



High Latitude SST Task Team

Michael Steele

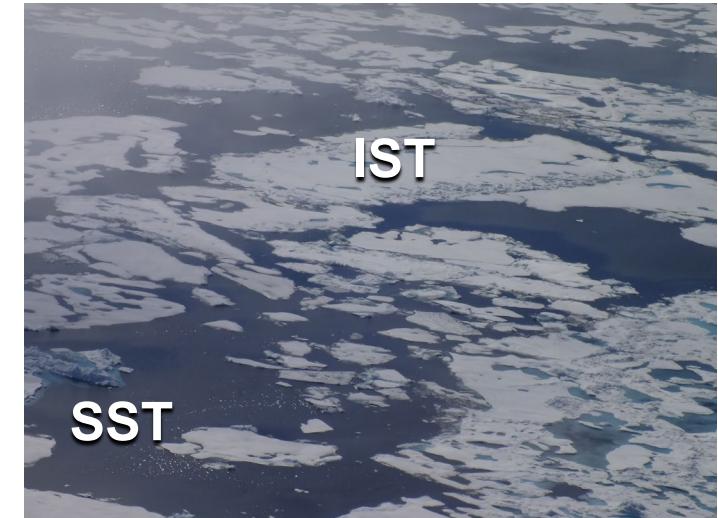
U of Washington, Seattle, WA USA



- Research summaries
- Future work

DMI research: SST and IST

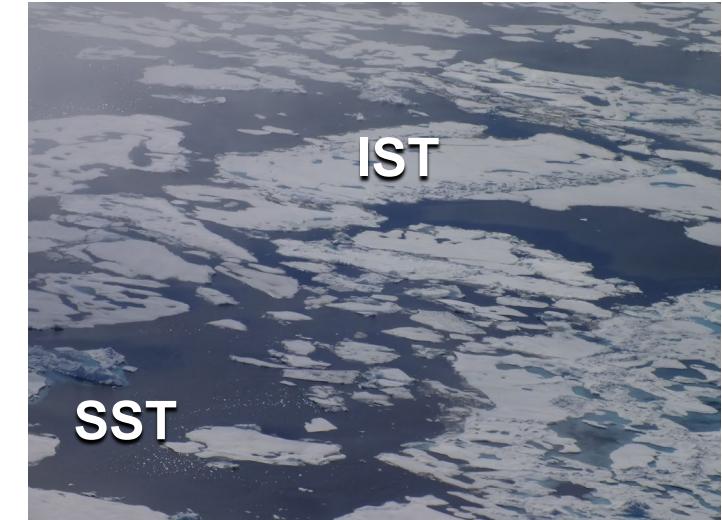
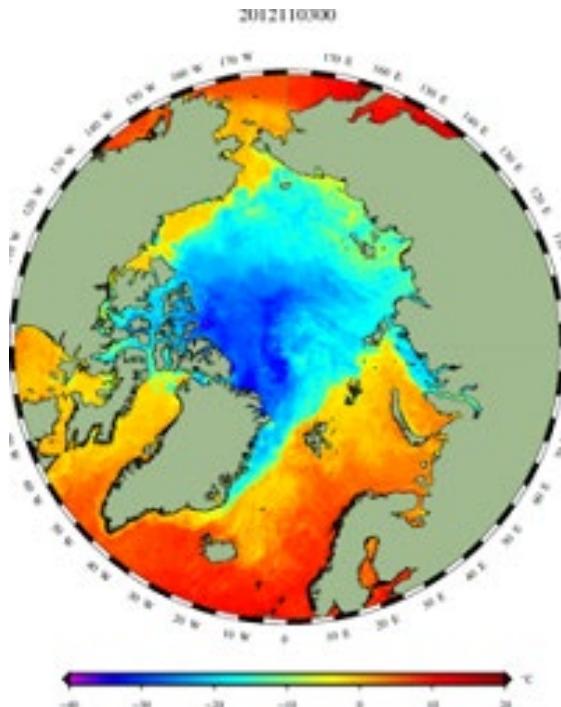
The *bottom boundary condition* for the polar marine atmosphere is not always SST.



