



# SIMBA

## SEA ICE Mass Balance in the Antarctic





September 26 we arrived at Ice Station Belgica

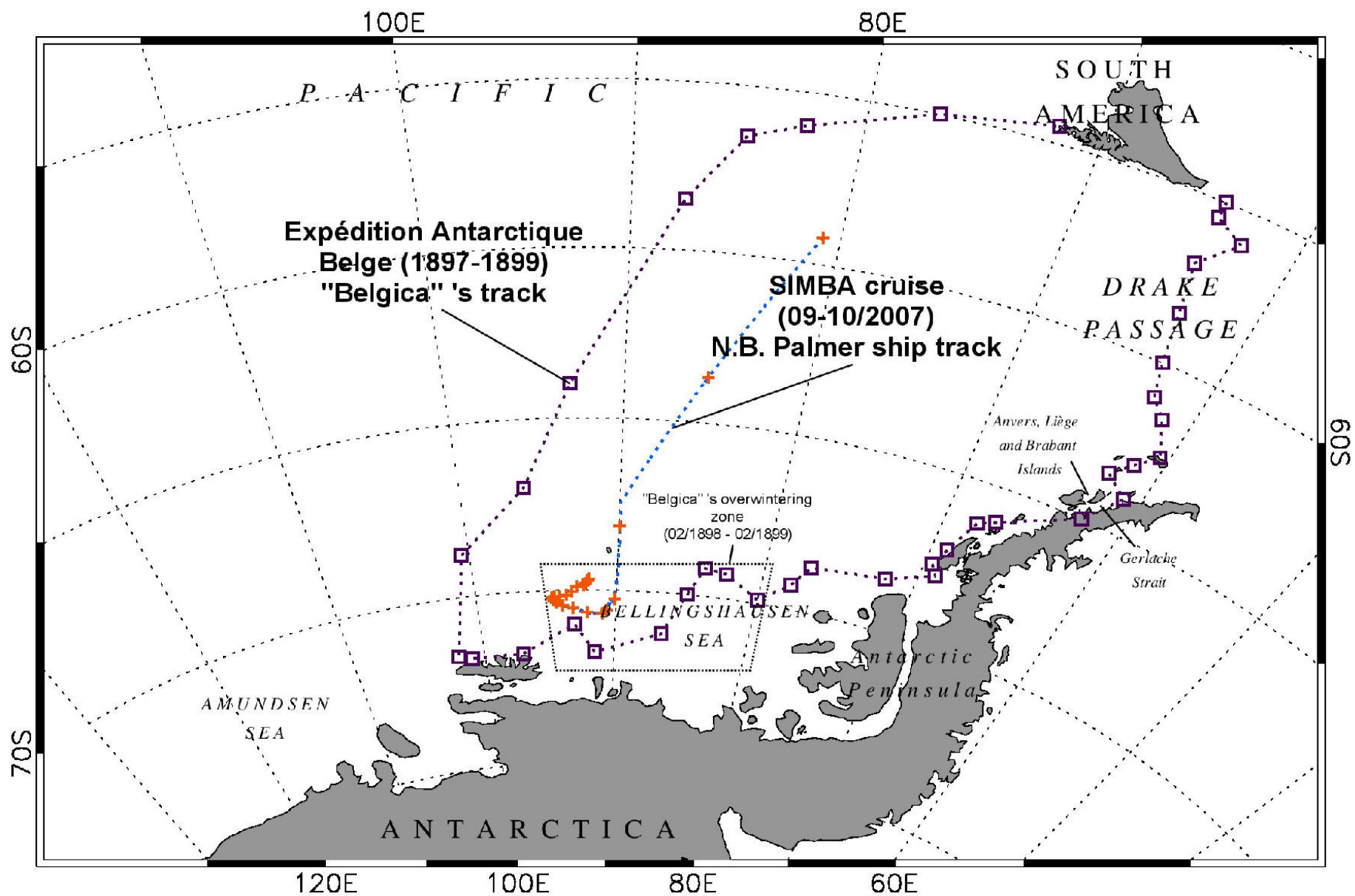
Latitude 71 South Longitude 90 West

25 days after first departing Punta Arenas

No human has ventured into this region in wintertime since the first Belgica expedition arrived in 1898



Note: they got trapped in the ice for 18 months!



