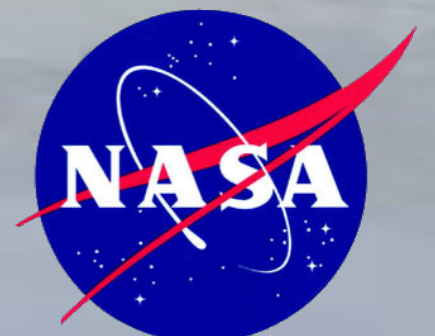
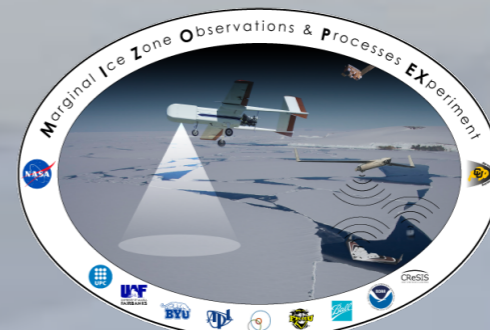


# Near-surface temperature gradients detected by microbuoys in the Arctic Ocean

Alice Bradley  
Scott Palo  
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Gabe LoDolce

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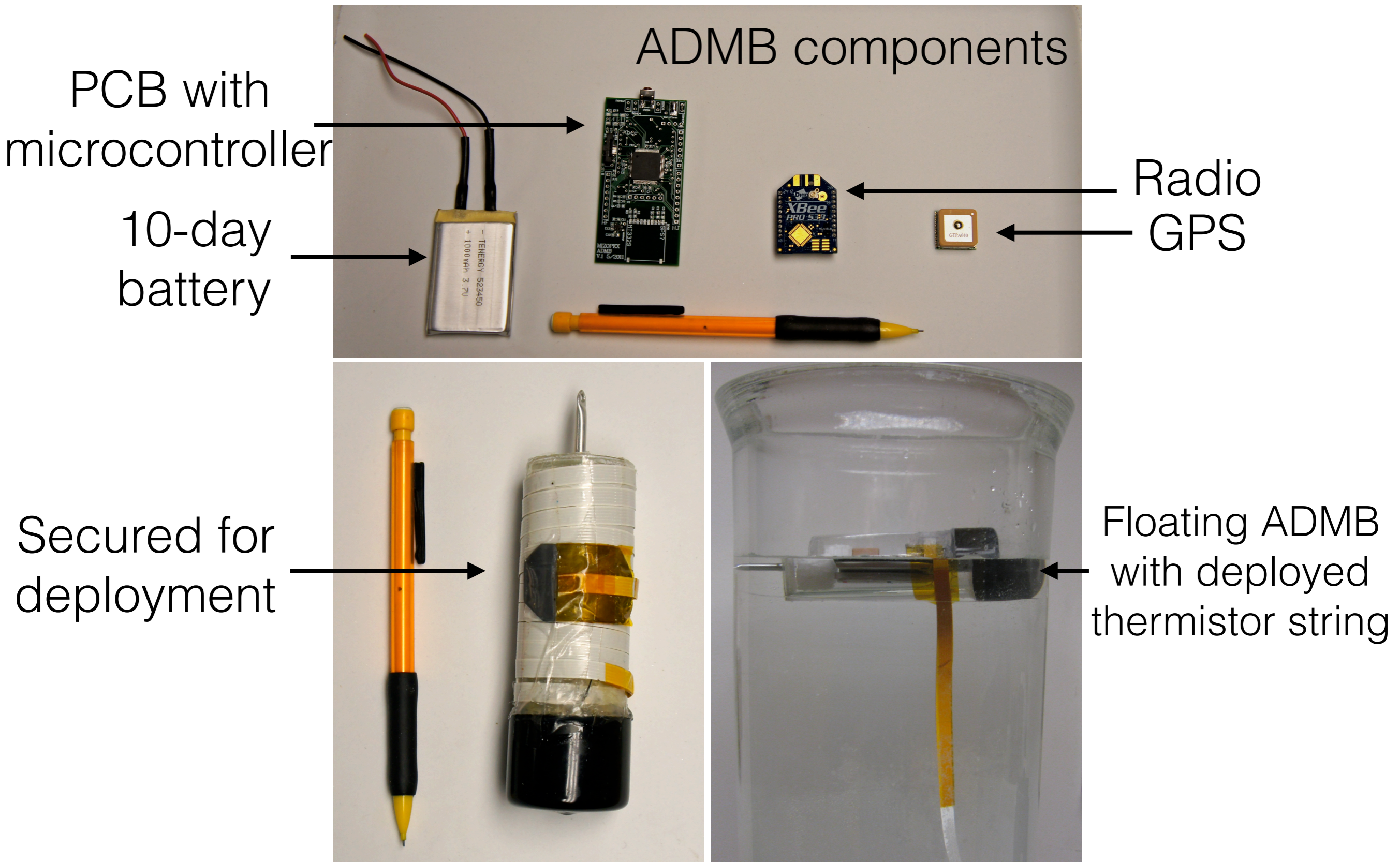
[alice.bradley@colorado.edu](mailto:alice.bradley@colorado.edu)



# Microbuoys

- (1) **Autonomous observations** of
- (2) small-scale processes
- (3) **Robustness** through numbers