DMI research: SST and IST

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- A new consistent CMEMS L4 Arctic **SST/IST/MIZT** climate data set (1982-2019) has been generated

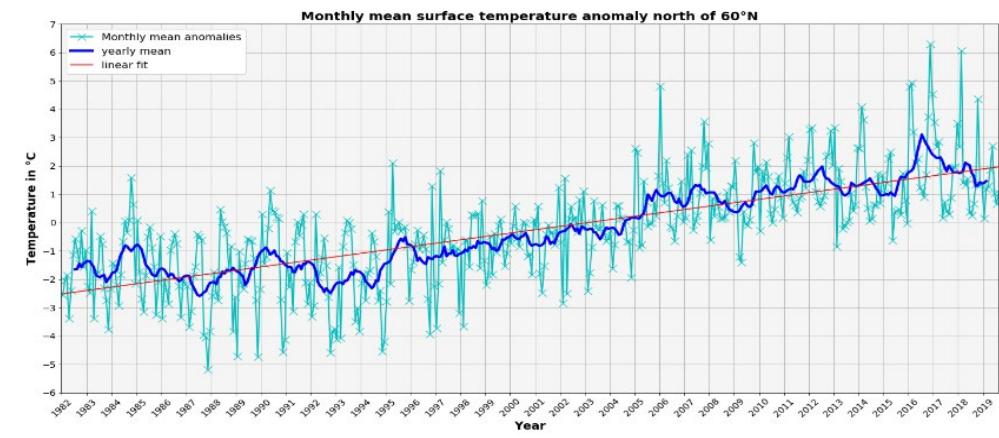
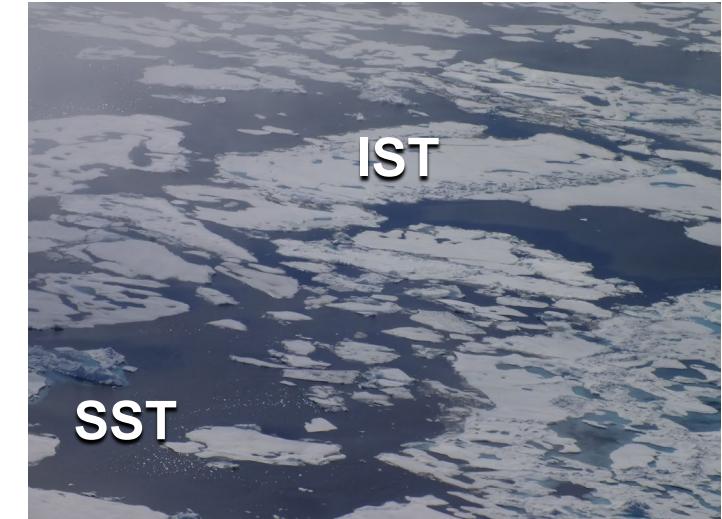
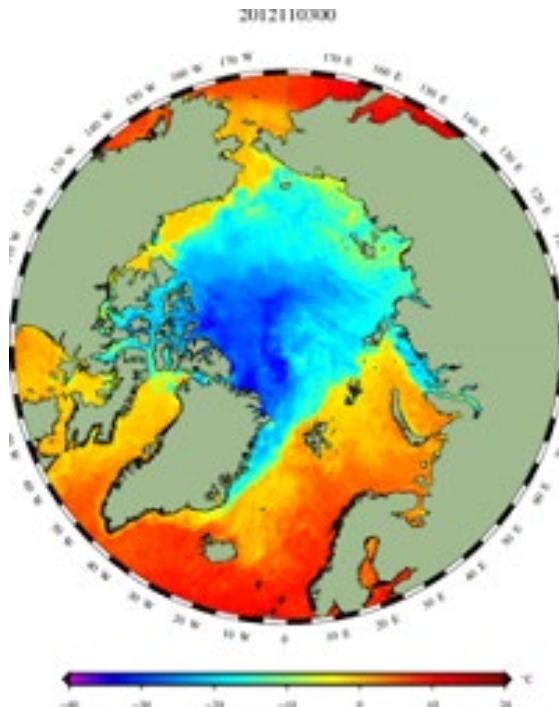


