

# QUANTIFYING UPPER LAYER OCEAN CIRCULATION USING ICEBERG GPS TRACKING

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# Outline:



**Big Picture:** Sea Level Rise & the Greenland fjord

**Methods Motivation:** Icebergs to study the ocean

**Study Site:** Ilulissat fjord & Jakobshavn Glacier

**Data:** Iceberg Tracking

**Why this matters:** Climate modeling

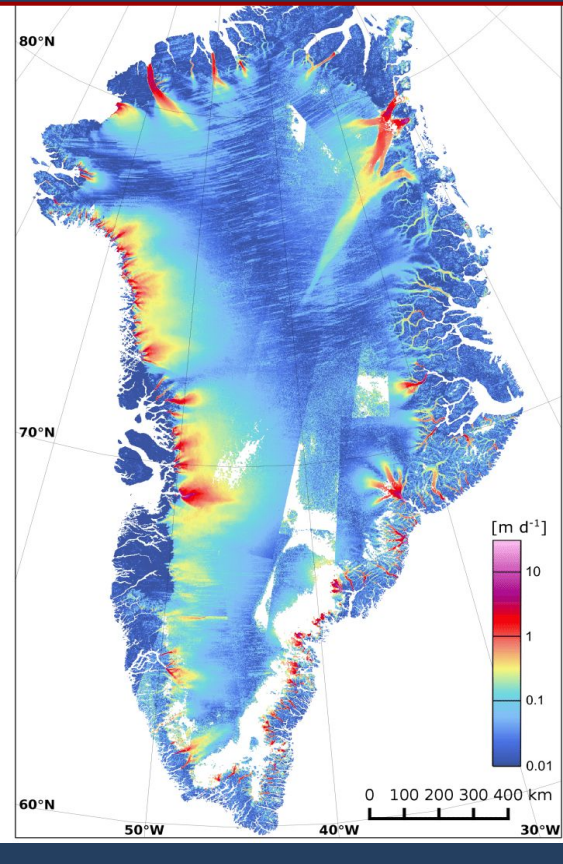
# Sea Level Rise



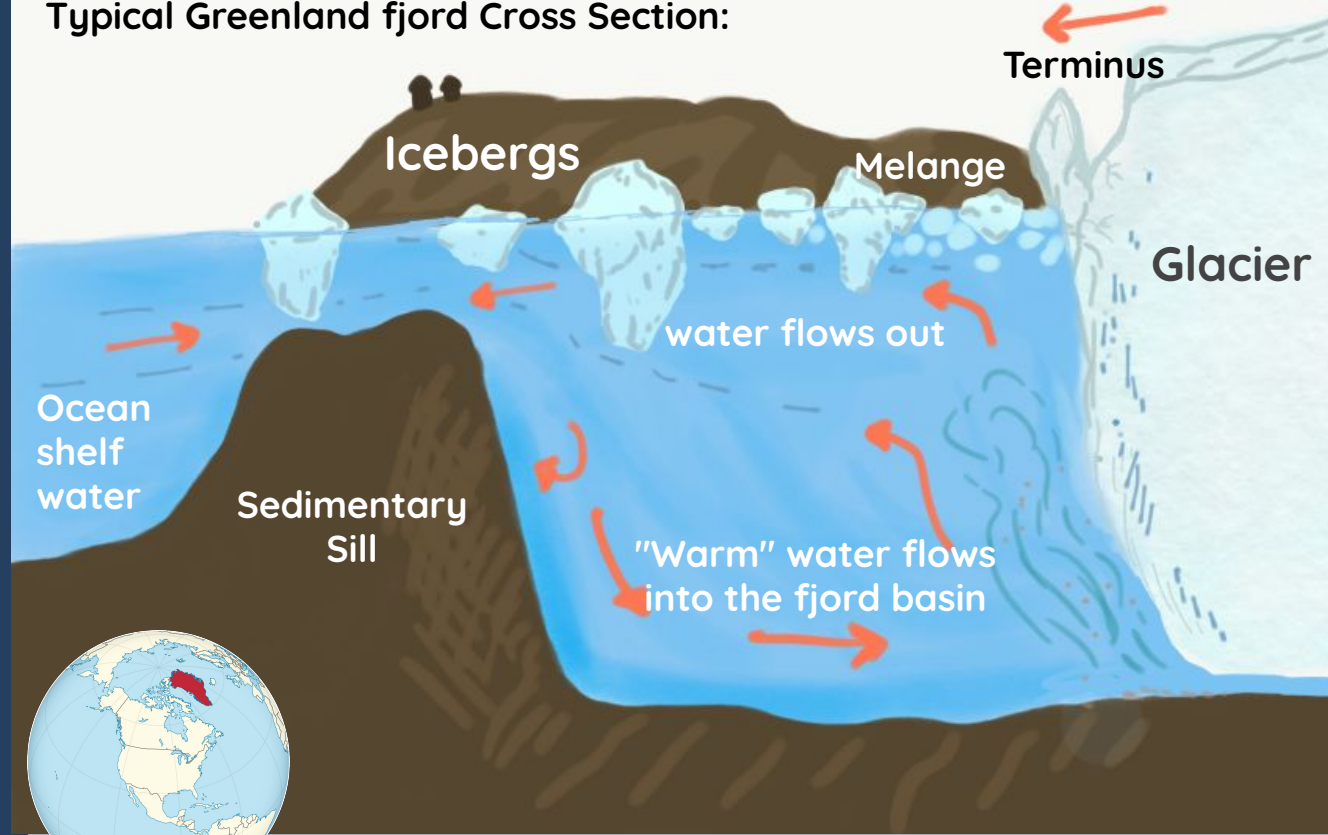
Ferdi Rizkiyanto



# Climate Change: Greenland & Icebergs



Typical Greenland fjord Cross Section:



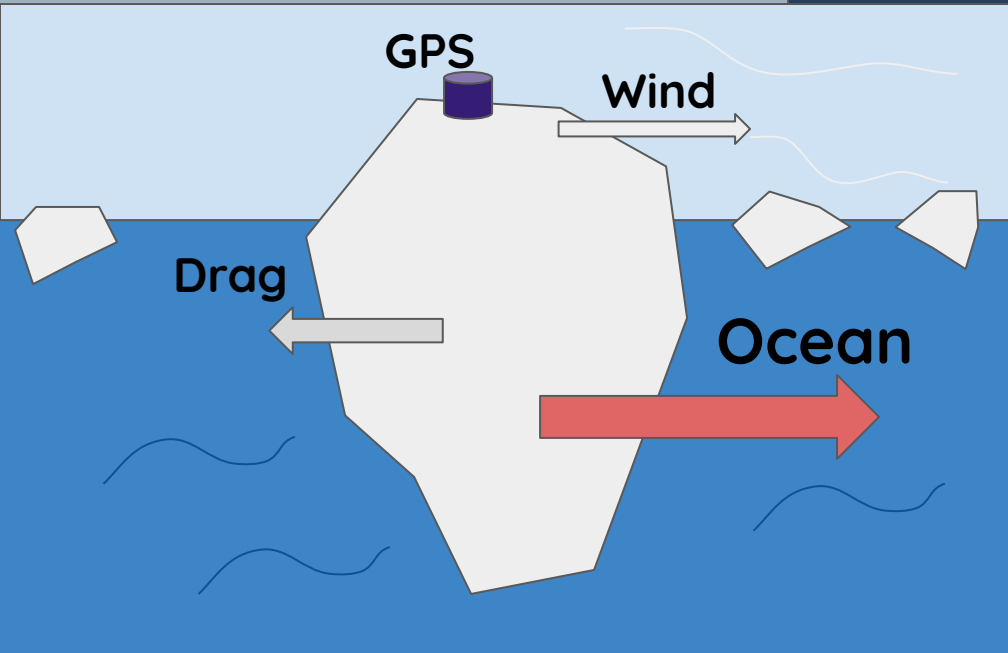
Ice choked fjords are dangerous...

(Not our team)



