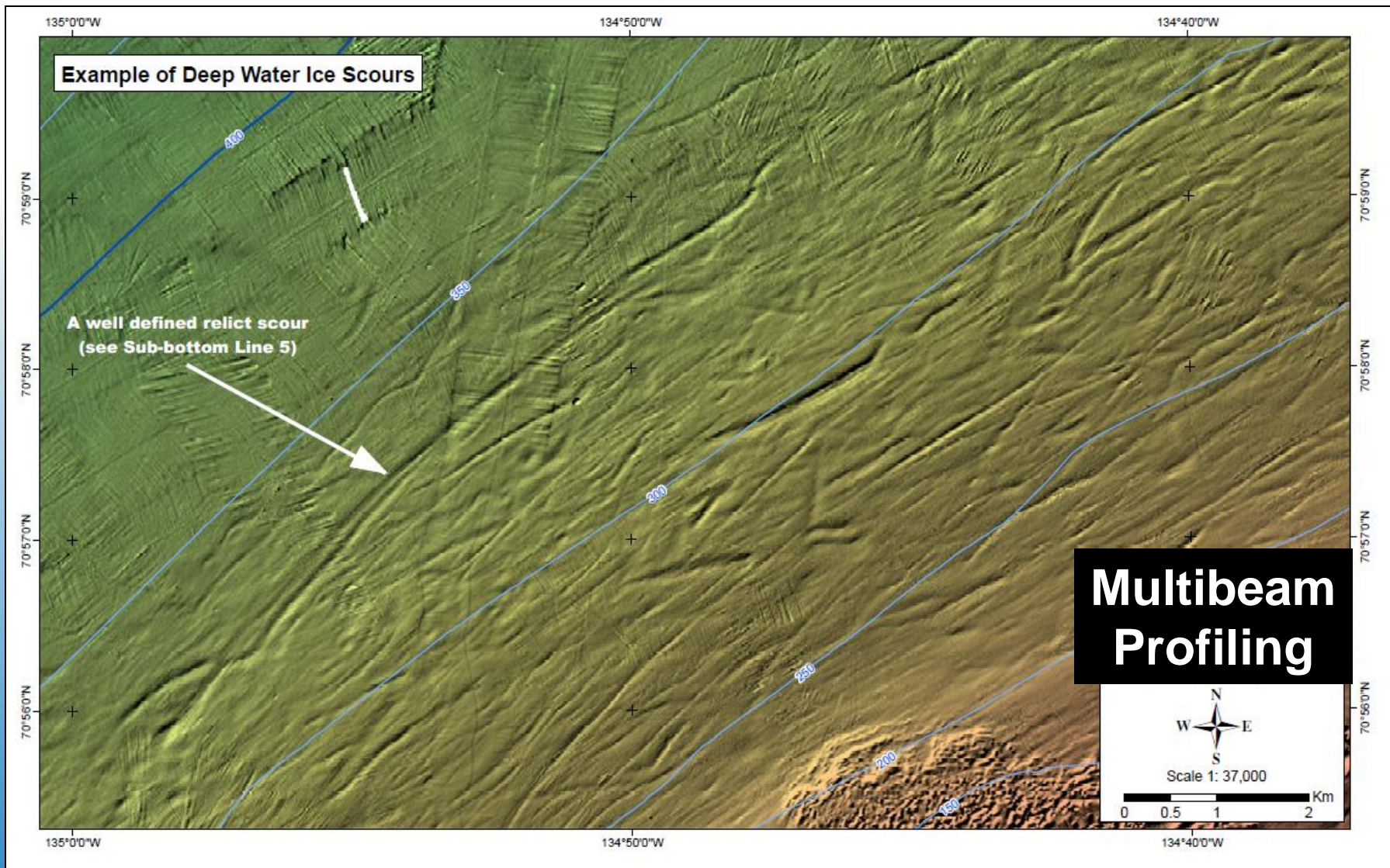
**Subbottom  
Profile**

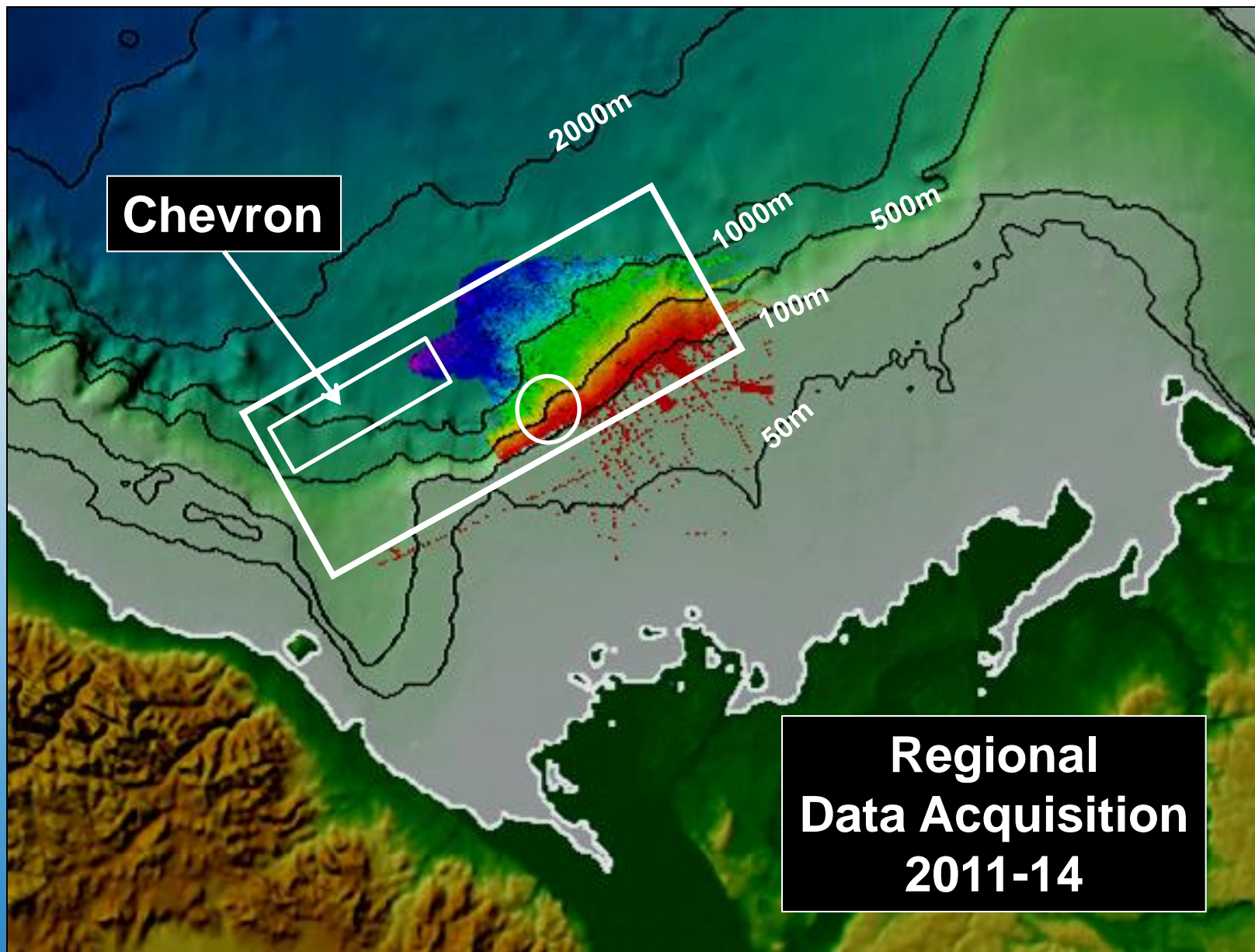


