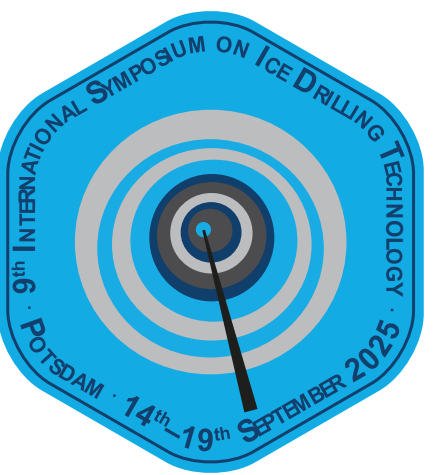


Unique NSF IDP Sub-Ice Drilling Yields Success for Science in Greenland



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Shallow Drilling Site Winkie Drill

Season Objective

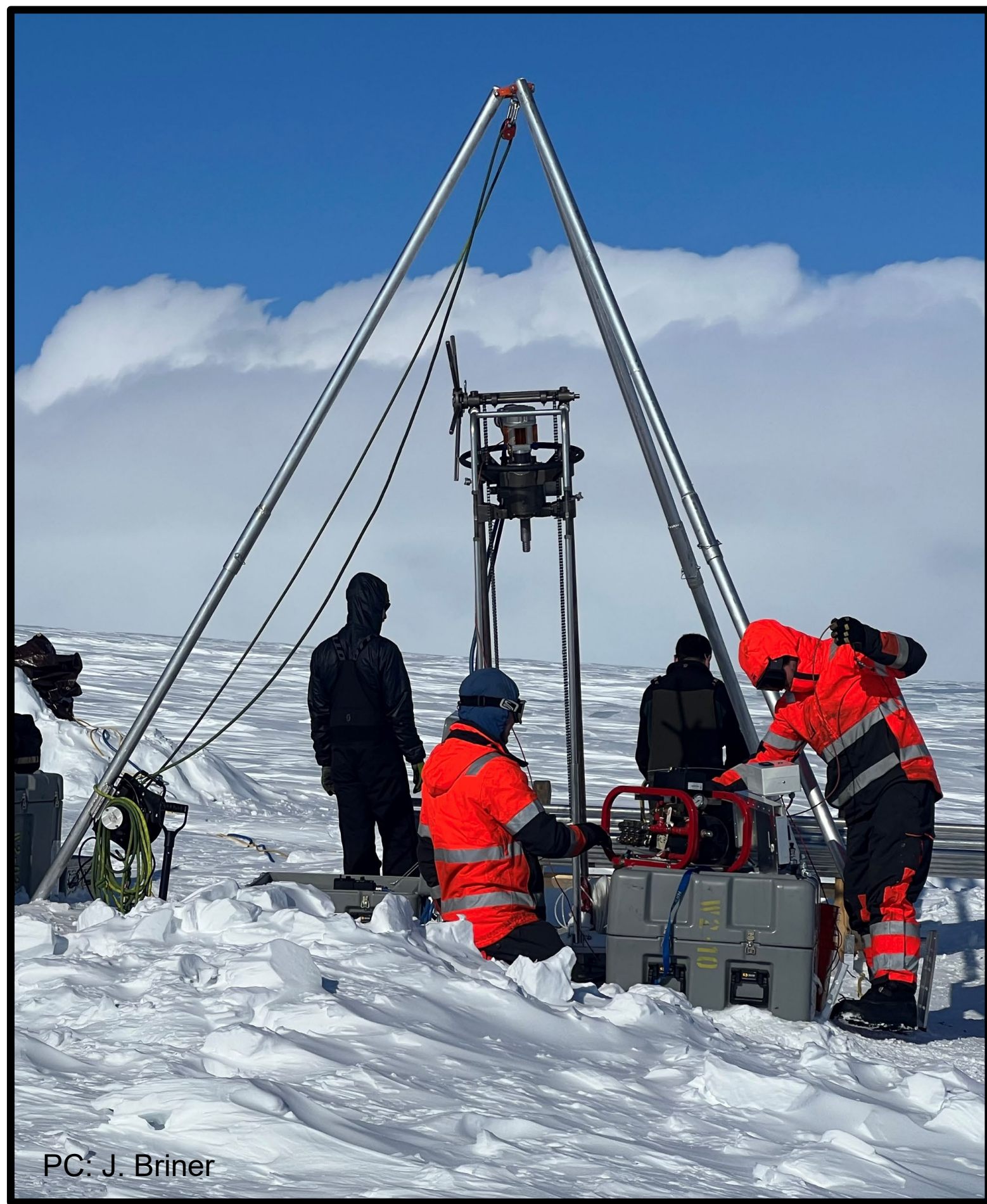
- Recover one 5 m sub-glacial bedrock sample from below at least 50 m of ice