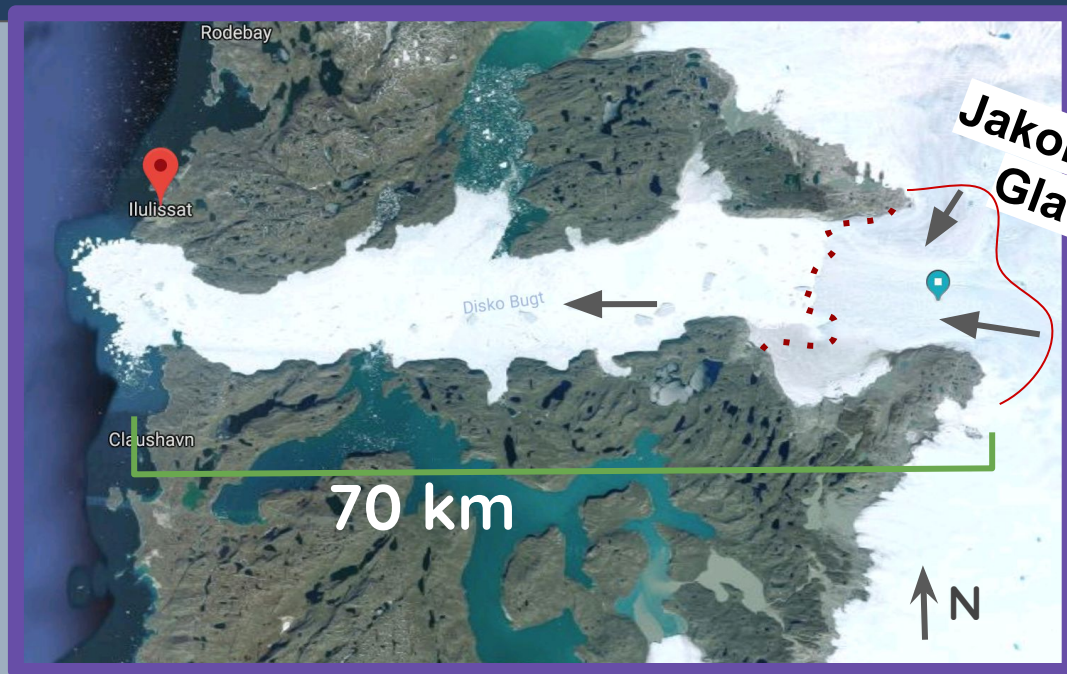
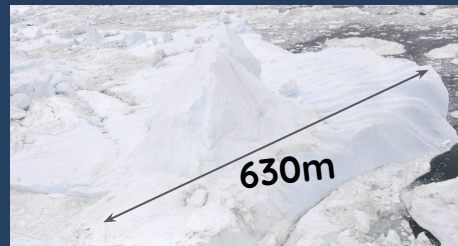
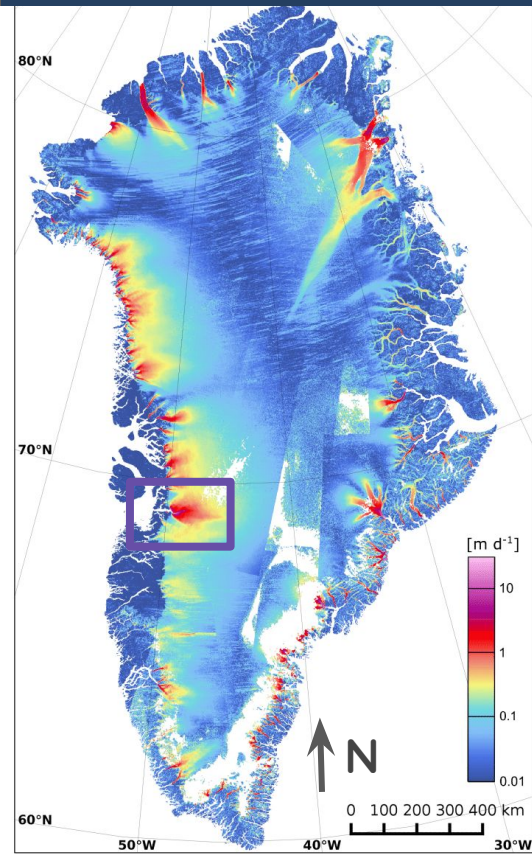
Ice choked fjords are dangerous...

# Solution: GPS Tracker deployment via Helicopter



Icebergs are controlled by ocean currents!

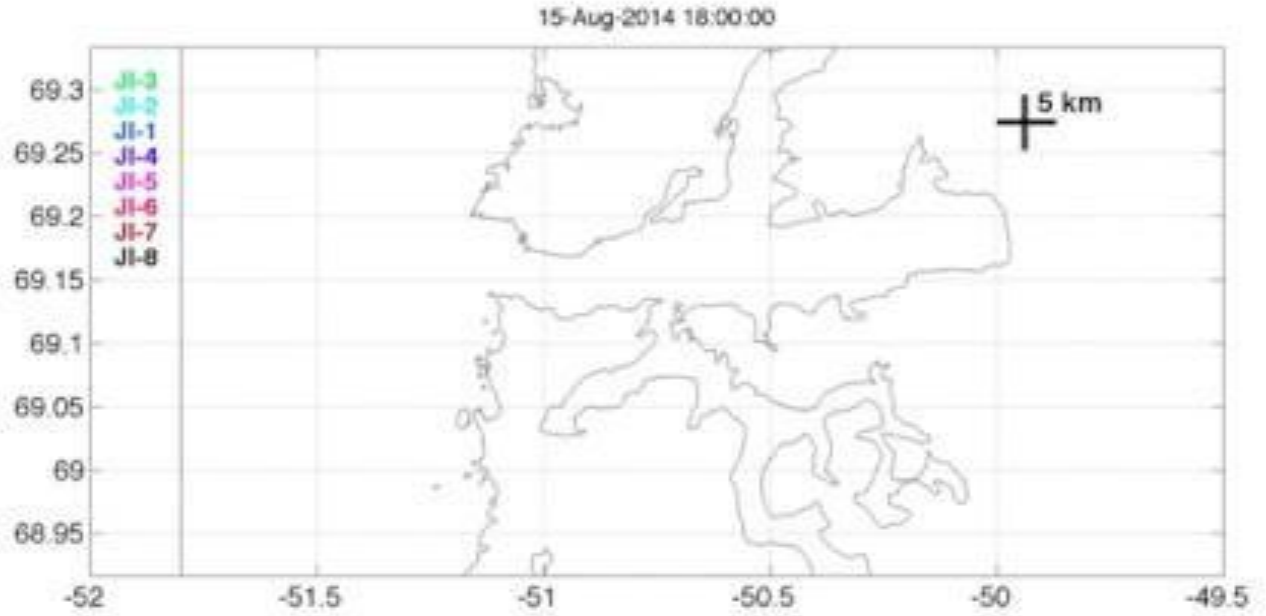
# Ilulissat fjord & Jakobshavn glacier, Greenland