- **Oral by Jacob Hoeyer:** S1-ID-040 - Development of consistent surface temperature retrieval algorithms for sea surface, marginal ice zone and sea ice in the polar region
- **Poster by Pia Nielsen-Englyst:** S1-ID-039 - A CMEMS level 4 SST and IST climate data set for the Arctic

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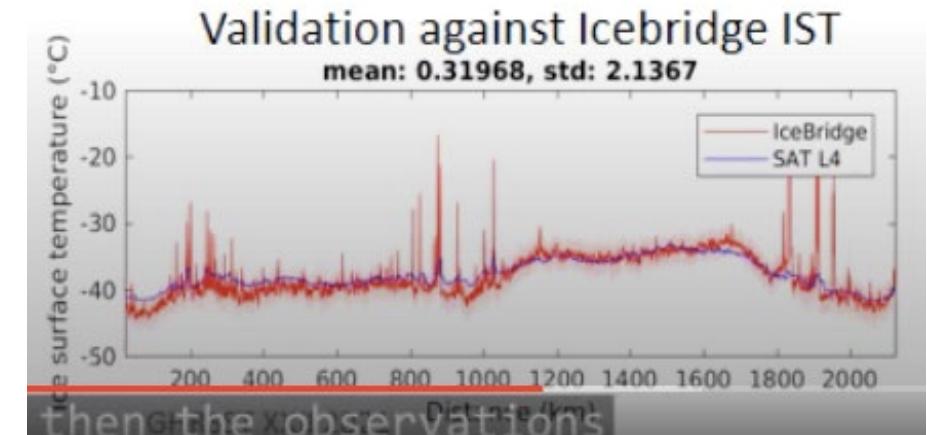
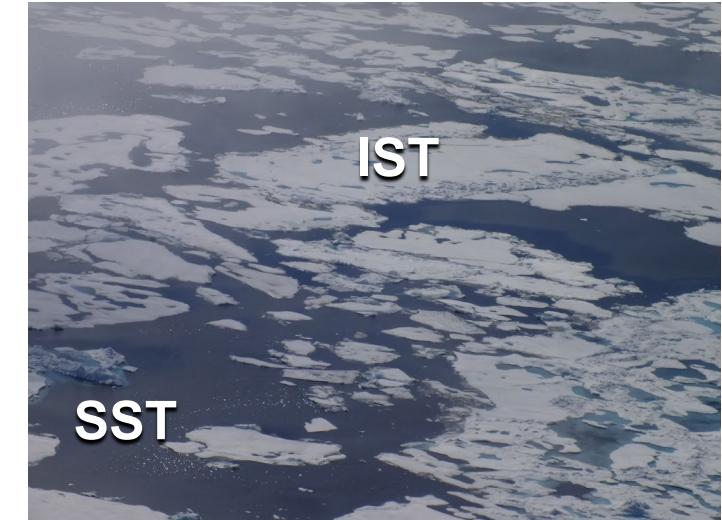
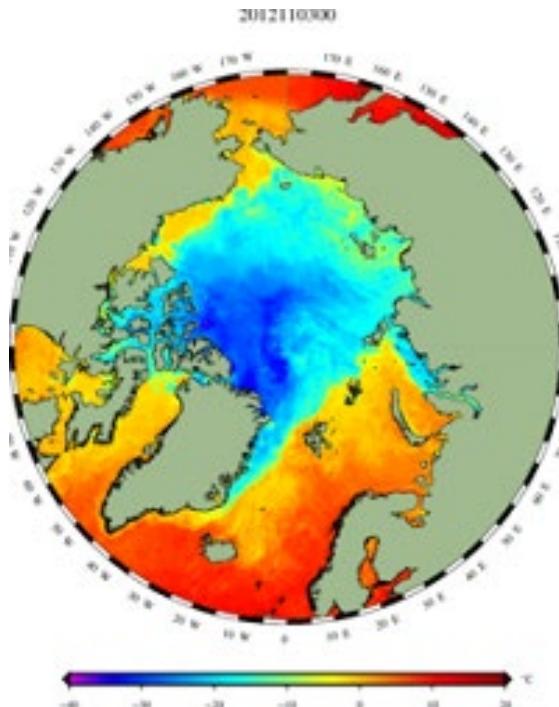