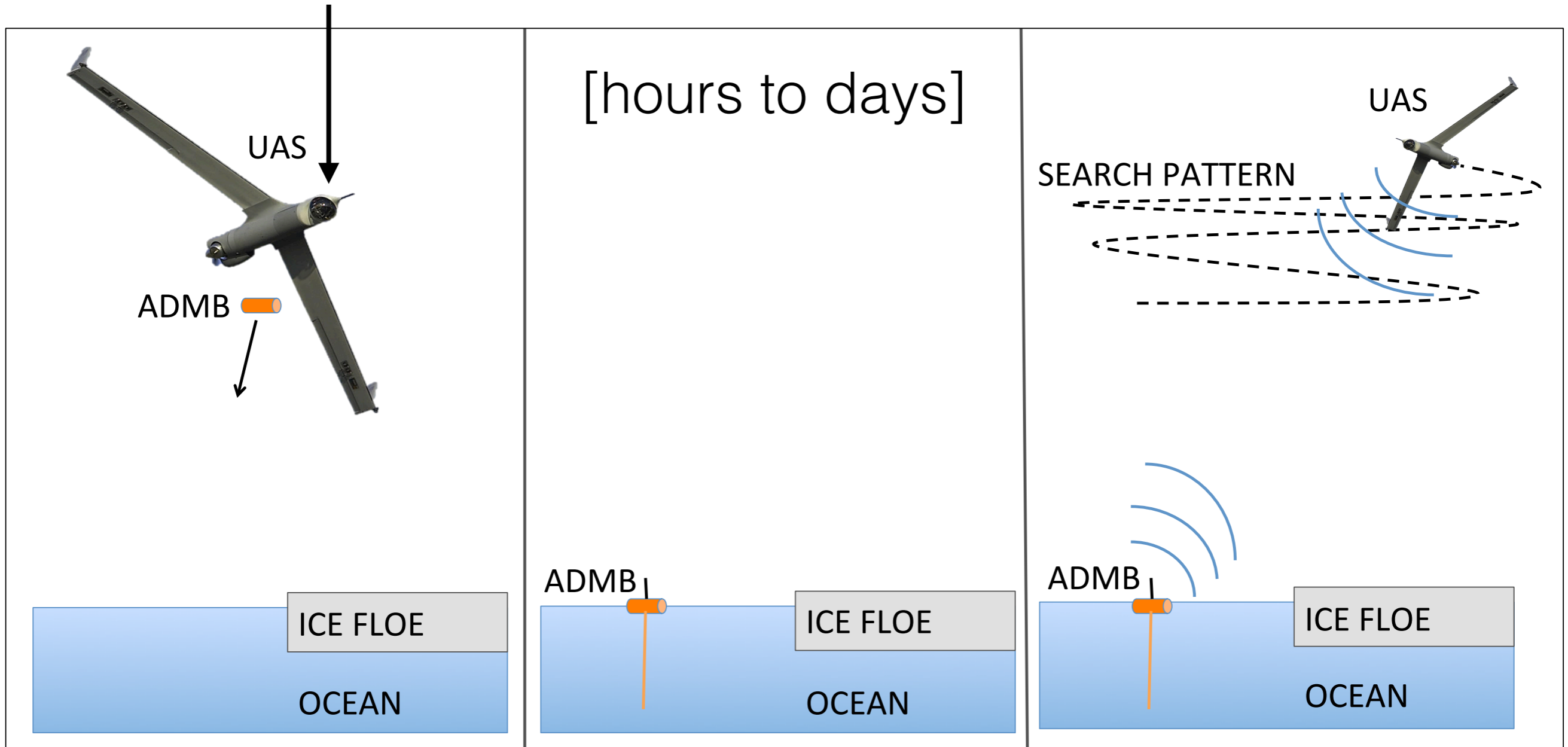
# Air-Deployed MicroBuoys