# Our GPS tracks...

★ START

✕ END



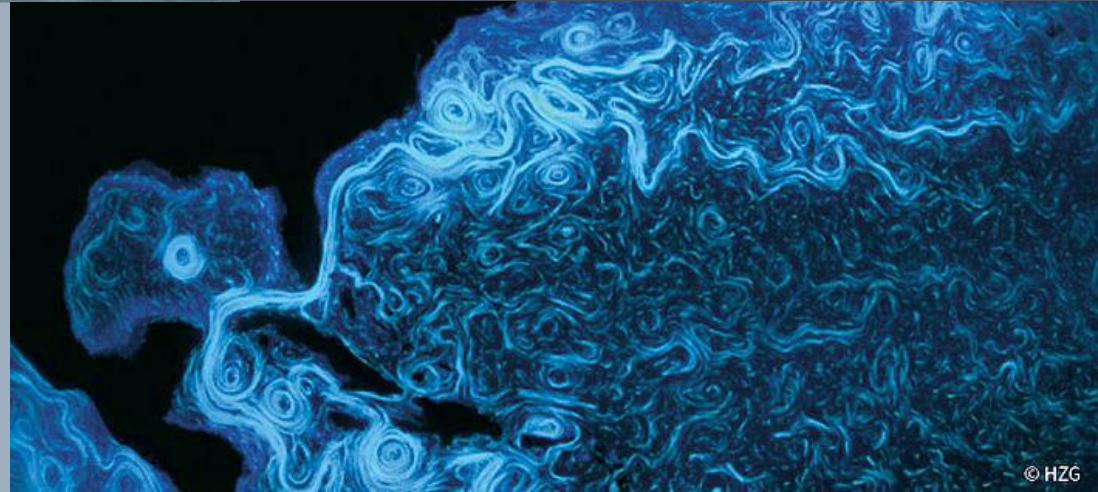


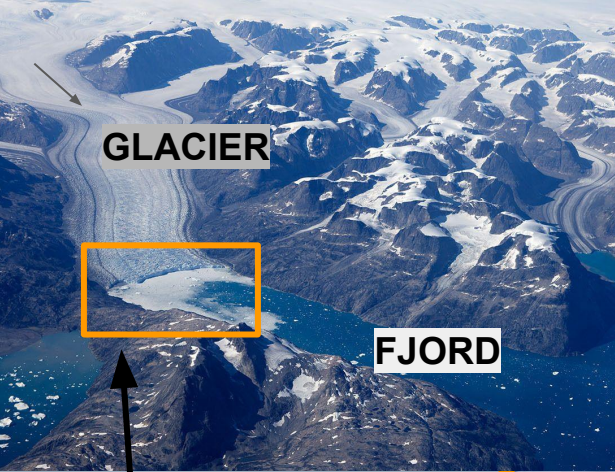
# *What do these tracks tell us?*



1. Melange and calving events

2. Eddy circulation patterns





19:42



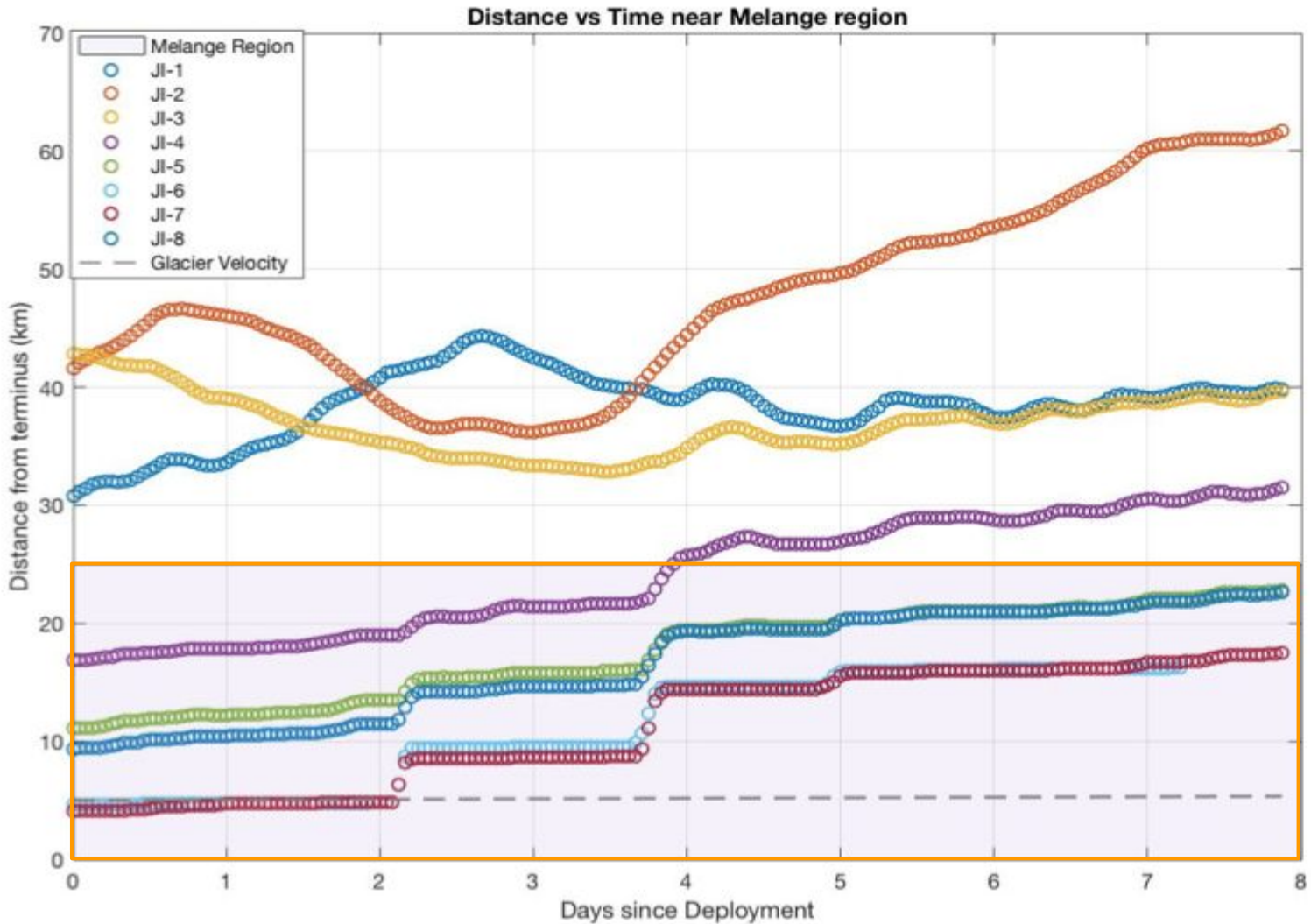
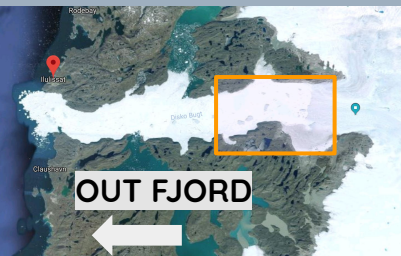
**MELANGE:**