4°C increase in Arctic Ocean (>60°N)

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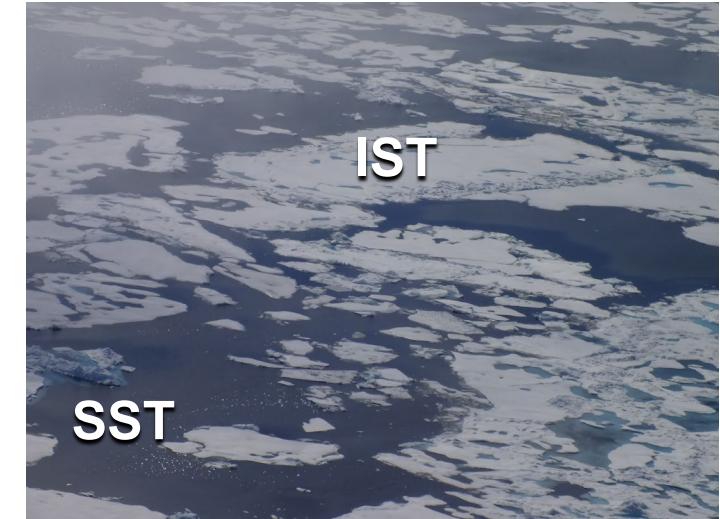
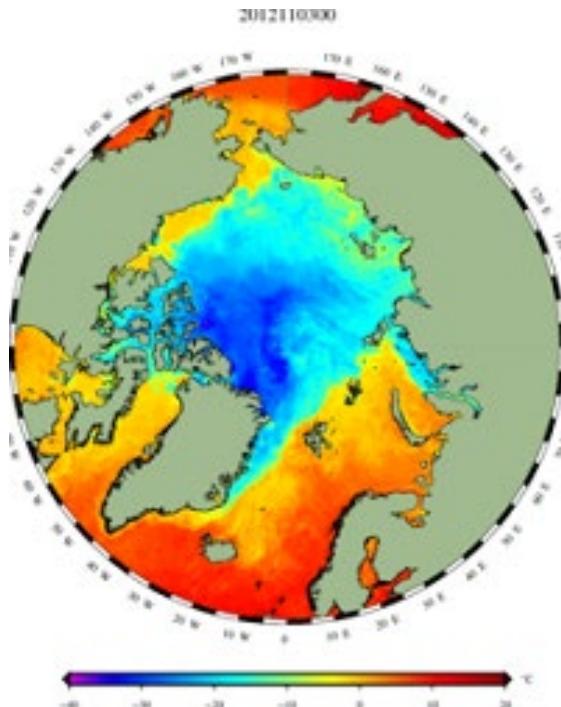