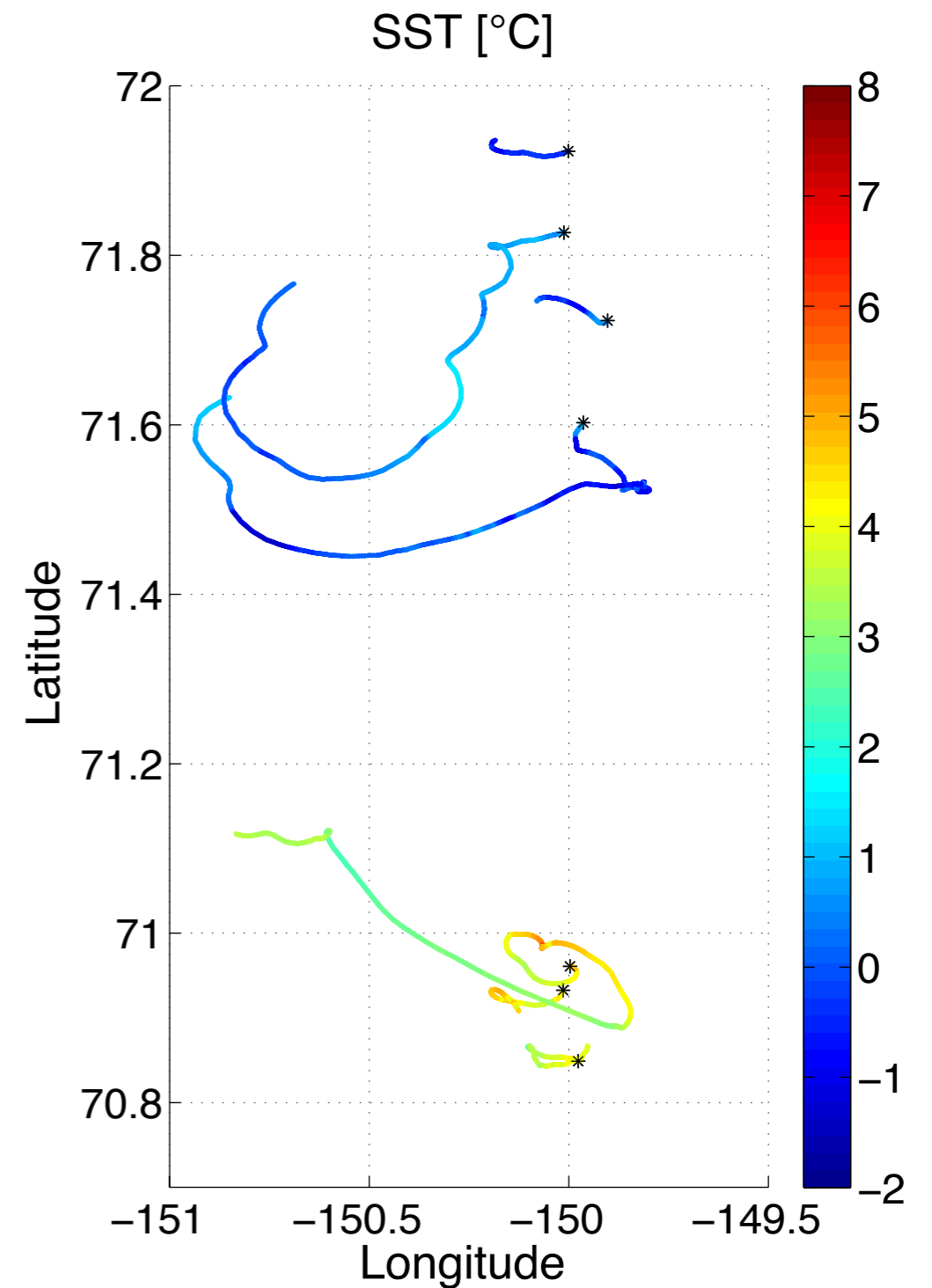
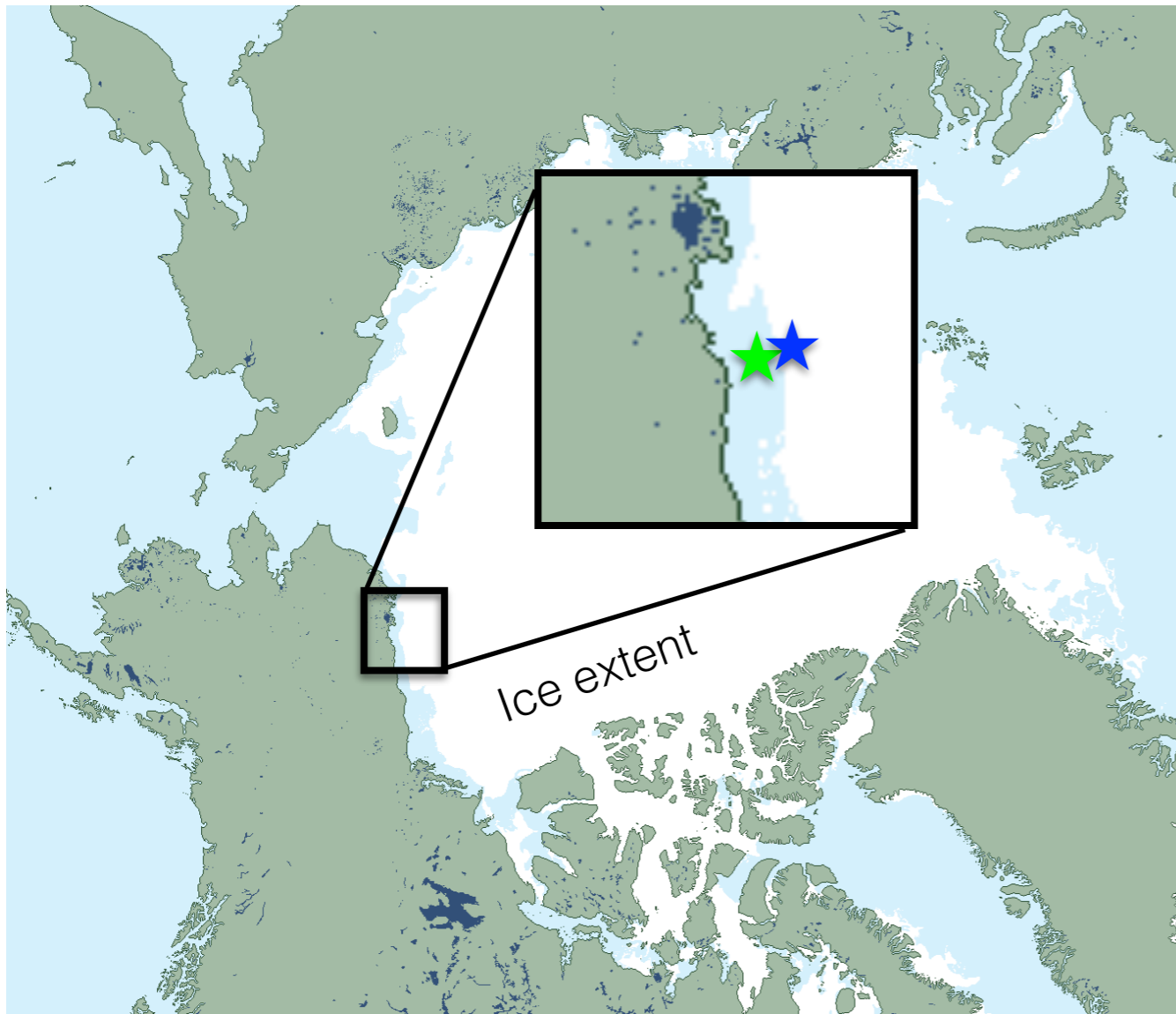
# ADMB deployment