Sea Ice +  
Icebergs near  
the Glacier &  
Ocean  
Interface



# The Melange

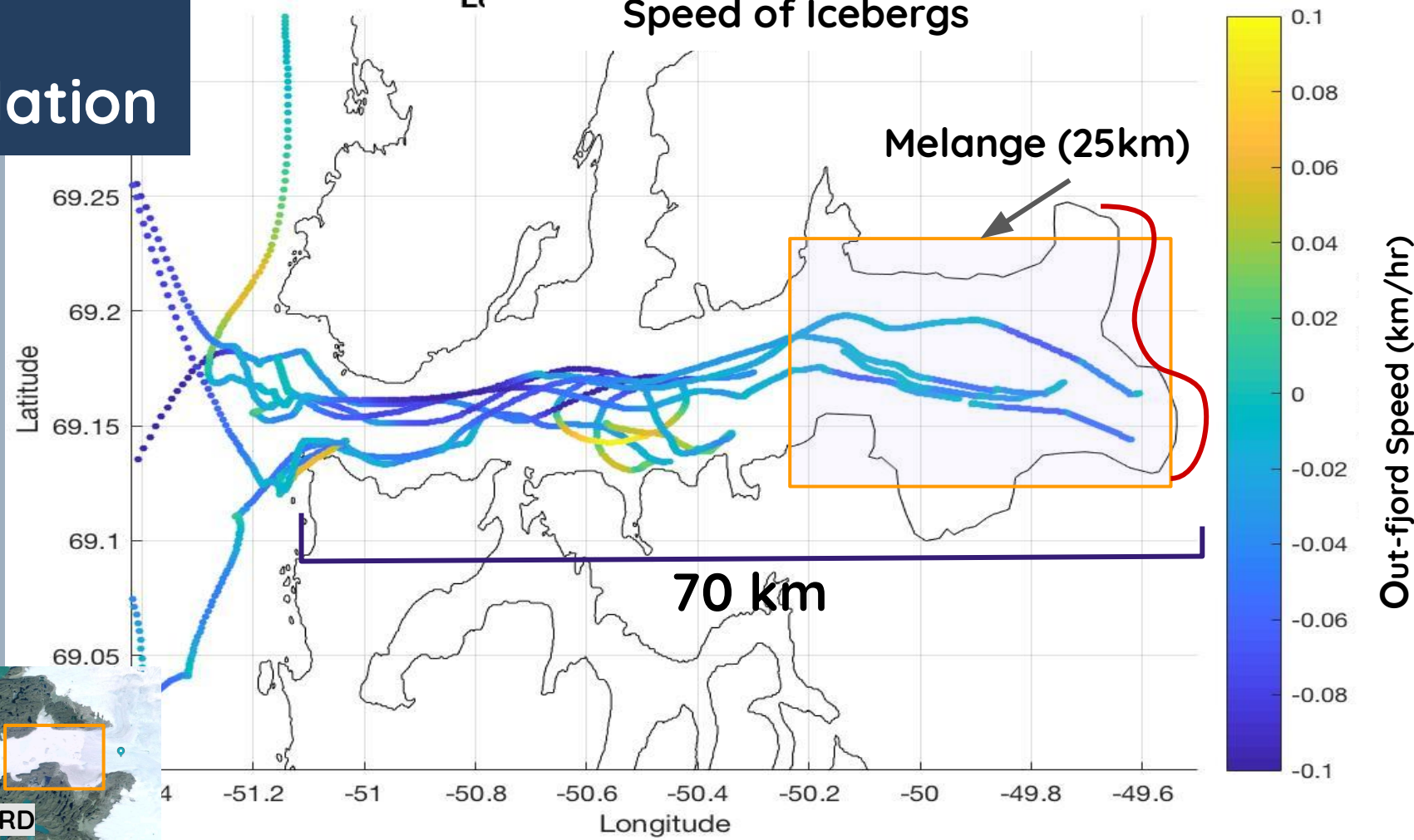
↑  
OUT  
FJORD



# Eddy Circulation

L<sub>c</sub>

## Speed of Icebergs



Latitude

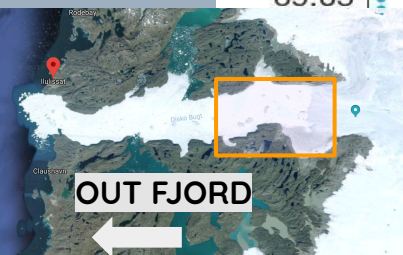
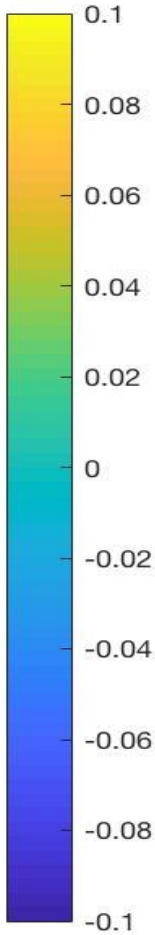
69.25  
69.2  
69.15  
69.1  
69.05

Melange (25km)