IST is noisy! Because it's snow & ice

DMI research: SST and IST

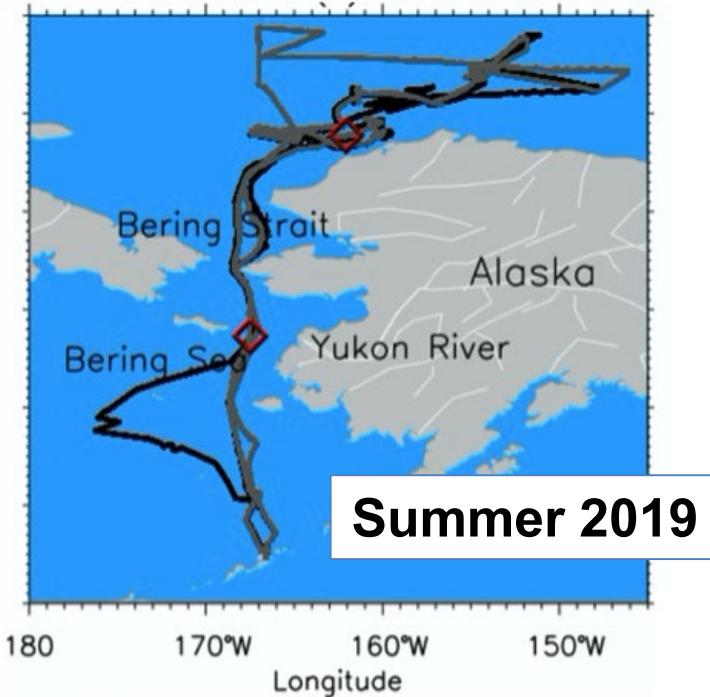
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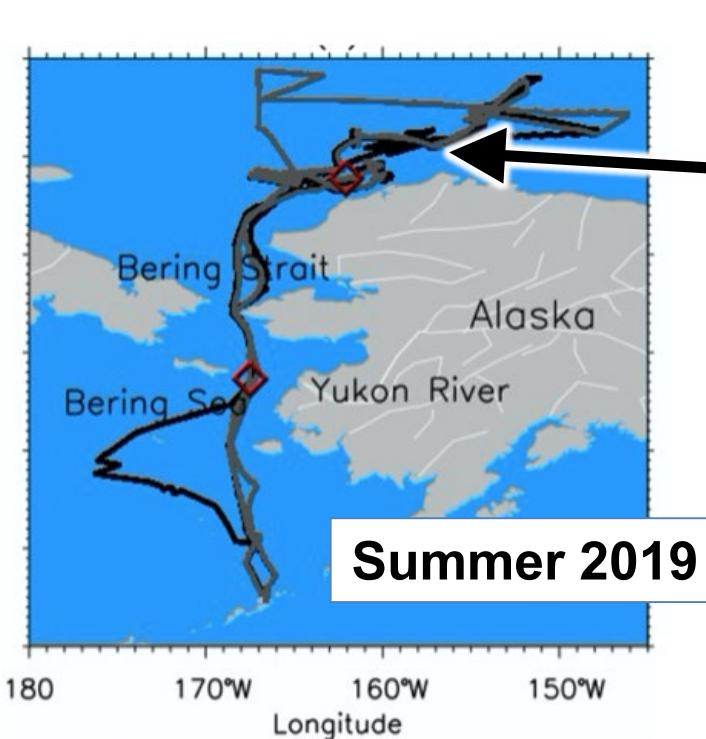
1. Need more “IST” ***in situ obs***
2. *How best to do this?*
(buoys, aircraft KT19, ??)