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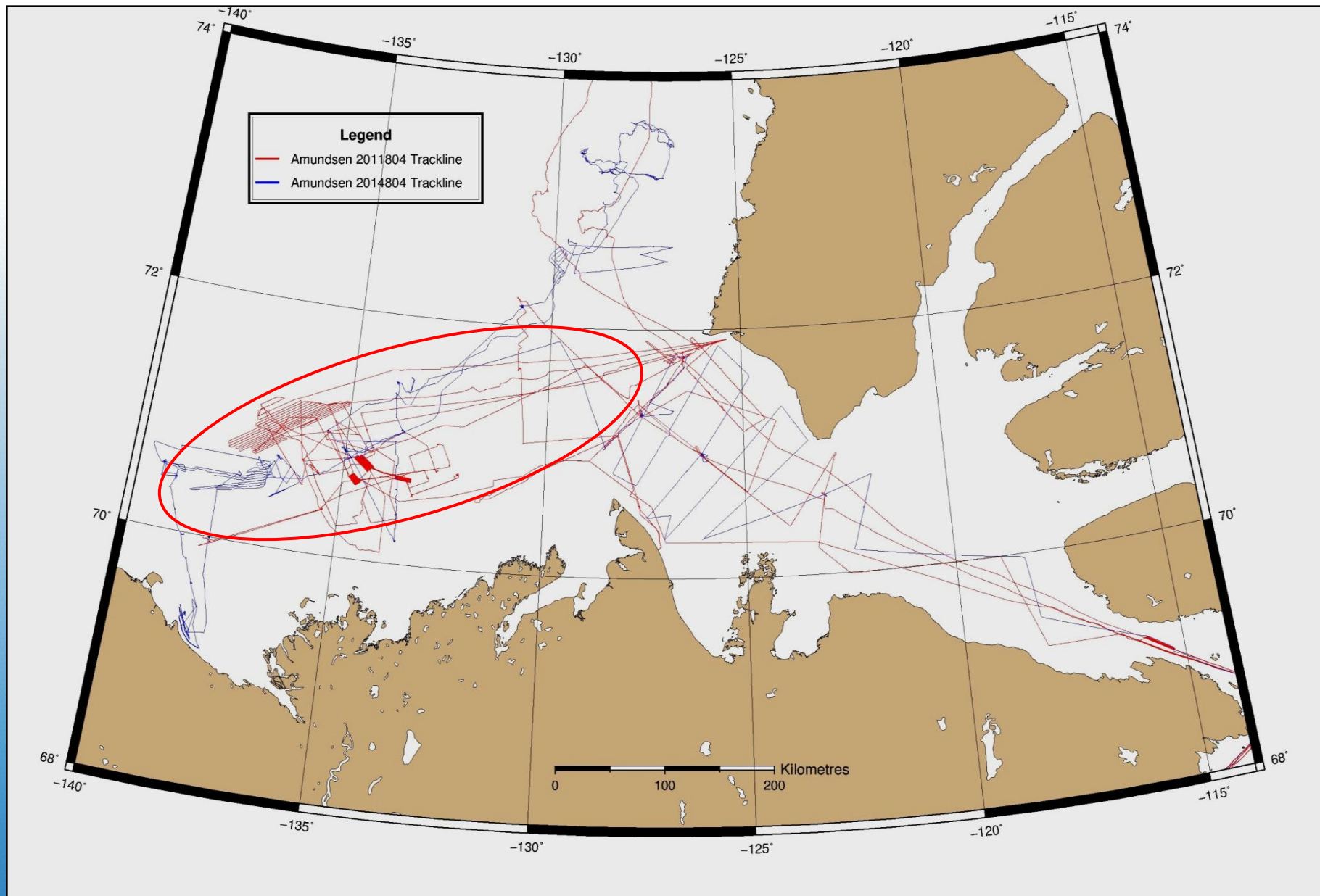