70 km

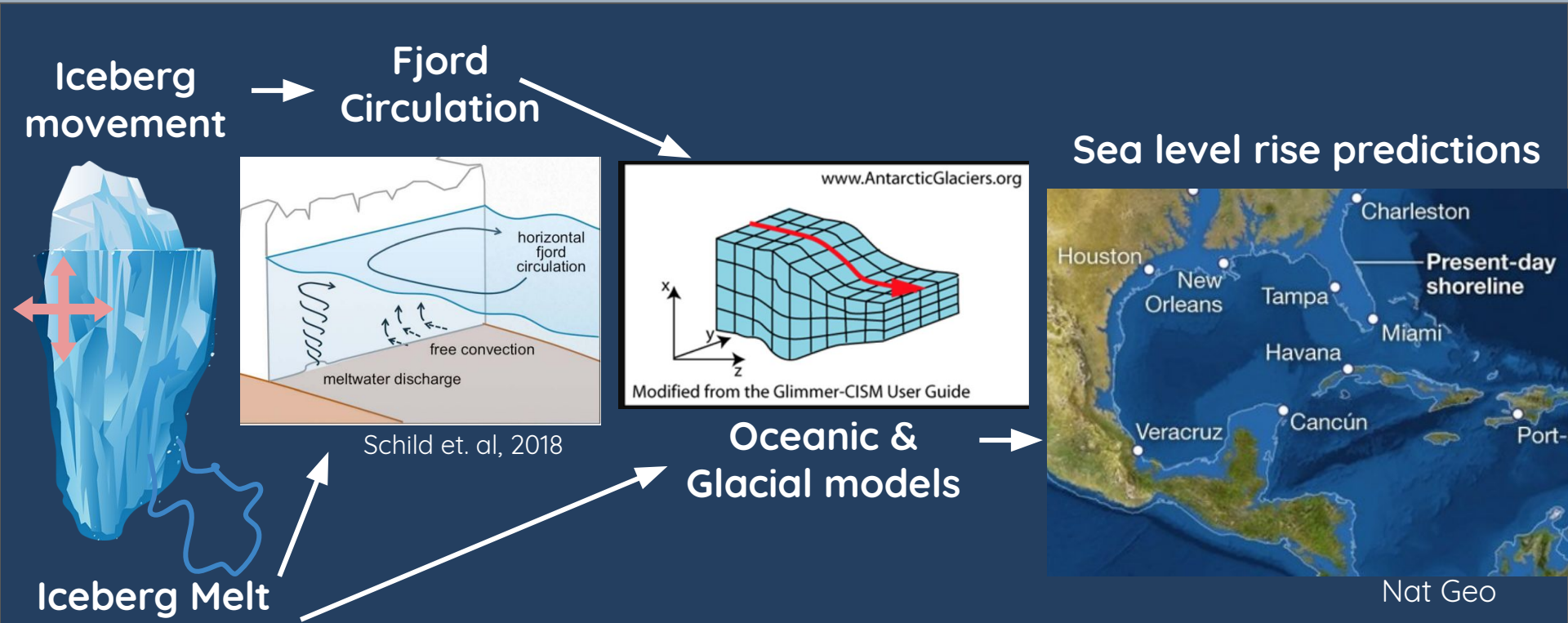
Longitude

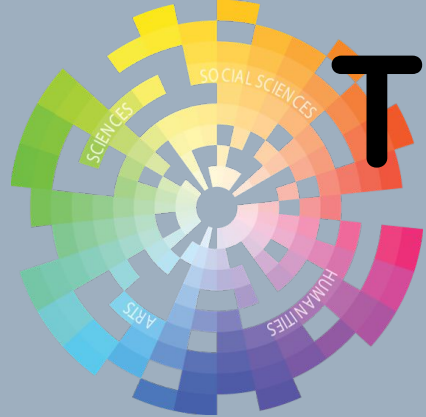
Out-fjord Speed (km/hr)



OUT FJORD