Courtesy of Martin VanCoppennelle

# SIMBA

Baseline data from which to monitor future change in **Antarctic** sea ice:

- **Geophysical processes** (snow & ice thickness and extent, physical properties, heat flux, energy balance)
- **Biogeochemical processes** (biological habitats, DMS production, trace metals, CO<sub>2</sub> Flux)
- **Satellite Remote Sensing** (validating tools for long-term monitoring of sea ice / climate systems)

# En Route to Final Ice Camp: Ice Observations



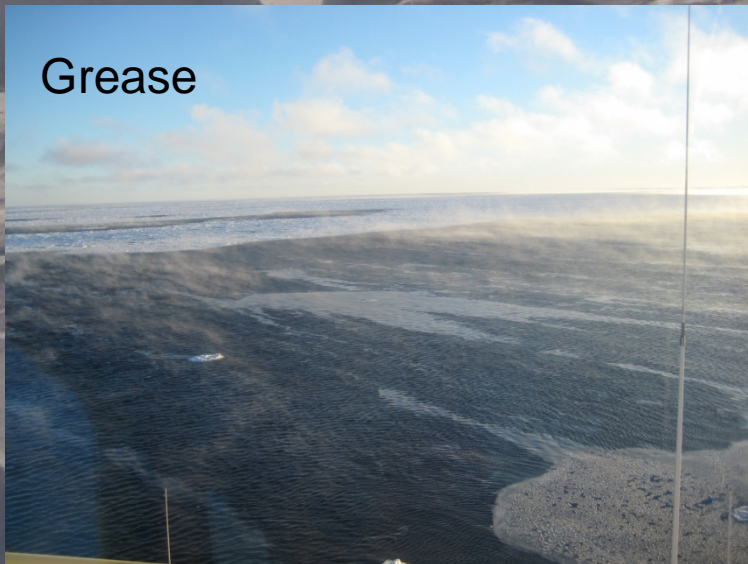
# En Route to Final Ice Camp: Ice Observations



Pancake



First Year



Grease



Nilas

# Geophysical Studies Conducted on the Sea Ice: **Time Lapse Camera**



# ROV'S and AUV'S



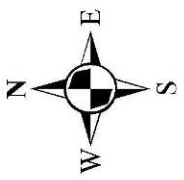
# SIMBA Geophysical Assessment



Emperor penguins lined up to assist with measurements

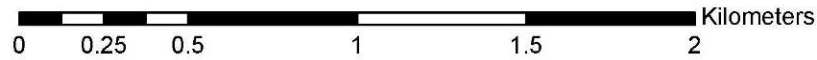
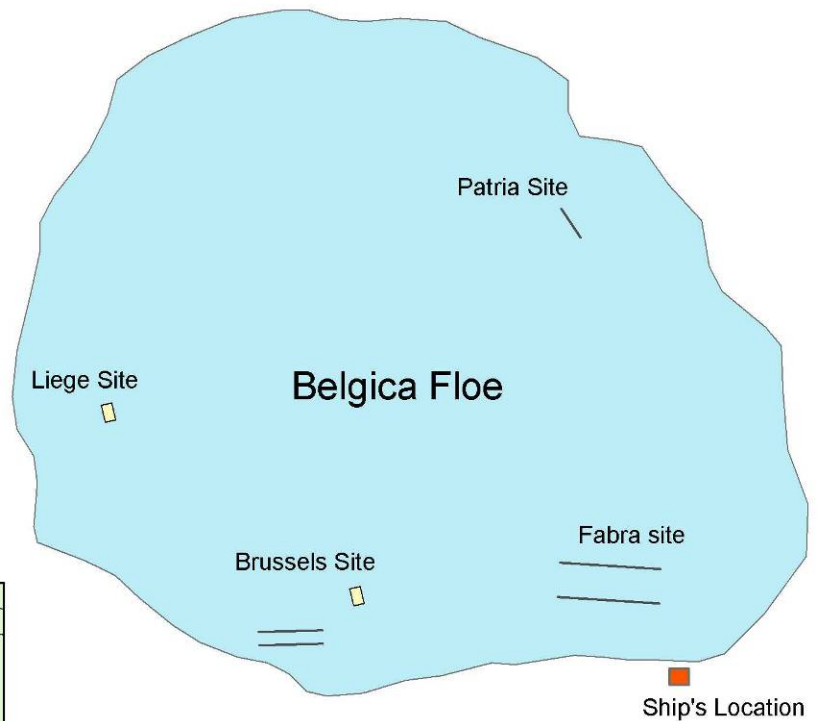
Photo by: Glenn Grant