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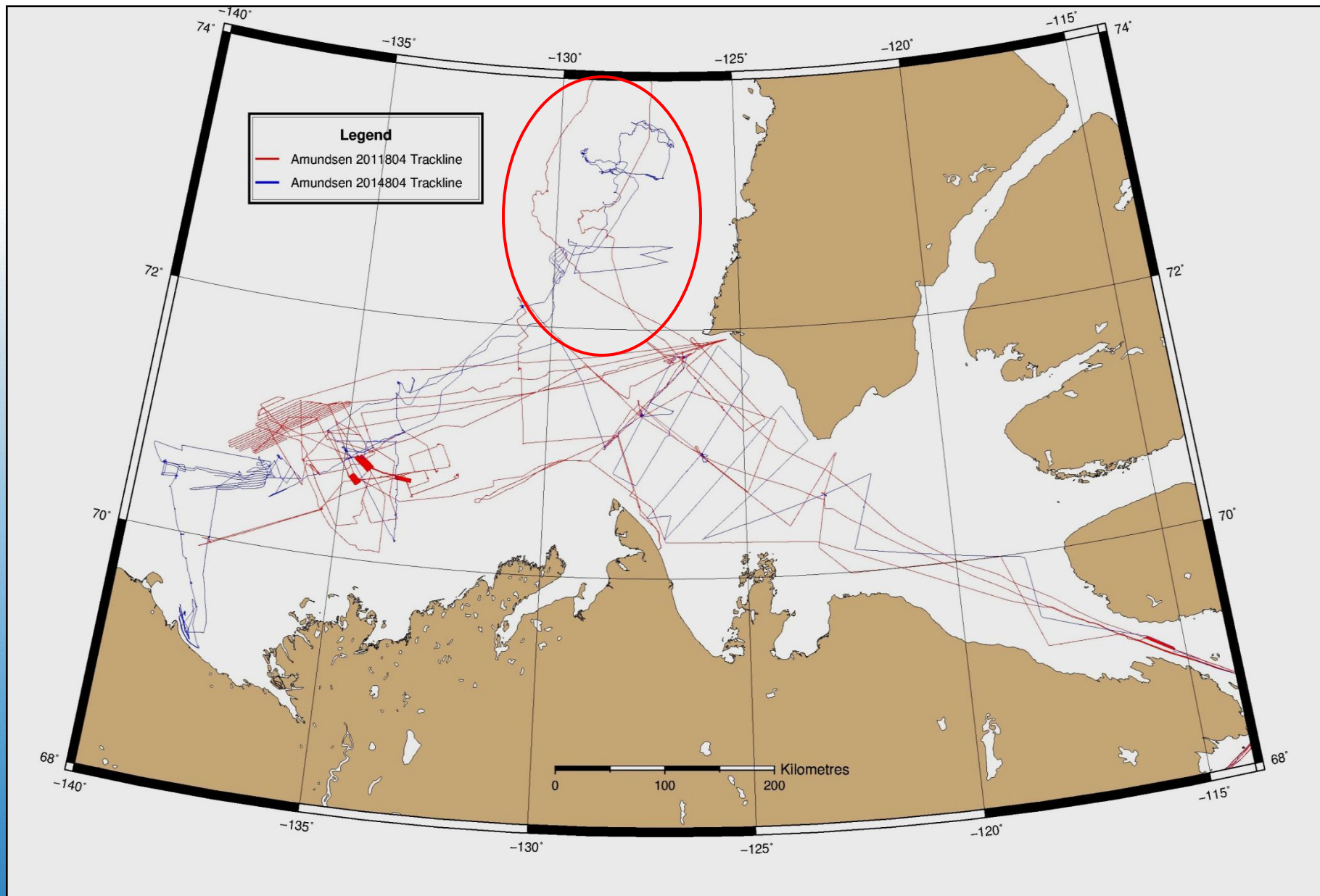
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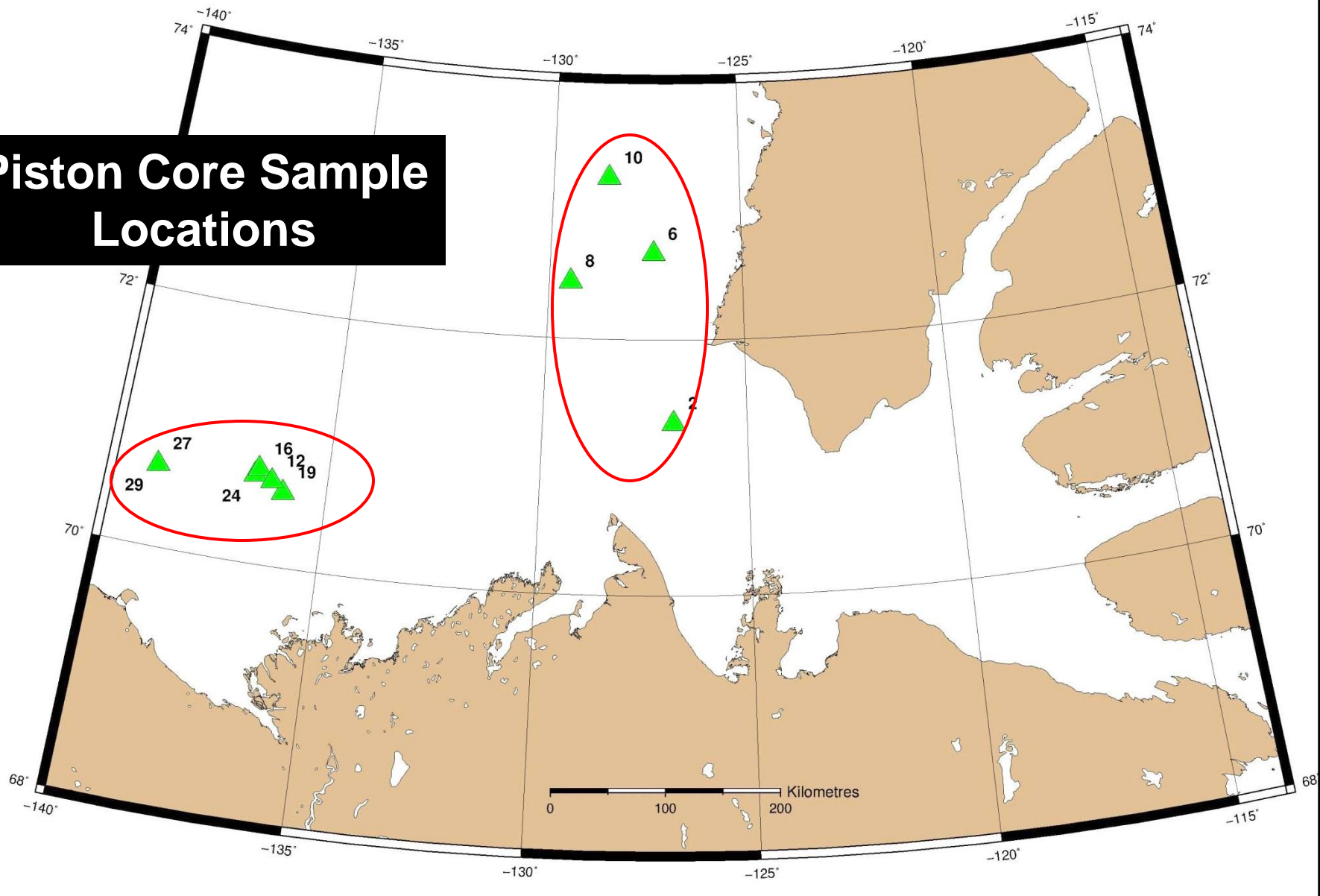


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# Piston Core Sample Locations