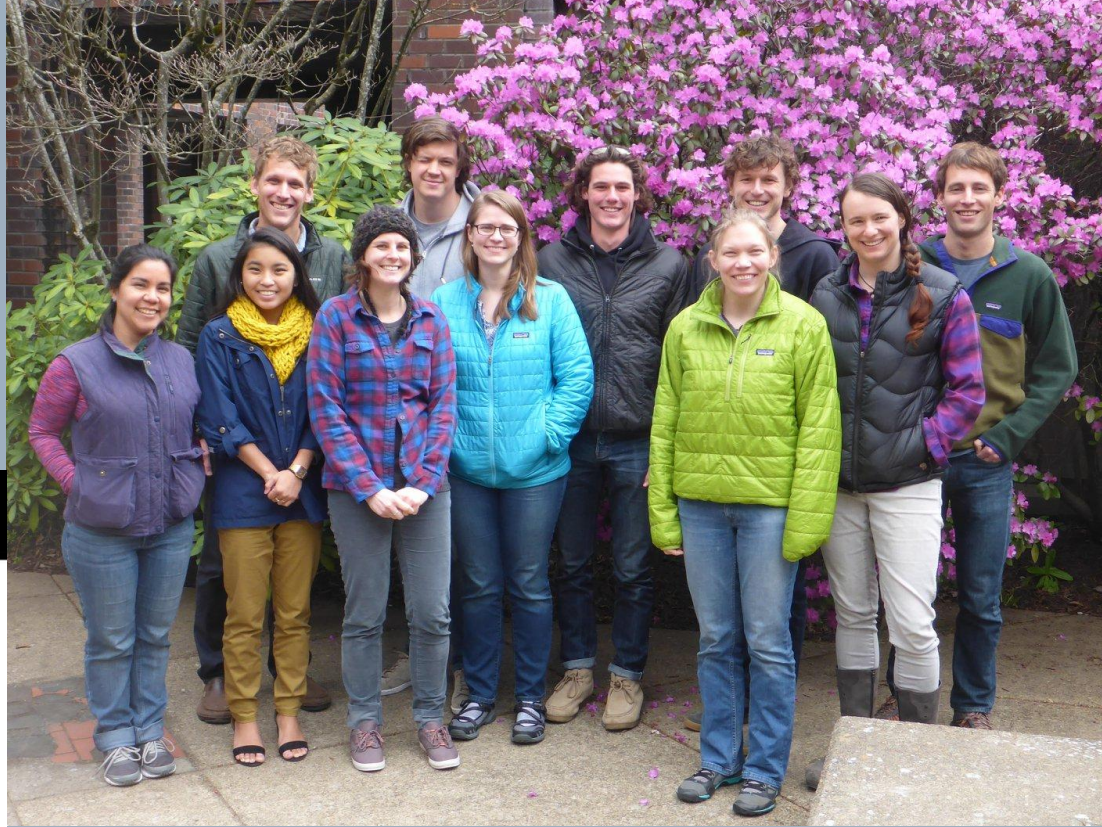
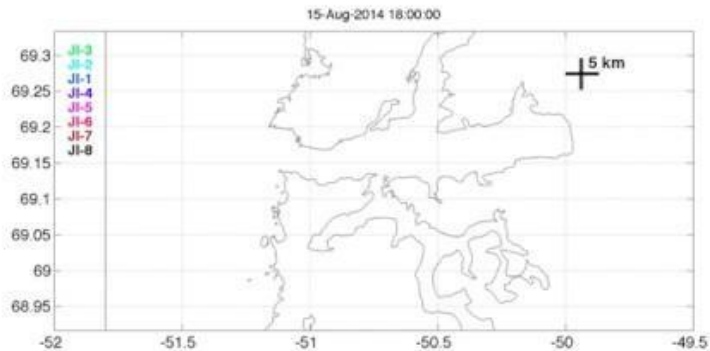
# Ilulissat's first quantification of upper layer circulation