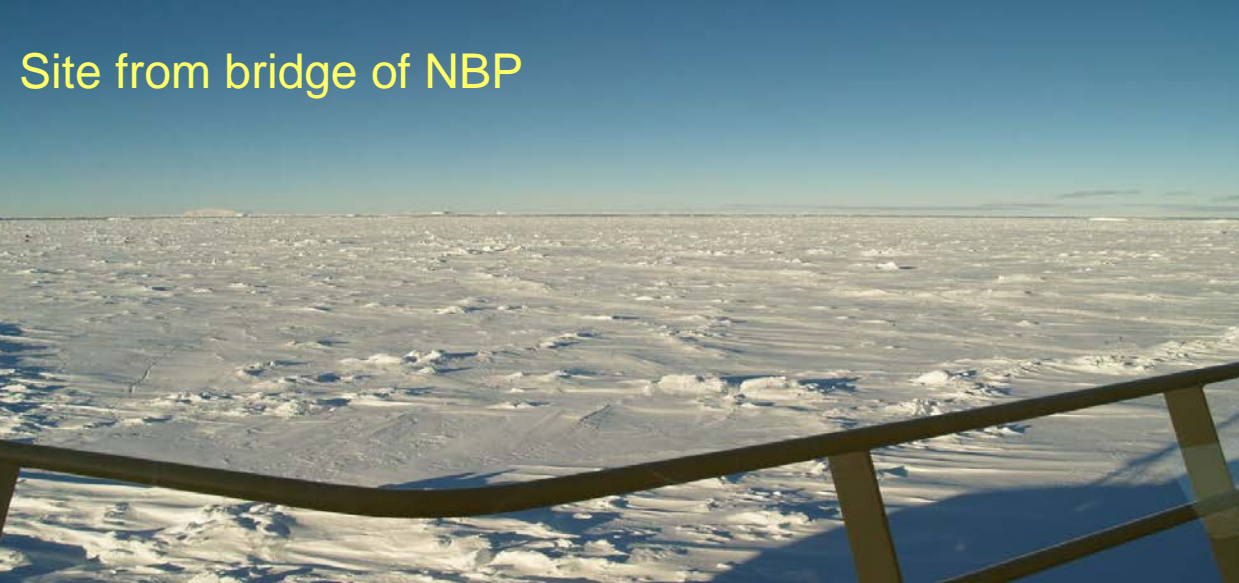
# Ice Station Belgica



## Legend

— Geophysical Lines

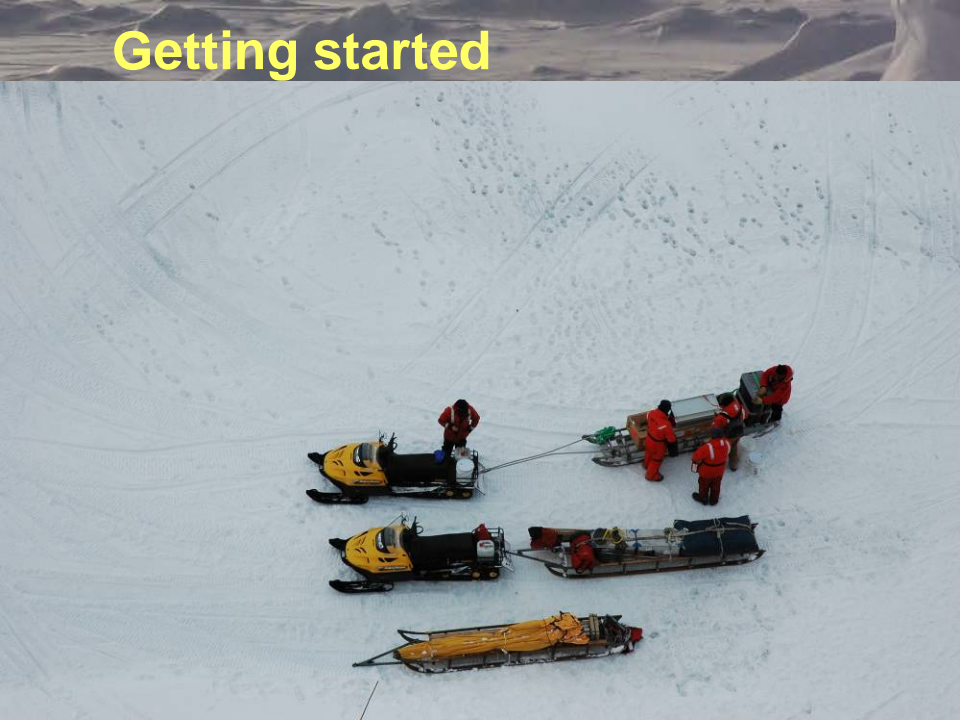




Surface roughness across Site



Getting started



# Geophysical Studies Conducted on the Sea Ice: **Snow Depth and Ice Thickness**

**View from Transect line 1**



# Geophysical Studies Conducted on the Sea Ice: Snow Depth and Ice Thickness

Step 4: Drill