JPL: Saildrone SST vs. L4 SST



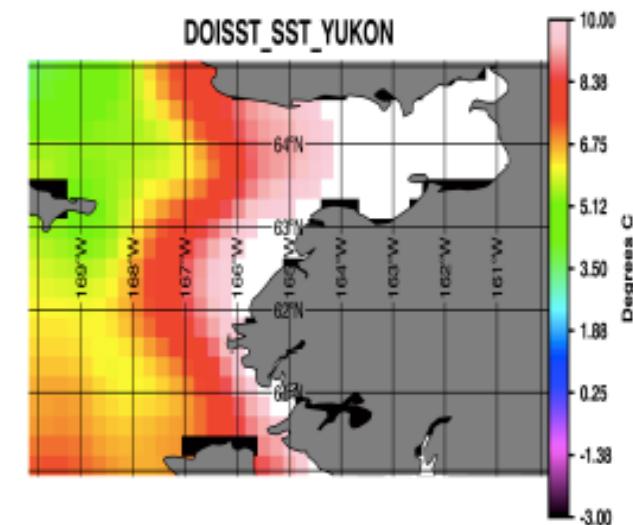
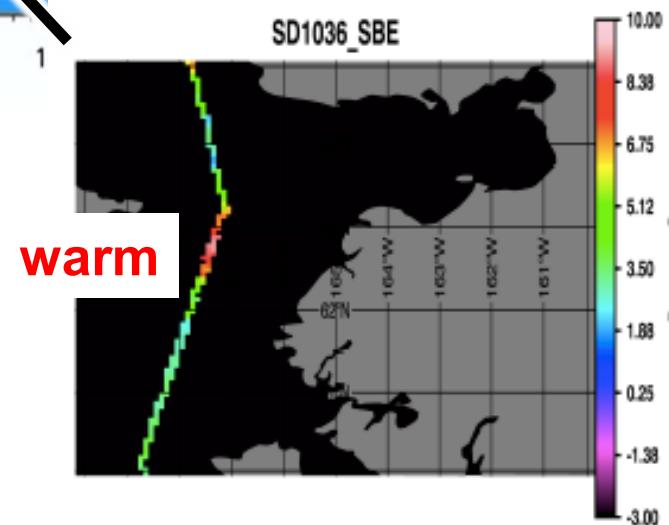
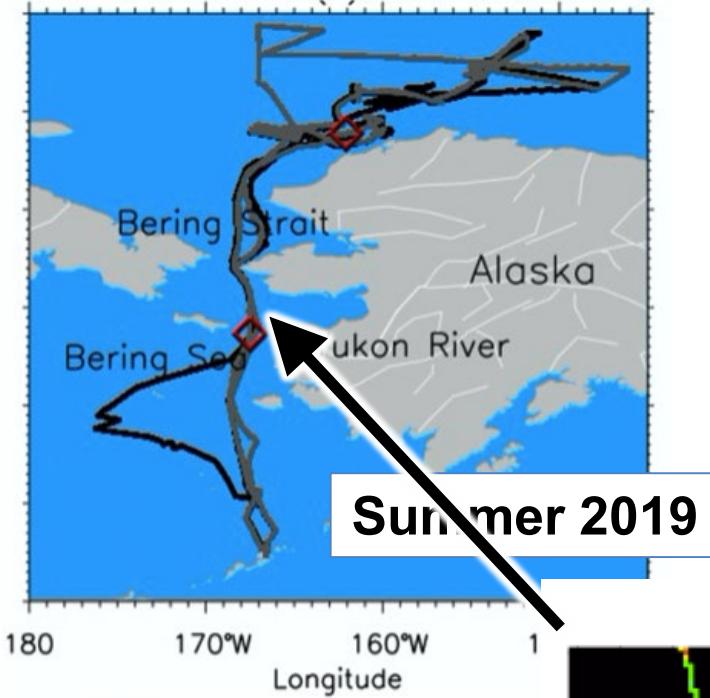
NASA MISST3 project:
2 more saildrones 2021!

JPL: Saildrone SST vs. L4 SST



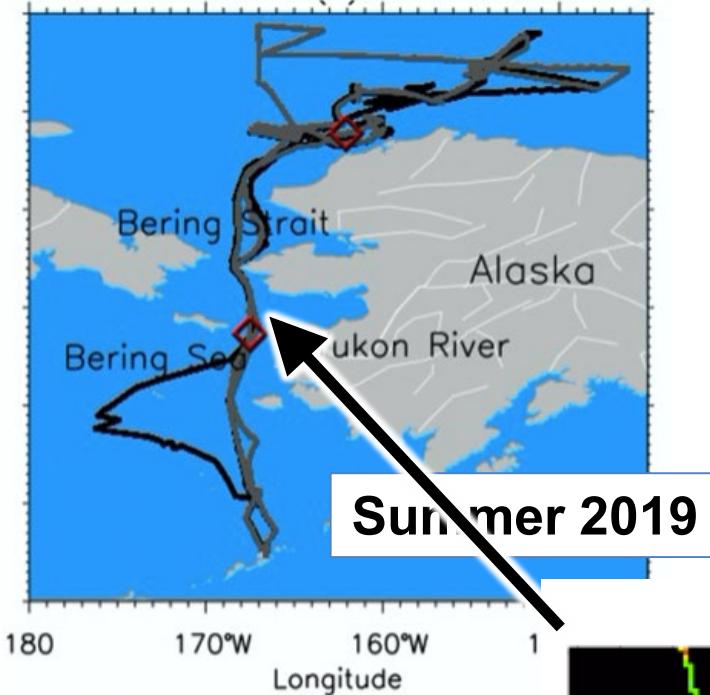
in the ice!