- UAS deployment system
- Drift with surface currents
- Radio data upload



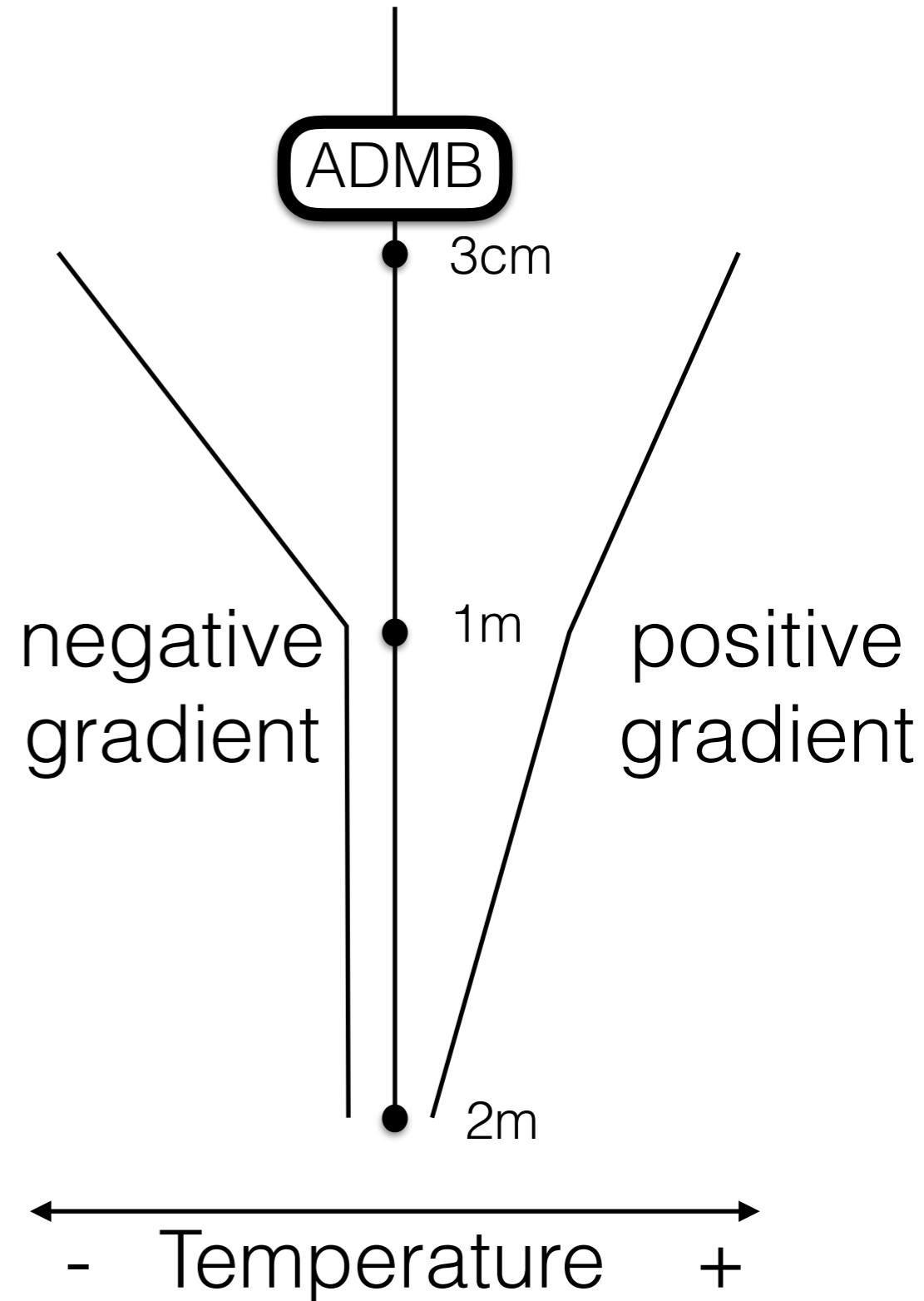
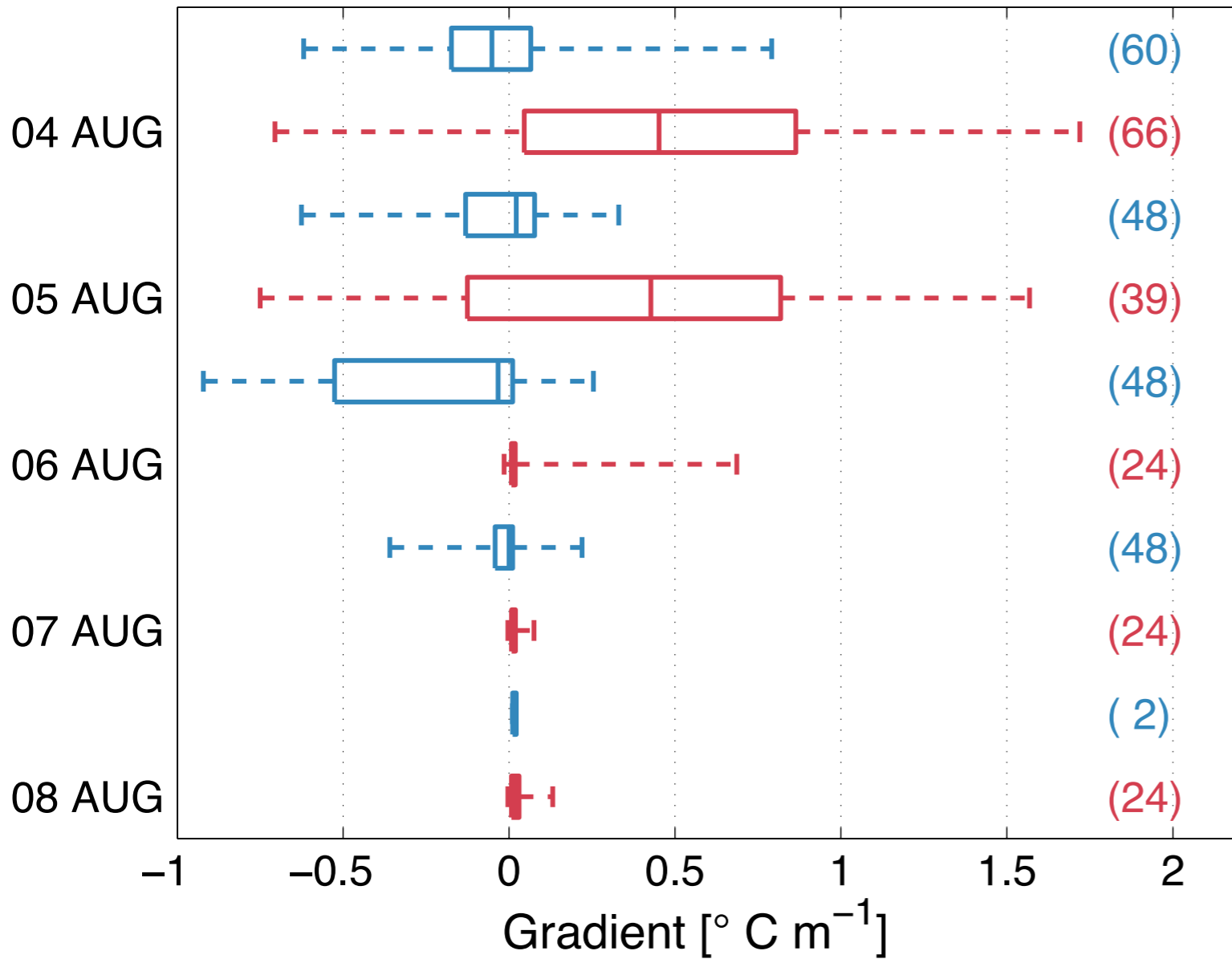
# Deployment