Drill Equipment

- Commercially available light logistics rotary coring drill modified to be capable of collecting 33.5 mm diameter ice and rock cores from depths up to 120 m

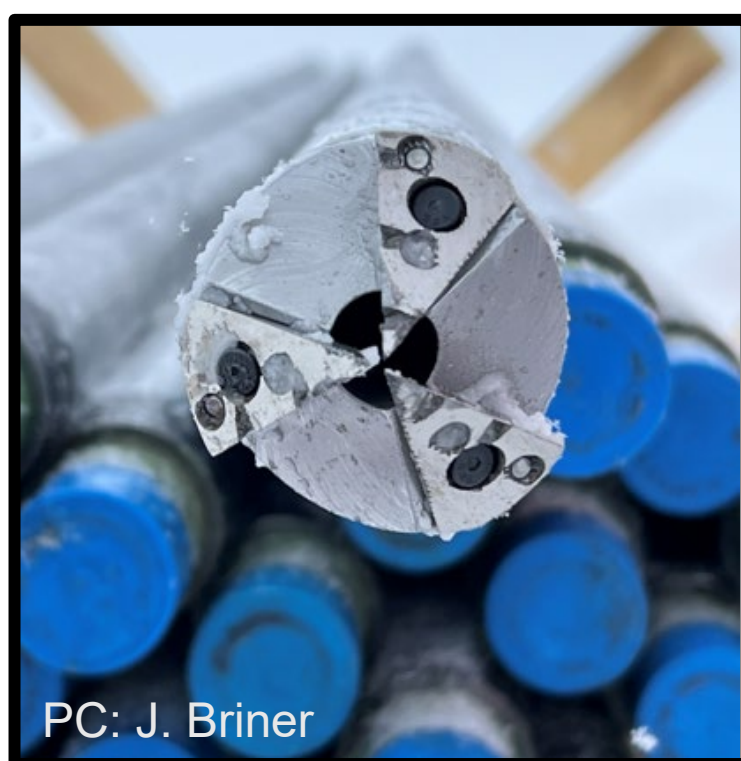
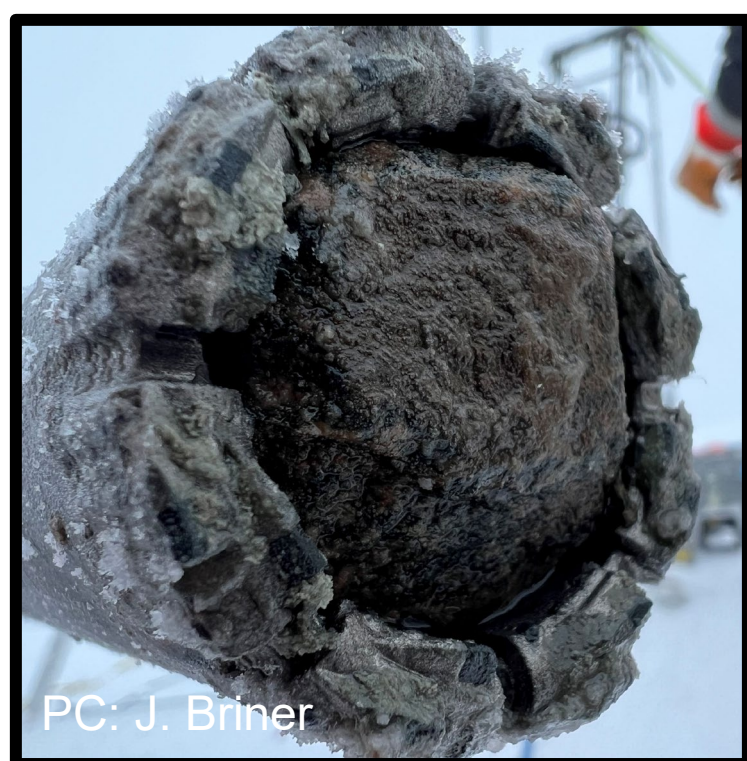
Project Logistics