+2 meter = 6 ft drill bit

ill bits



# Geophysical Studies Conducted on the Sea Ice: Snow Depth and Ice Thickness

Snow thickness can get up to  $\sim 1.5 \text{ m} = \sim 4.5 \text{ ft}$



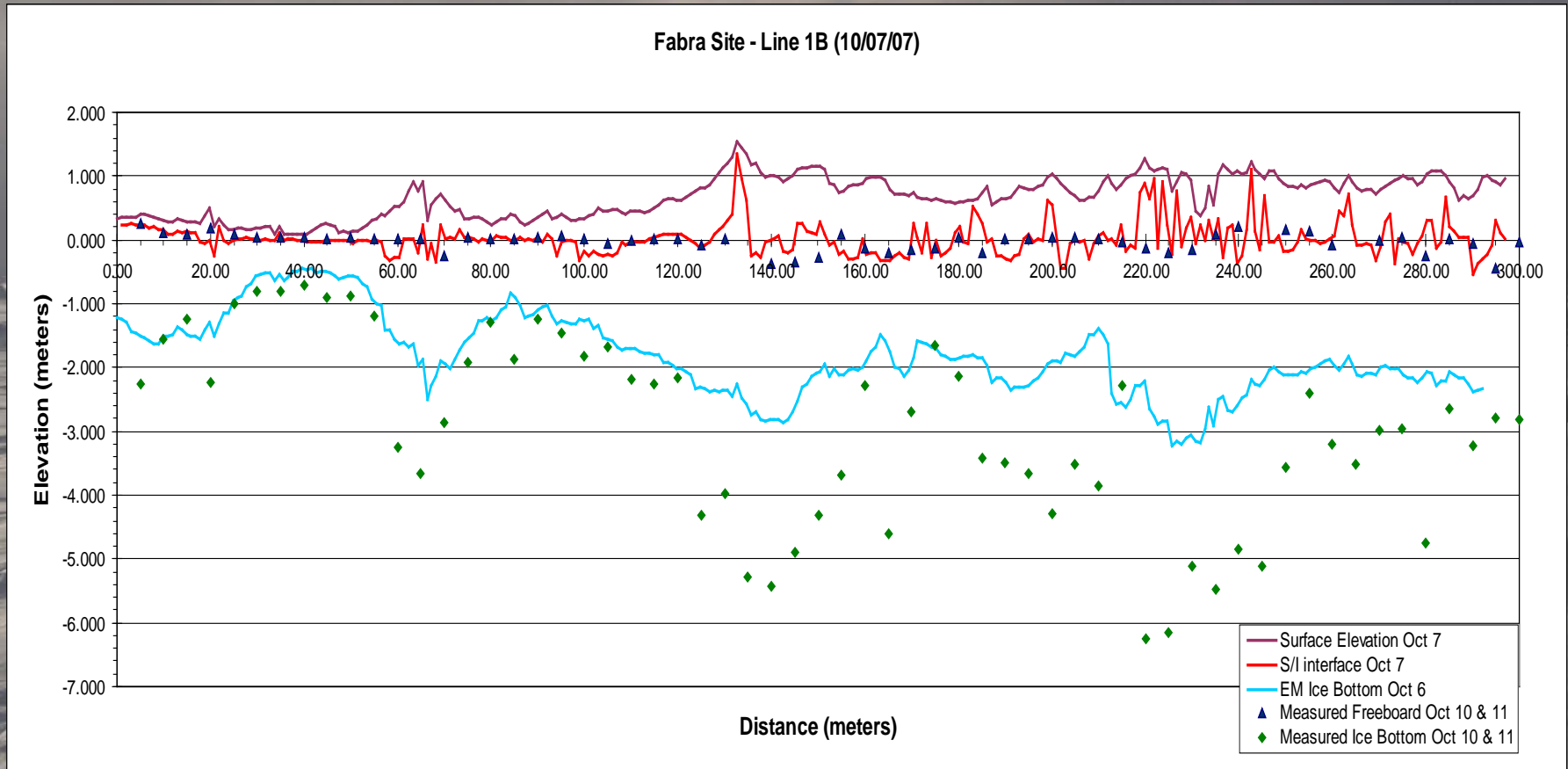
# Geophysical Studies Conducted on the Sea Ice: Snow Depth and Ice Thickness – EM 31