July-August 2013



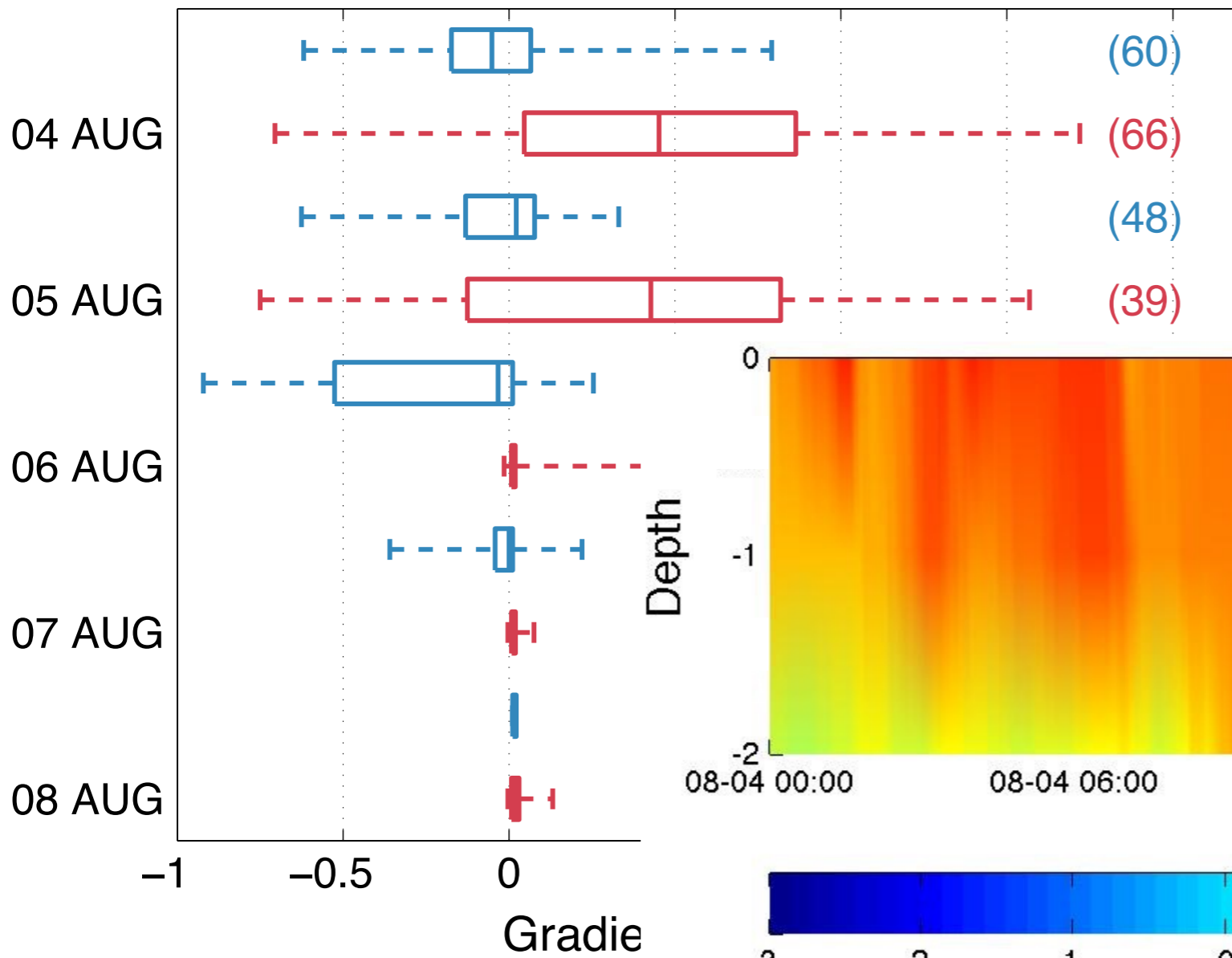
# Temperature gradients

Gradients by region and day