- 6,800 lbs. of drilling equipment, drilling fluid, fuel, and 5-person team shuttled by helicopter to field site on ice margin
- 20 days on site including 9 days of drilling activity



Drilling Results 2 m of sub-glacial core recovered from beneath 97 m of ice

- Deepest sub-glacial core ever recovered with Winkie Drill
- Full face ice coring bit successfully tested allowing rapid bedrock access and reduced logistics at blue ice sites
- Subglacial sediment clogged fluid circulation system and prevented bedrock core collection

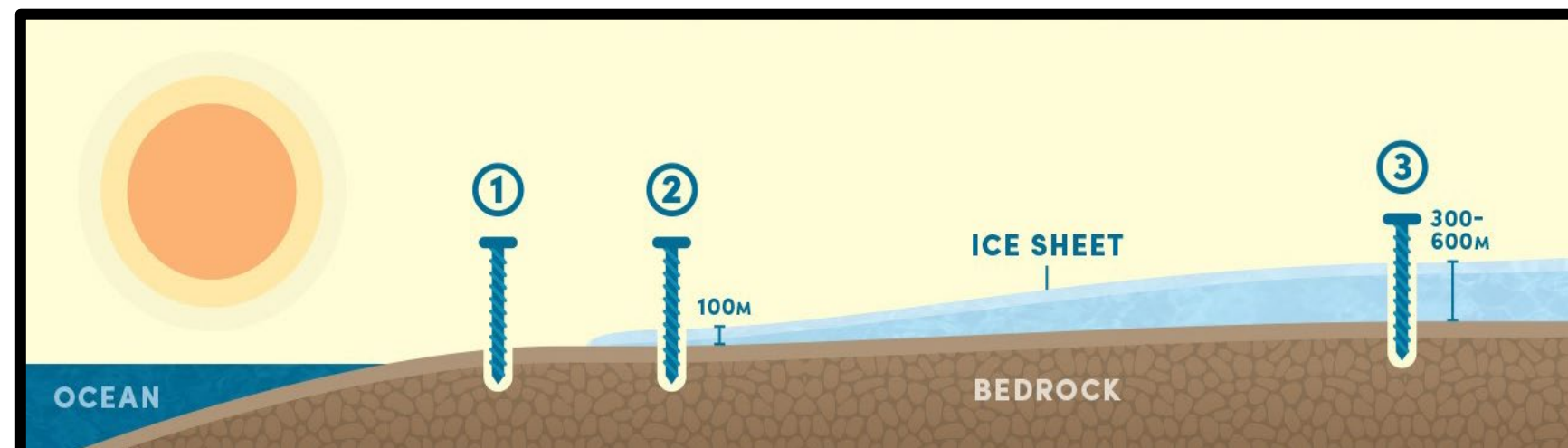


IDP sub-glacial coring drills for the first time collected 9.4 m of frozen sediment and bedrock cores from beneath the Greenland Ice Sheet.

GreenDrill Project

Multi-year science and engineering collaboration focused on using the chemical signature from sub-glacial bedrock cores to better understand how the Greenland ice sheet responded to past periods of global warming and impacted sea level rise.

Drilling Transect: Winkie Site (2), ASIG Site (3)



Source: University Communications, University at Buffalo



Source: University Communications, University at Buffalo



Deep Drilling Site Agile Sub-Ice Geological Drill

Season Objective

- Recover ice and sub-glacial bedrock sample from below 500 m of ice

Drill Equipment

- Commercially available MP1000 minerals exploration drill rig modified to be capable of collecting 39 mm diameter ice and rock cores from depths up to 700 m

Project Logistics

- 60,000 lbs. of drilling equipment, drilling fluid, fuel, and 10-person team transported by Basler and helicopter to field site
- 68 days on site including 29 days of drilling activity



Drilling Results and Future Work 7.4 m of sub-glacial core including 4.5 m of bedrock recovered from beneath 509 m of ice

- Deepest sub-glacial core ever recovered with ASIG Drill
- Novel technique of resetting the casing string saved season after hydrofracture event
- Normal circulation drilling proven as a reliable method for reducing hydrofracture risk for future seasons