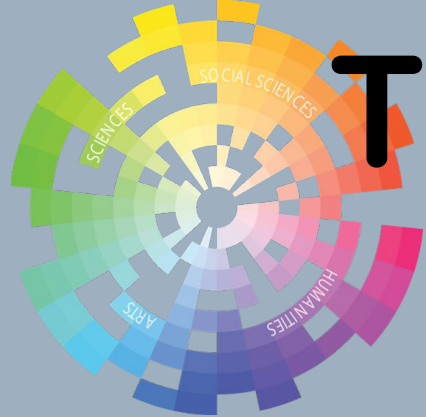
# Thank you!

A replay of our tracked icebergs:



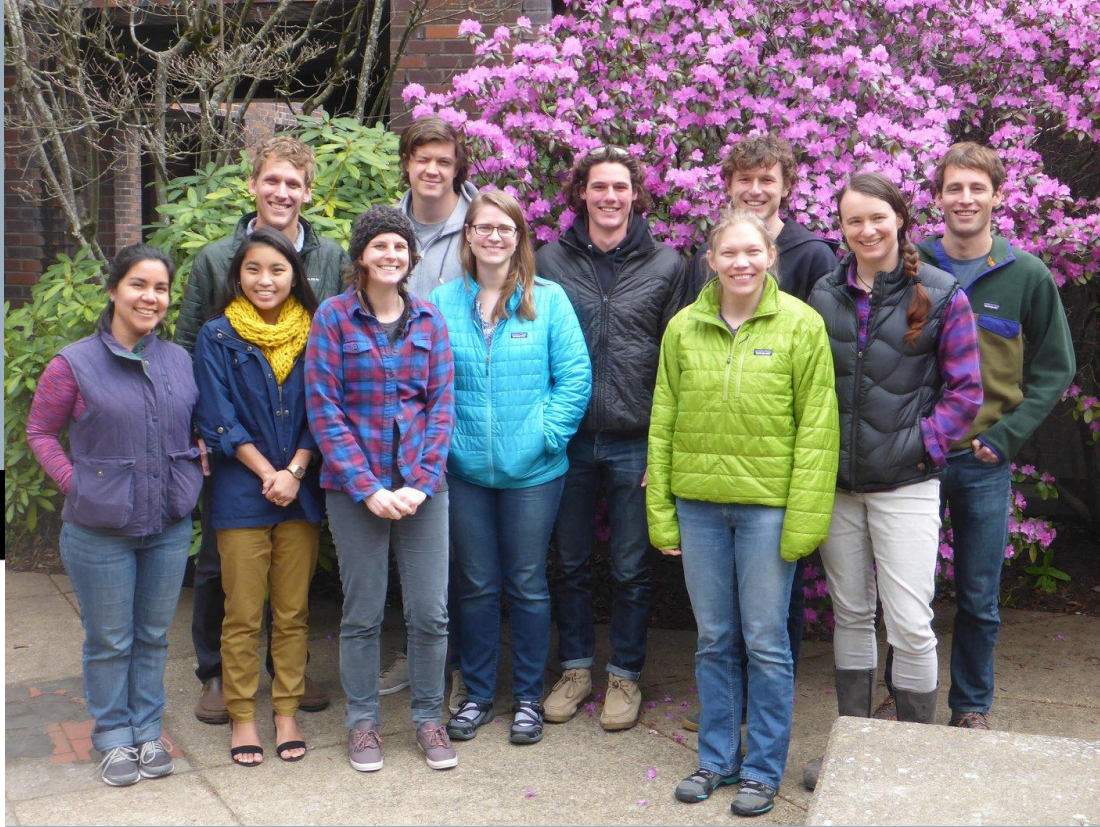
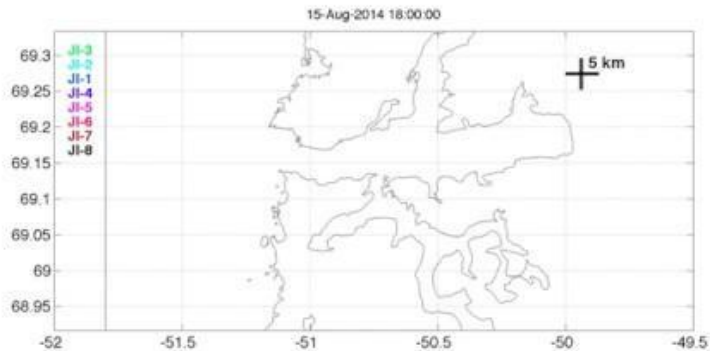
# OCEANSICE SCIENCE

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# Thank you!

A replay of our tracked icebergs:



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# Our GPS tracks...

The following video is in the same orientation as the map!