JPL: Saildrone SST vs. L4 SST

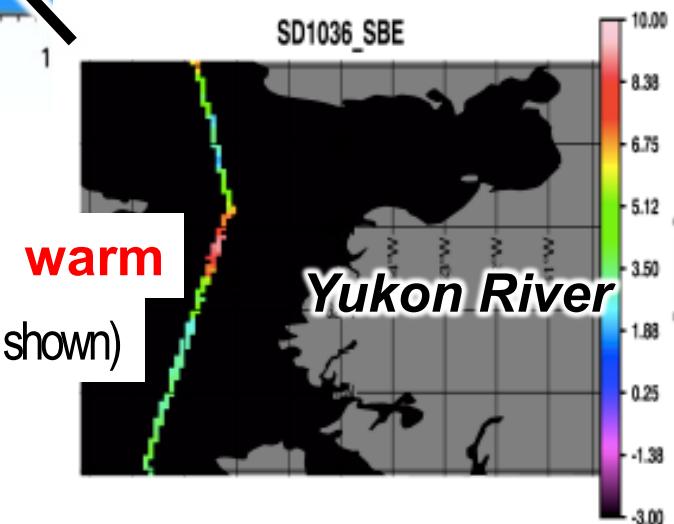


Poster by Jorge Vazquez-Cuervo: Using
Saildrones to Validate Sea Surface
Temperatures in the Arctic