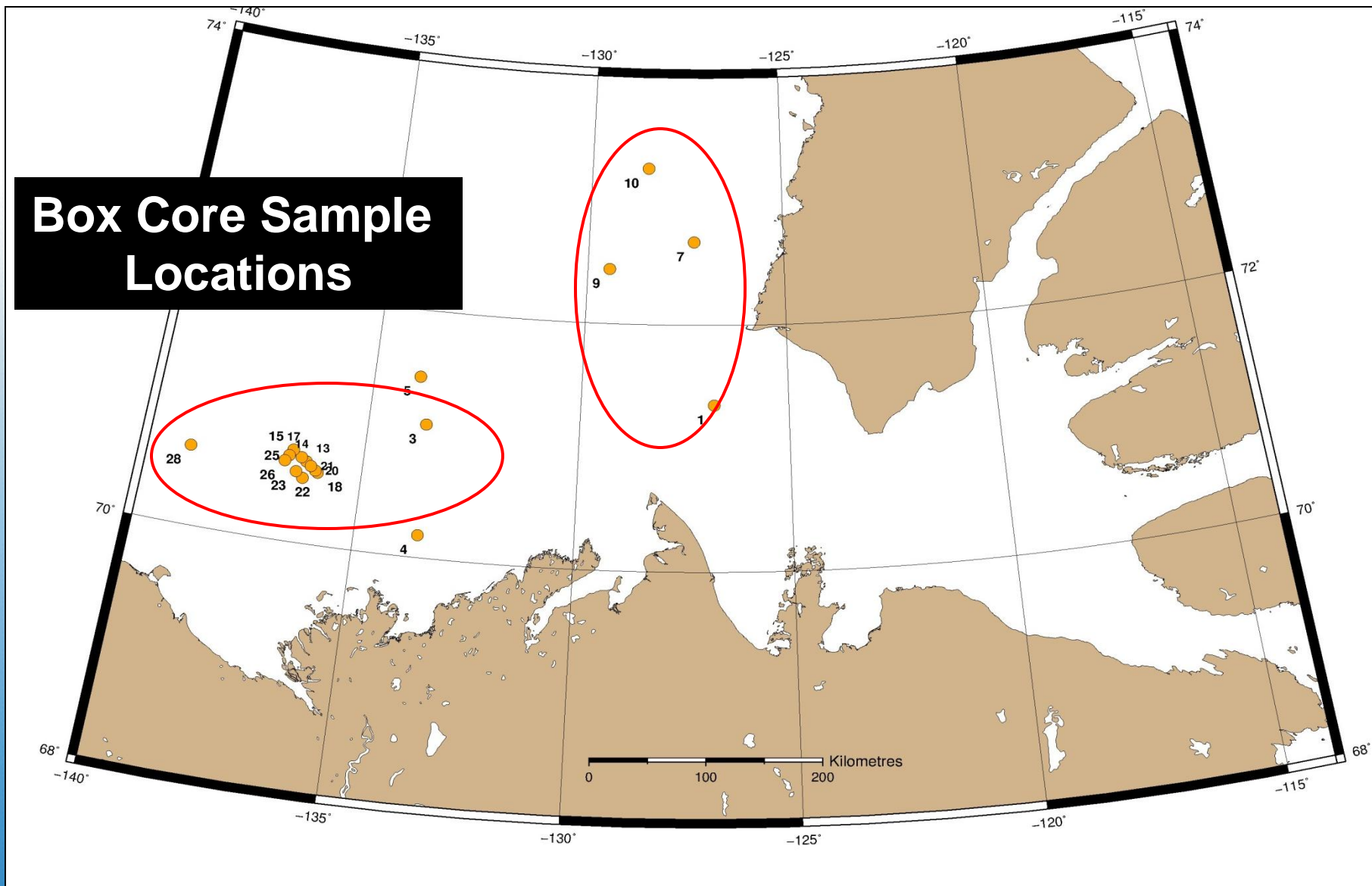


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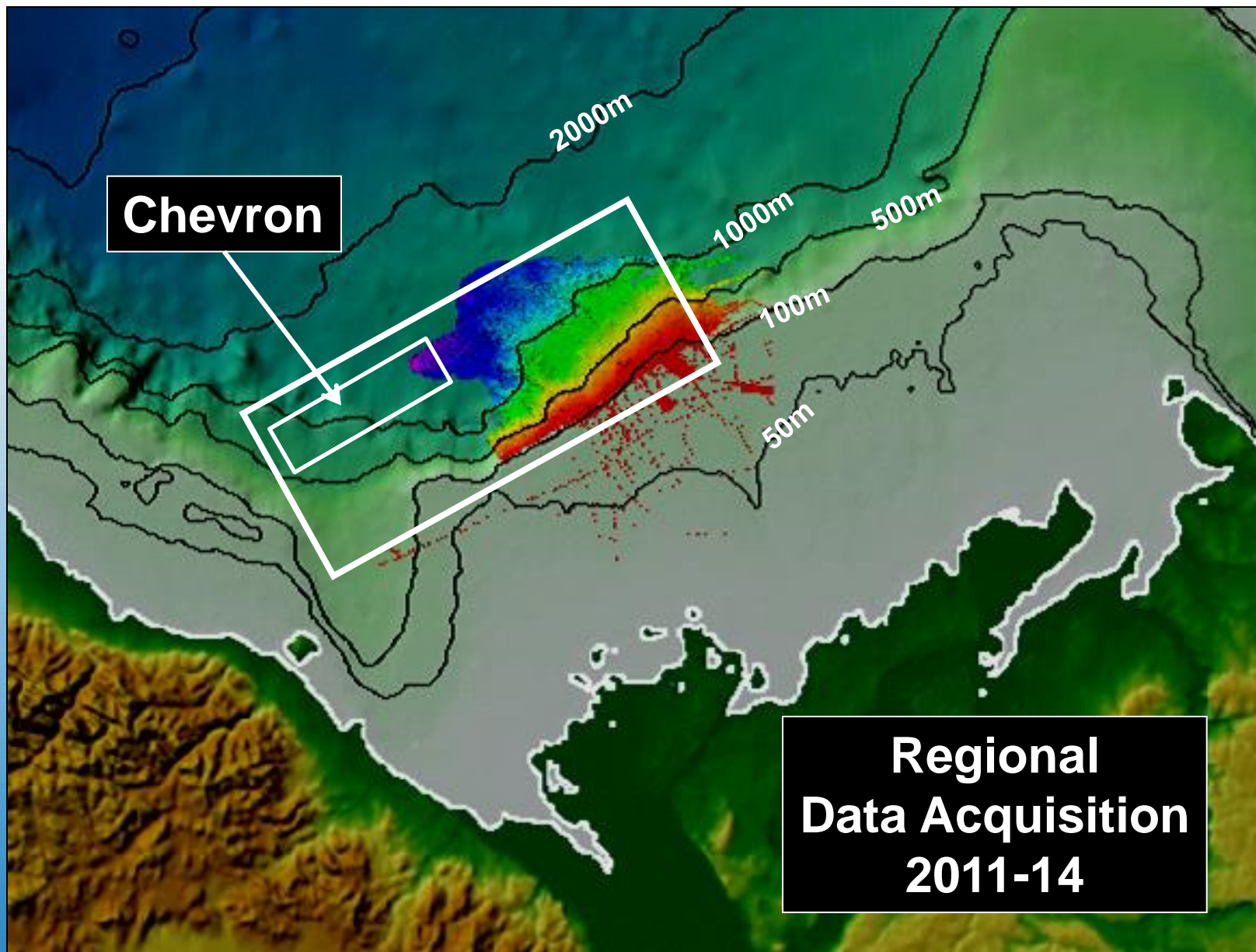
# Box Core Sample Locations