*Concurrent measuring of ice thickness to compare with in situ measurements*



# Typical Profile of Snow Depth and Ice Thickness



# Geophysical Studies Conducted on the Sea Ice: **Snow Pits**



# Geophysical Studies Conducted on the Sea Ice: **Resistivity**



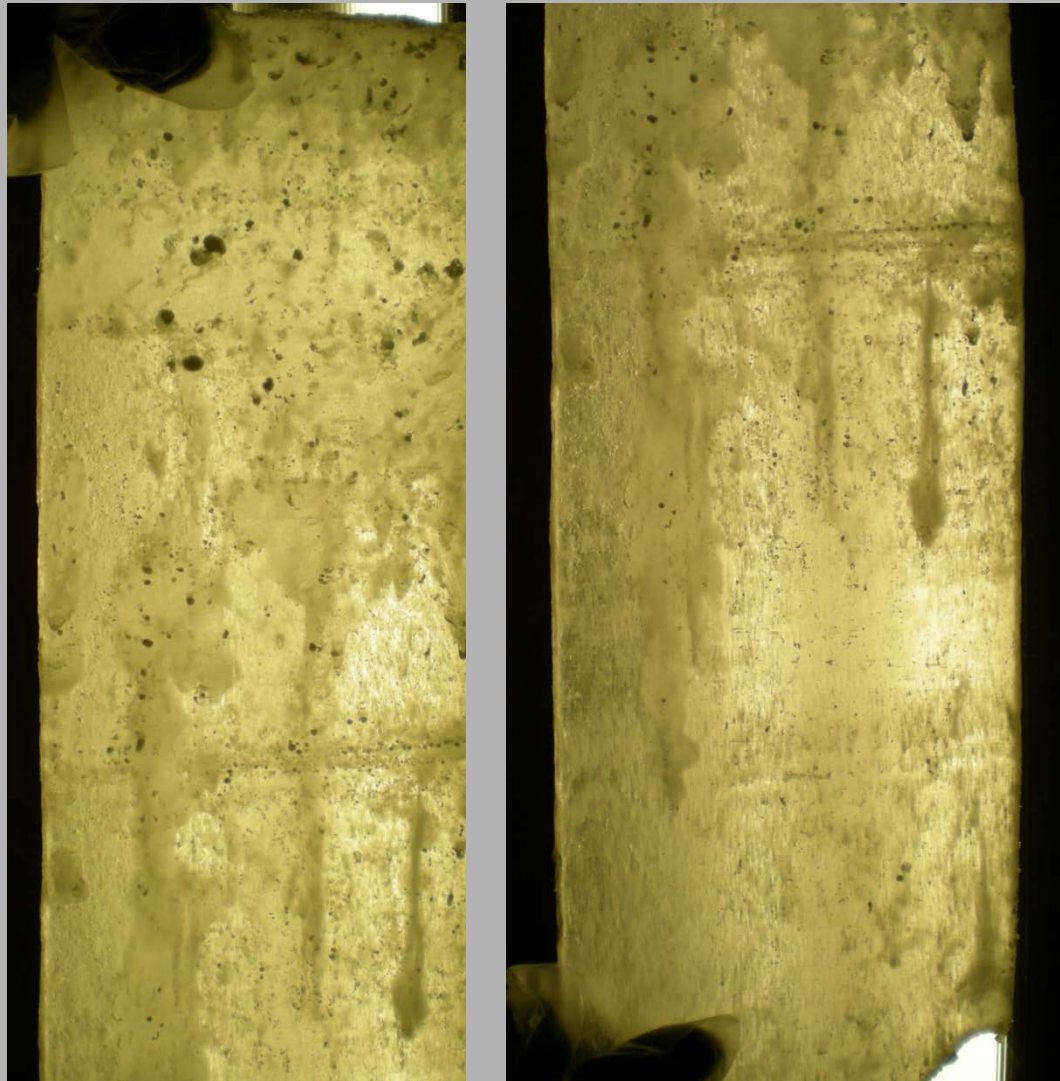
# Various Teams Required to Each Job



# Biogeophysical Studies Conducted on the Sea Ice: Ice Coring



# Biogeophysical Studies Conducted on the Sea Ice: Ice Coring



**Figure 8 :** 1 cm-thick section of the Brussels 4 core clearly showing the descending refrozen brine tubes. Fingers for scale.



# *The End*

**Good Luck on your Antarctica Challenge**

Thanks:

UTSA:

Stephen F. Ackley, Blake Weissling, Mike Lewis,  
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ULB:

Jean-Louis Tison and Martin VanCuppenelle

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