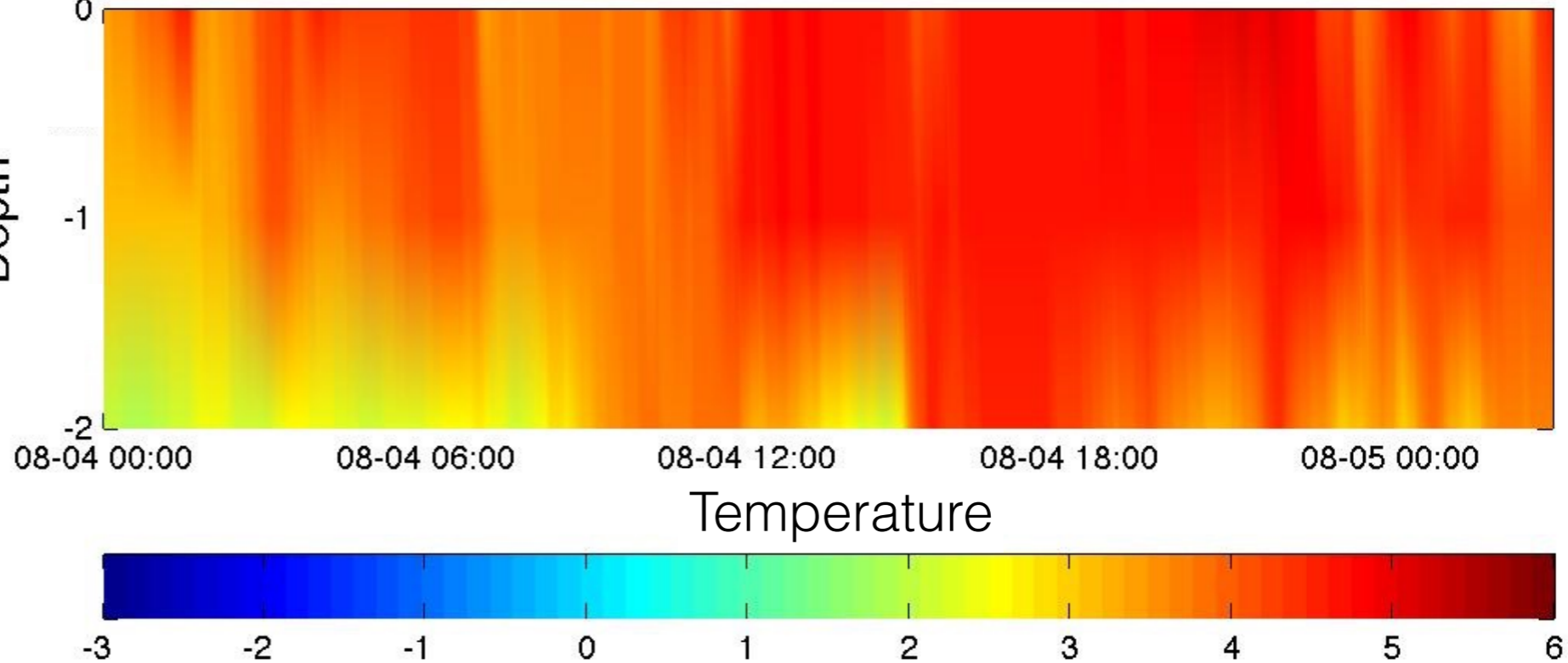
# Temperature gradients

Gradients by region and day



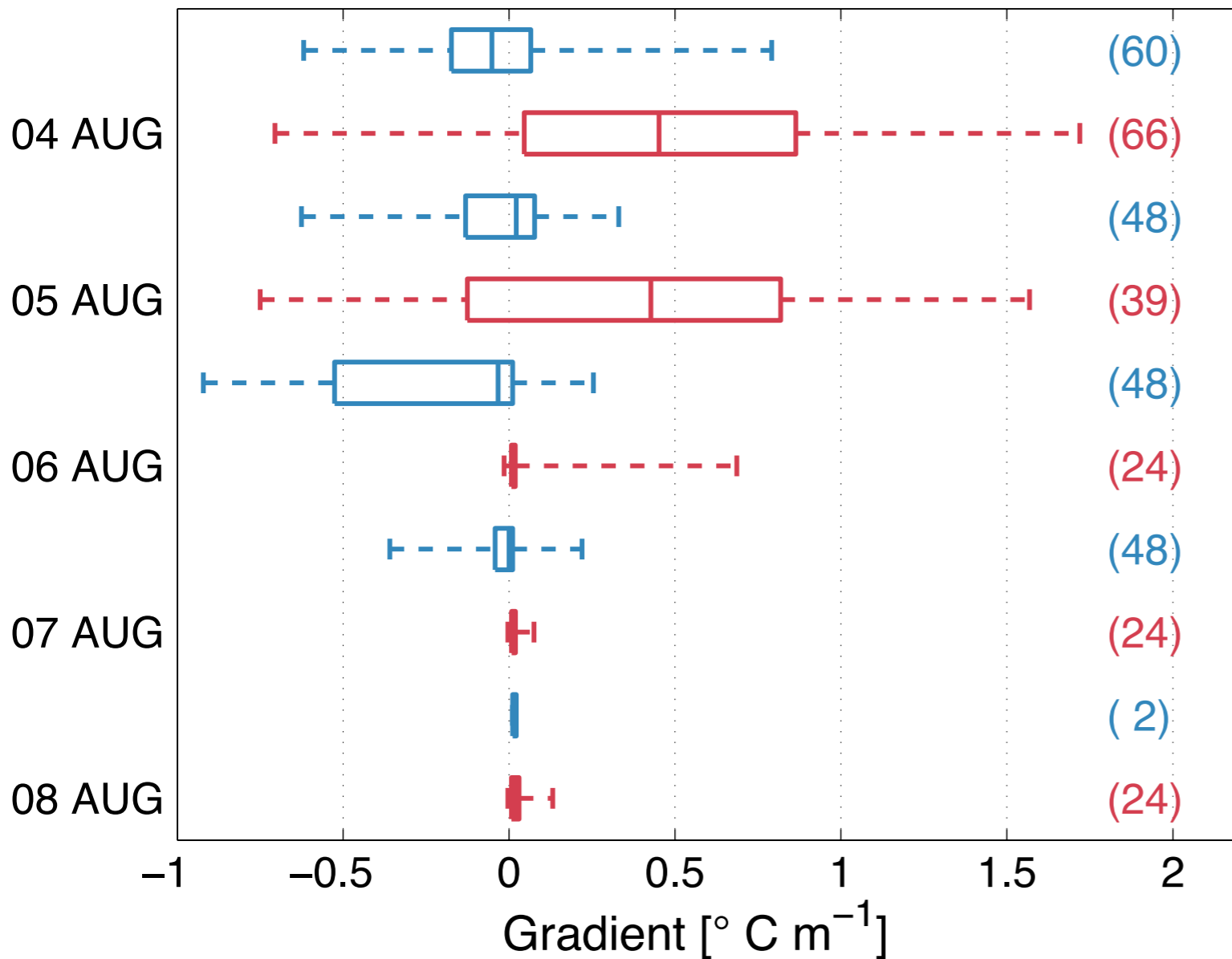
## Southern Set:

- >2 weeks since ice
- positive gradients



# Temperature gradients

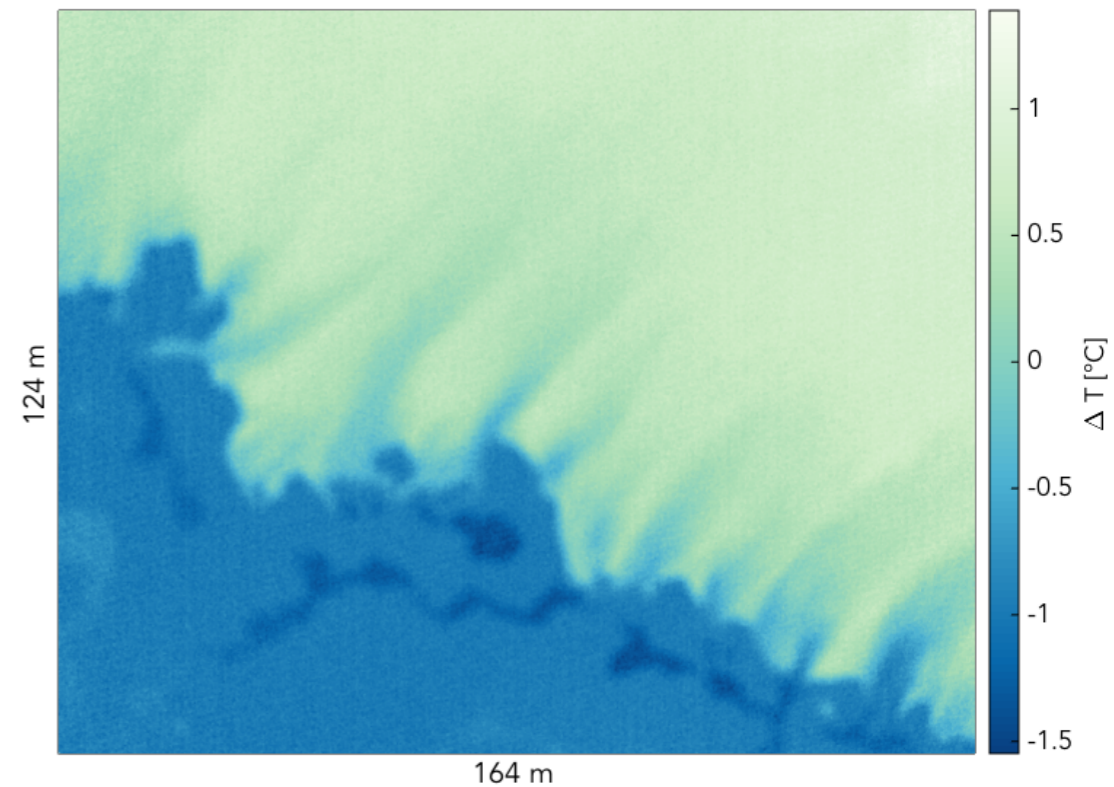
Gradients by region and day



## Northern Set:

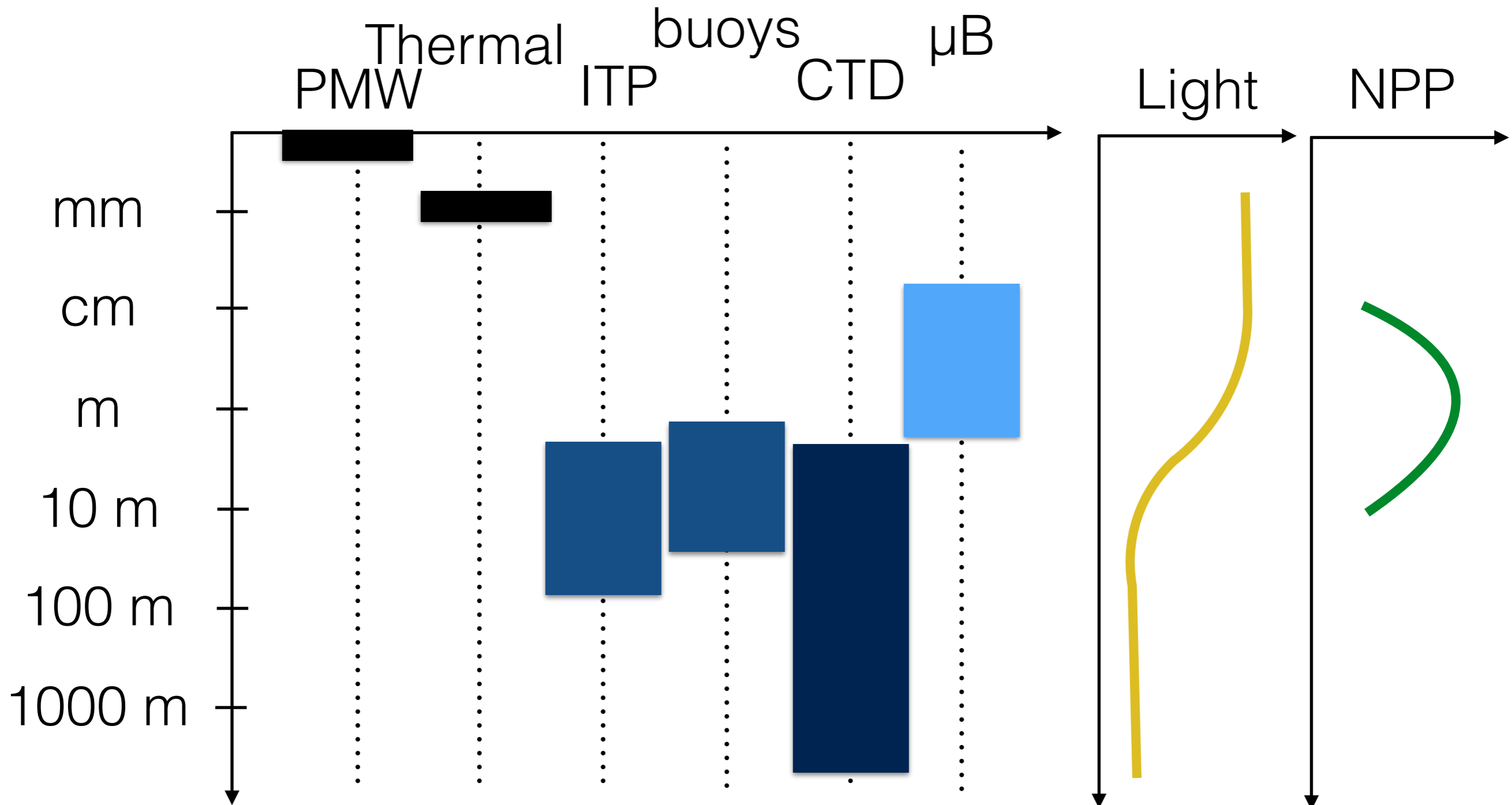
- Remnants of ice cover
- negative gradients