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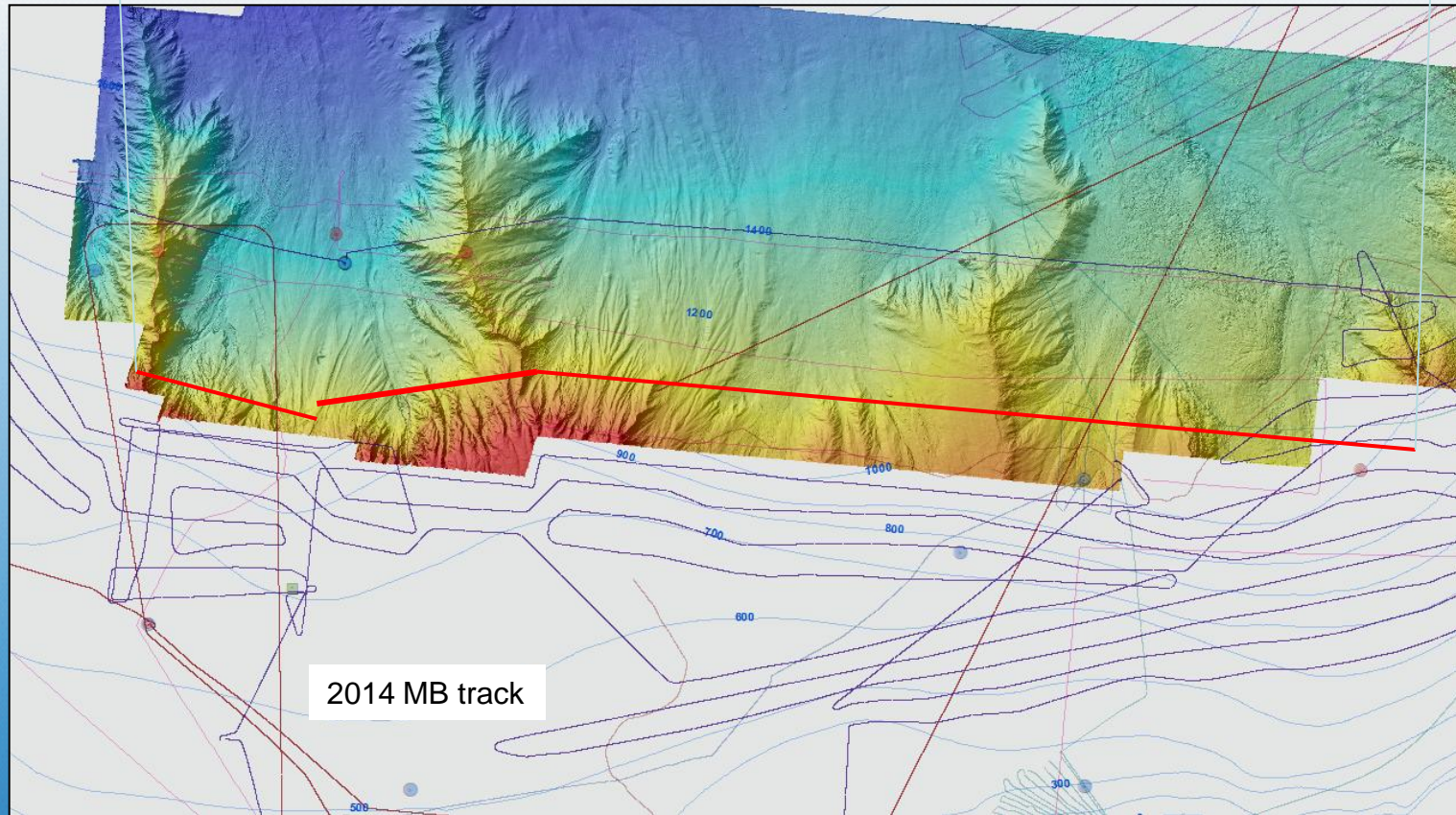
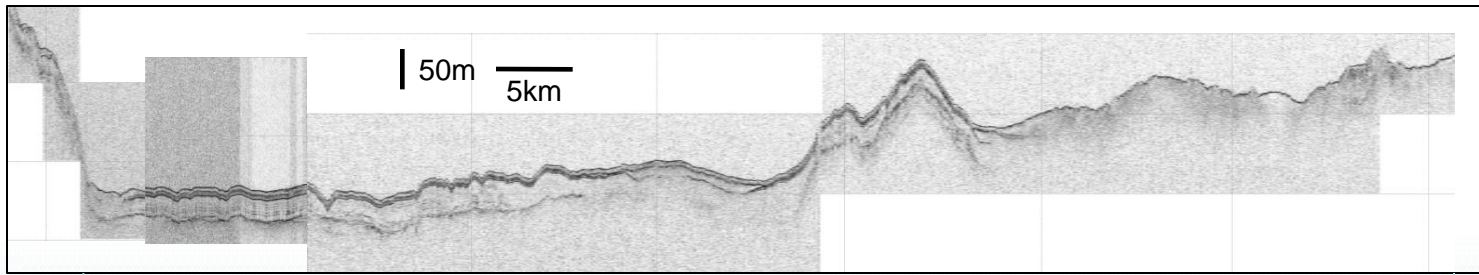
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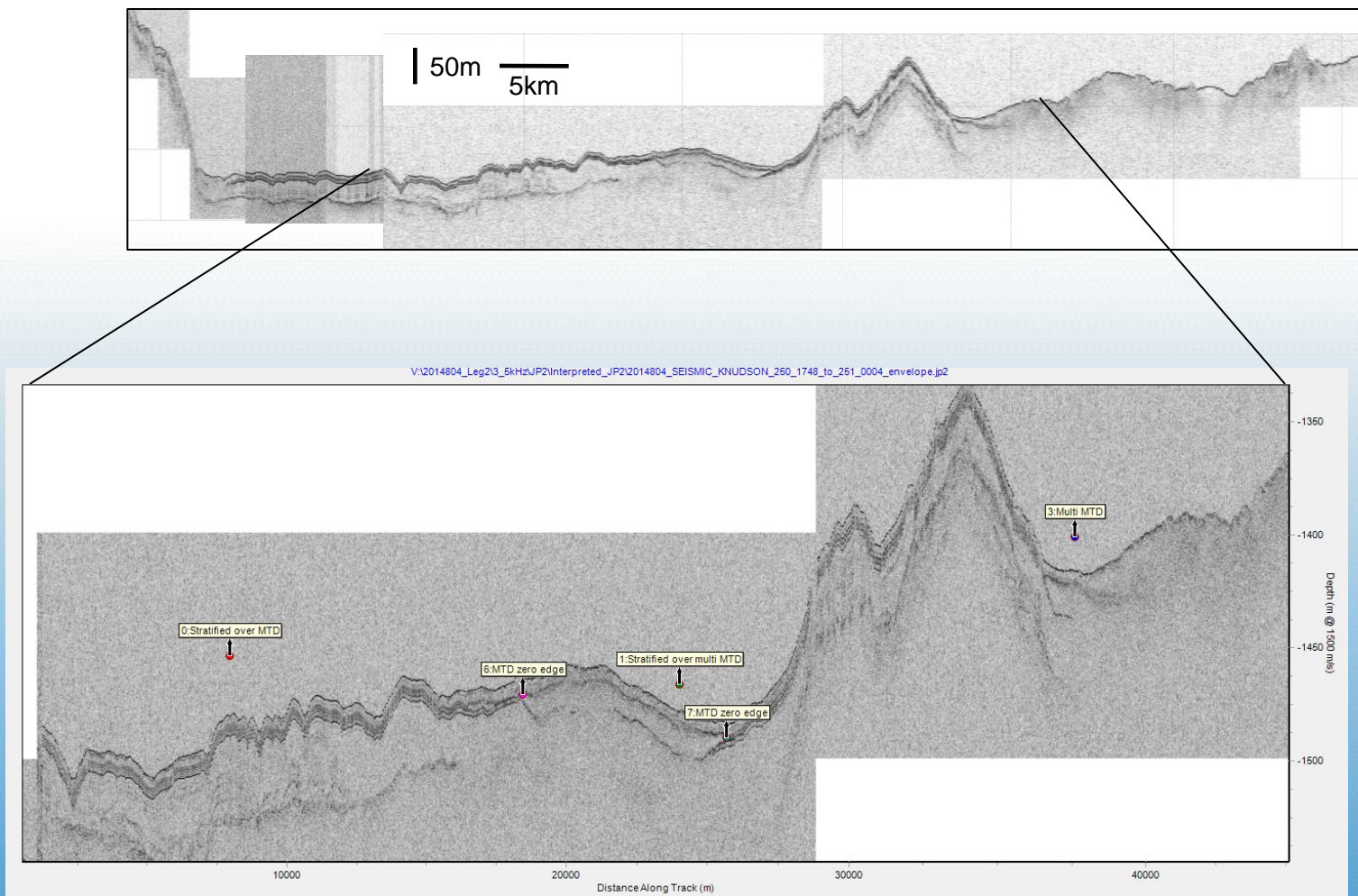
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## KEY Findings

**East to West” decrease in occurrence & magnitude of submarine landslides,  
West: Older Geology than East**



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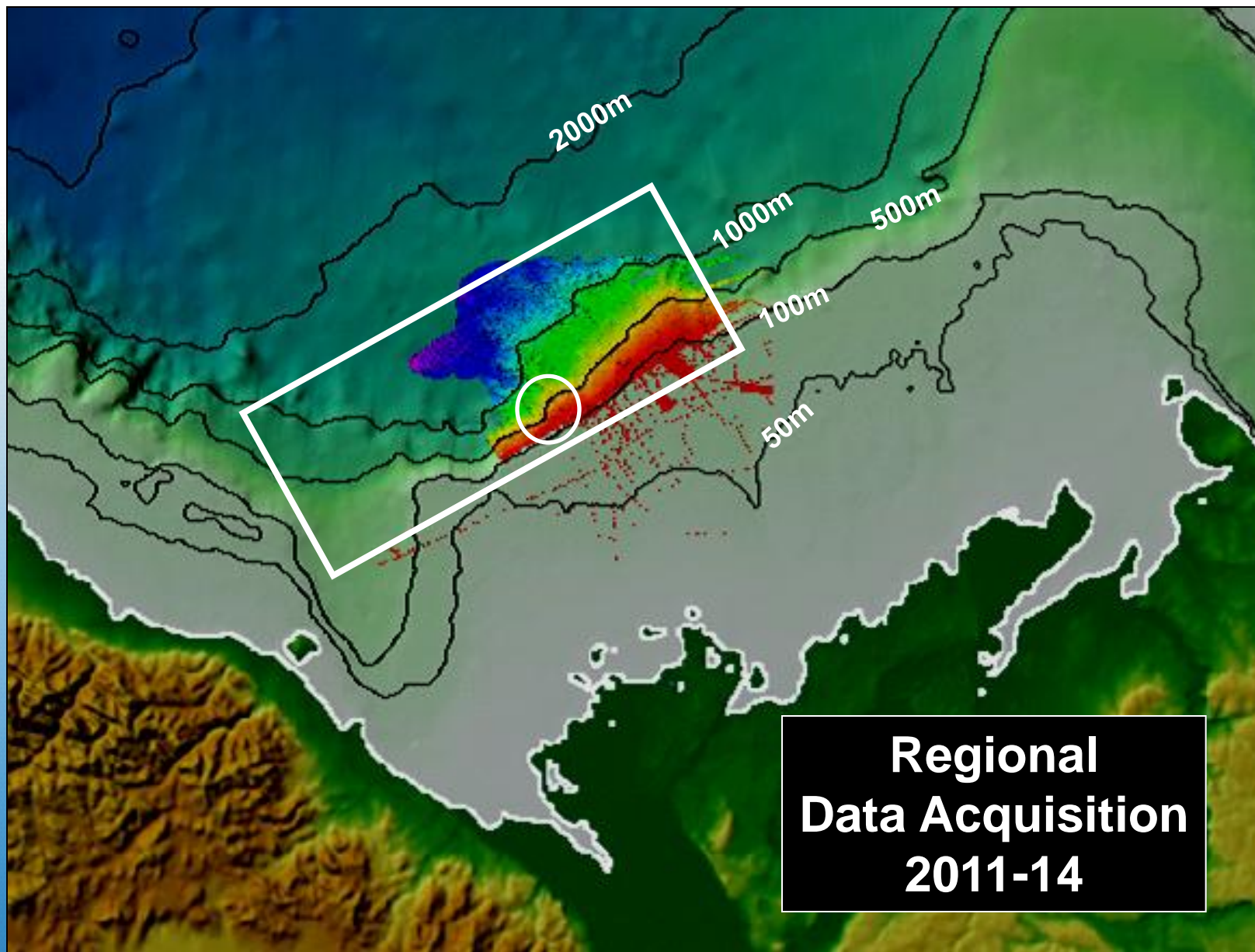