ATOM image of ice floe edge





# Vertical scales in sensing



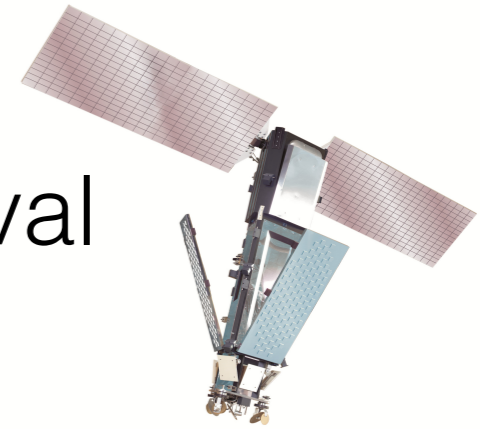
# Ongoing development

Adjustable  
sensing programs

Pushbutton operation  
Easy deployment

30+ day battery life

Iridium data retrieval



~500 mL volume



1-5 m cable



Suspended sensing package

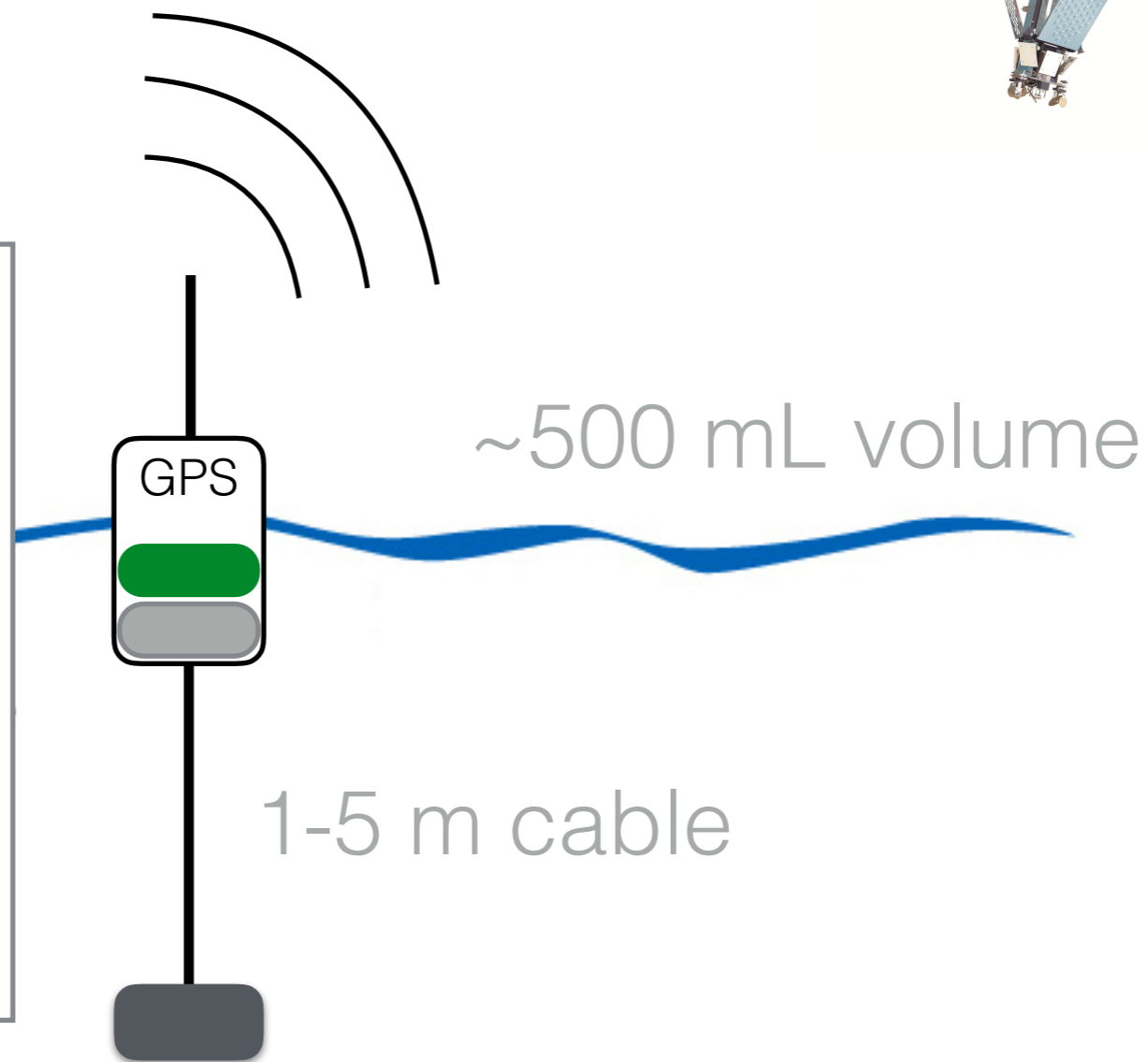
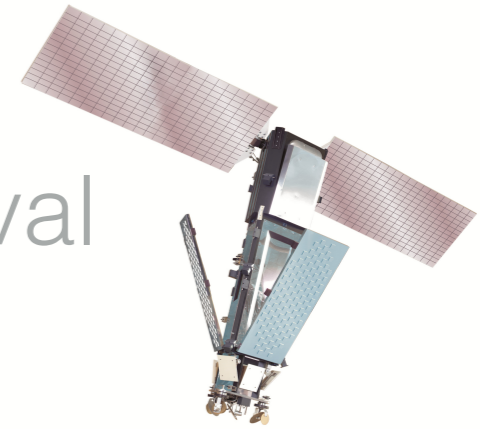
# Future development

Adjustable sensing programs

Potential sensors:

- Temperature
- Conductivity
- Pressure
- Acoustics
- Light
- ...

Iridium data retrieval



Suspended sensing package

# Microbuoys in Arctic Observations



Collaborative deployments

- Spatial variability around larger observing systems
- Local ocean conditions
- Informing ice forecasting



# Acknowledgements

NASA Marginal Ice Zone Processes Experiment

DARPA

NASA Earth and Space Science Fellowship

Bradley, A. C., Palo, S., LoDolce, G., Weibel, D., & Lawrence, D. (2015). Air Deployed Micro Buoy measurement of temperatures in the marginal ice zone upper ocean during the MIZOPEX campaign. *Journal of Atmospheric and Oceanic Technology*.

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