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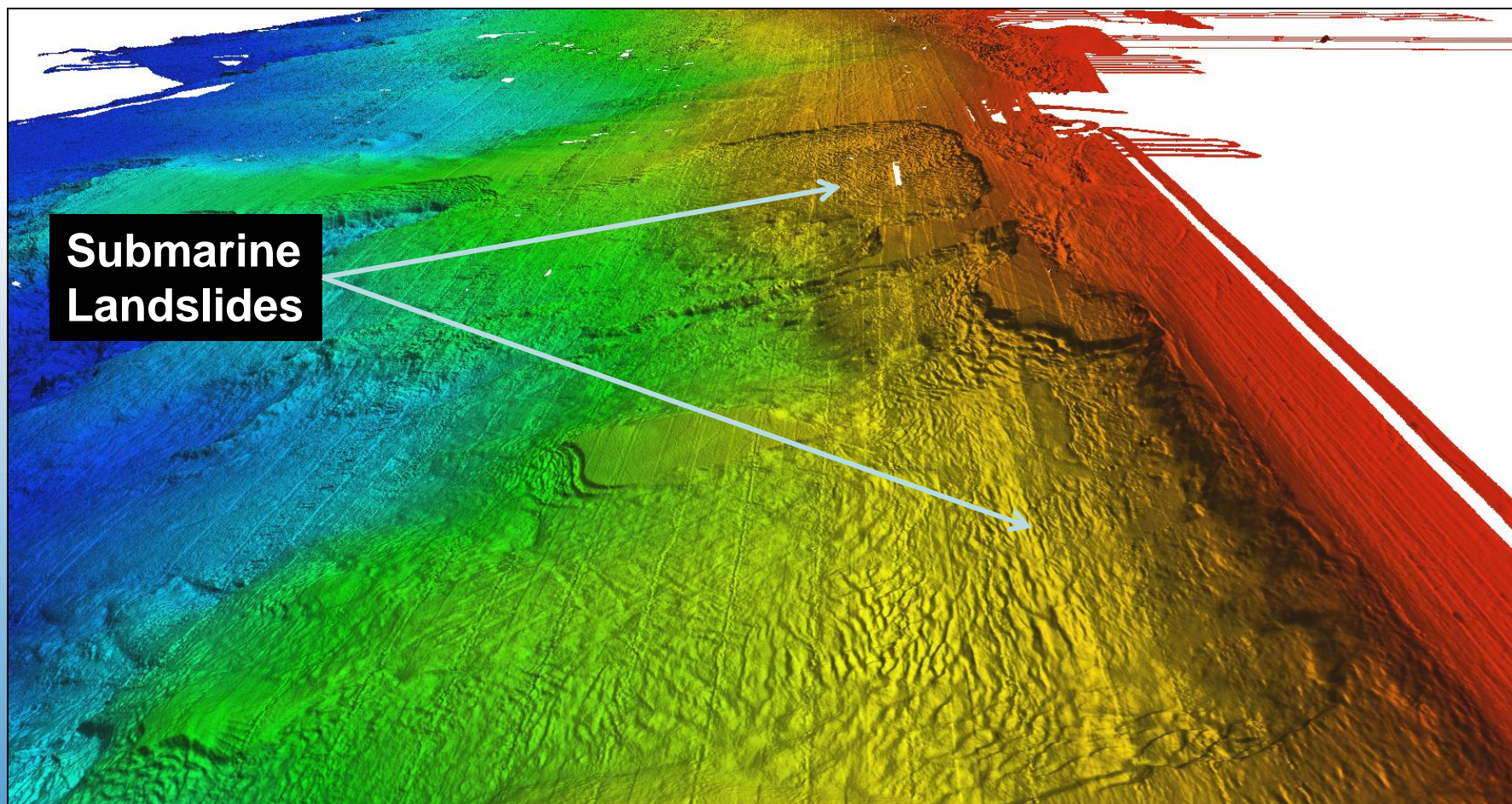
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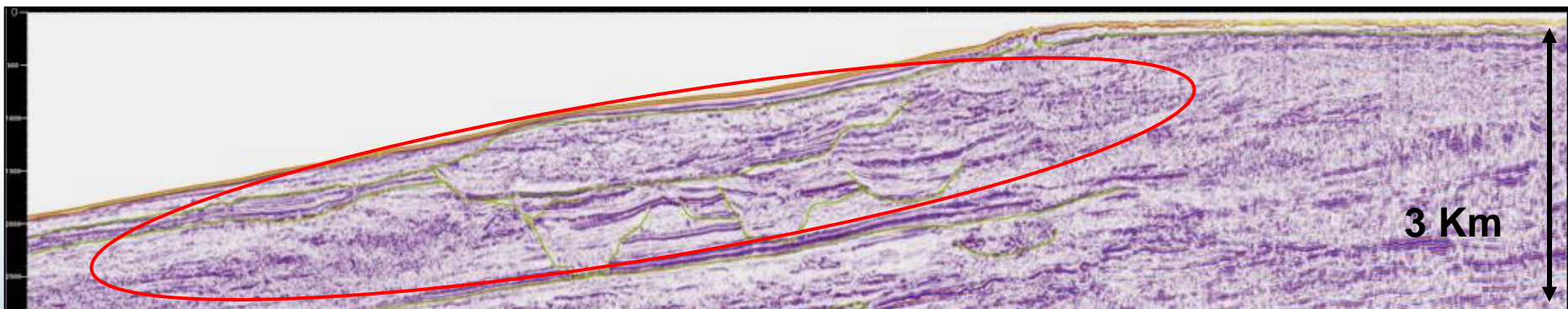
## Central Beaufort Outer Shelf and Upper Slope



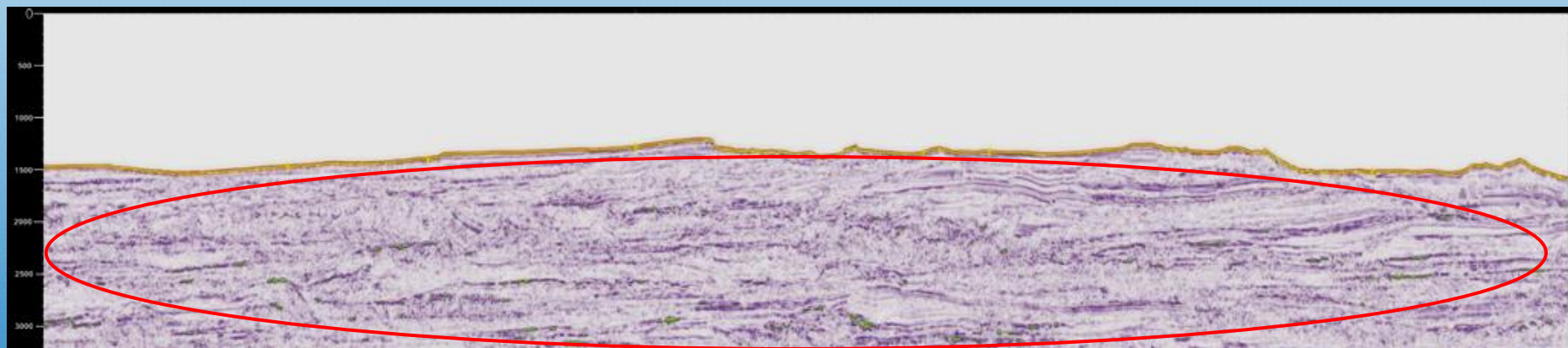
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**North-South Shallow Seismic Cross-Section Across Shelf Edge**



**East-West Cross-Section Along Upper Slope**

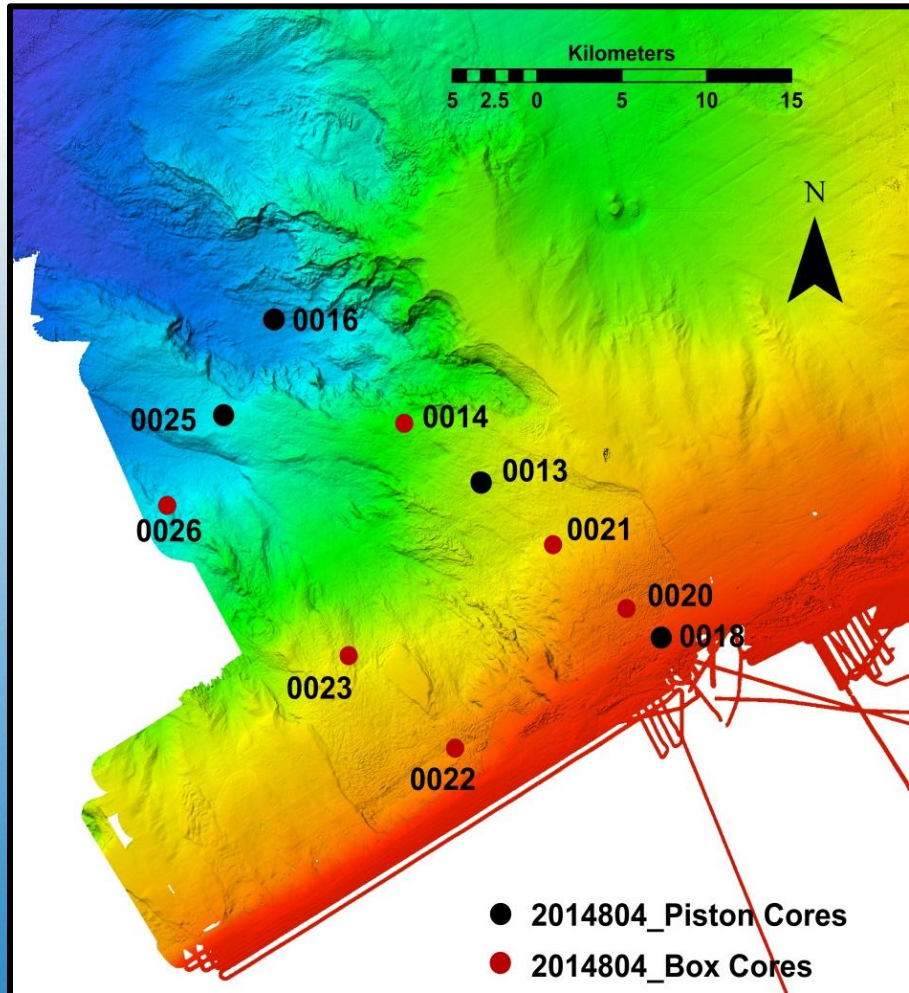


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# Submarine Landslides



## KEY Finding

**Age of Failures?**  
**Saabs Sediment Sampling**  
**Upper 40 cm**

- Slide Floor
- Undisturbed seabed

**Samples Submitted for Dating**



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# ***Data Management***

- **Polar Data Catalogue: Meta Data**
- **Polar Data Catalogue Link to NRCan**

## **Data**

- **Multibeam**
- **Subbottom**
- **Sediment cores**



# ***Key Products***

- **Northern Communities: IRIS**
- **NEB: State of Knowledge 1; State of Knowledge 2**
- **Industry: IOL: EIS; Alternate Drilling System (also Chevron)**
- **All: Polar Data Catalogue**



# ***Offshore Geohazards Regional Assessment Knowledge **Gaps*****

- **Age/recurrence rates of geohazards**
- **Depths below 100 metres**
- **Surface to depth links**
- **Western Beaufort region**



# ***Geological Survey of Canada***

**Enhanced Geoscience  
Delivery  
Beaufort Sea Geohazards  
New Team**

**Ned King  
5 Geoscientists**



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