JPL: Saildrone SST vs. L4 SST

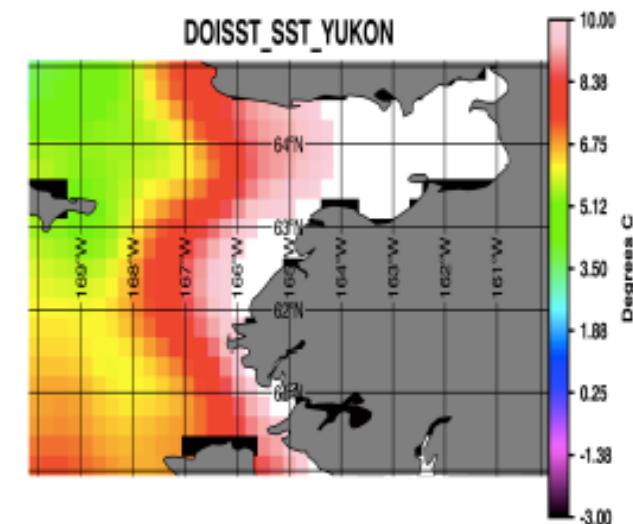


Summer 2019

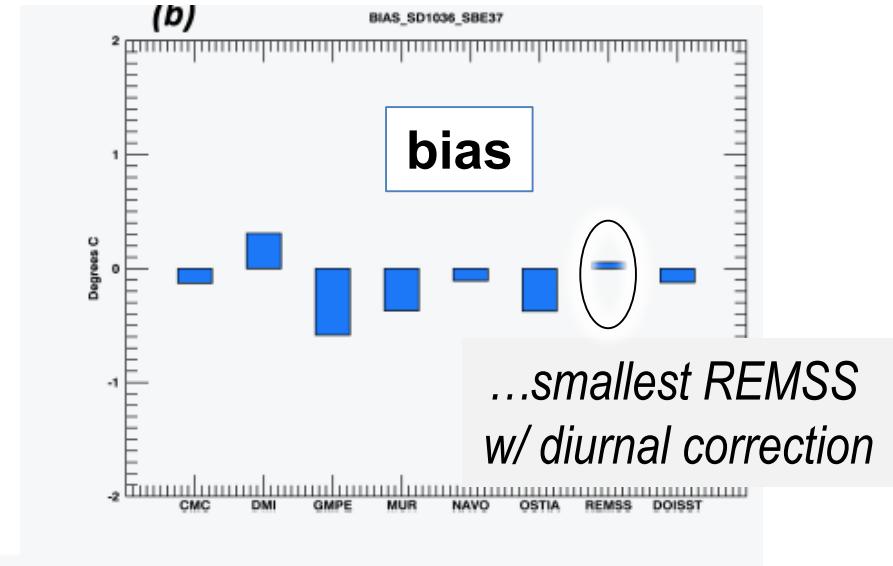
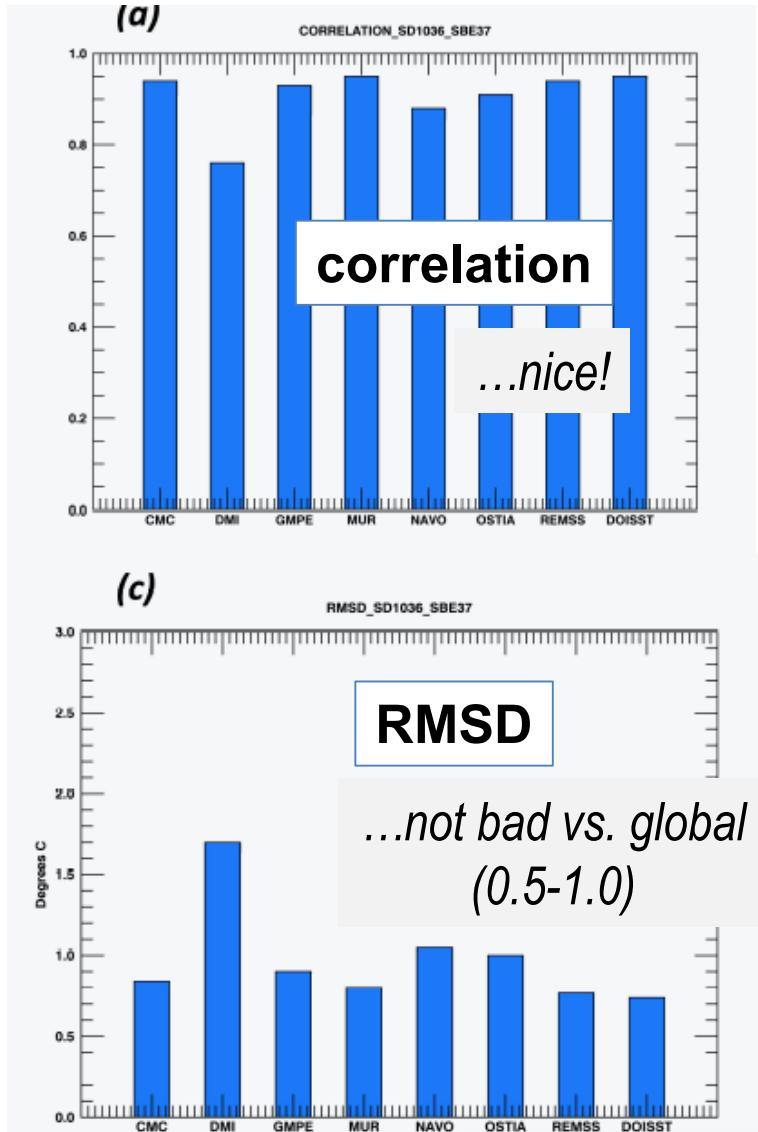


warm
& fresh (not shown)

Poster by Jorge Vazquez-Cuervo: Using
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JPL: Saildrone SST vs. L4 SST



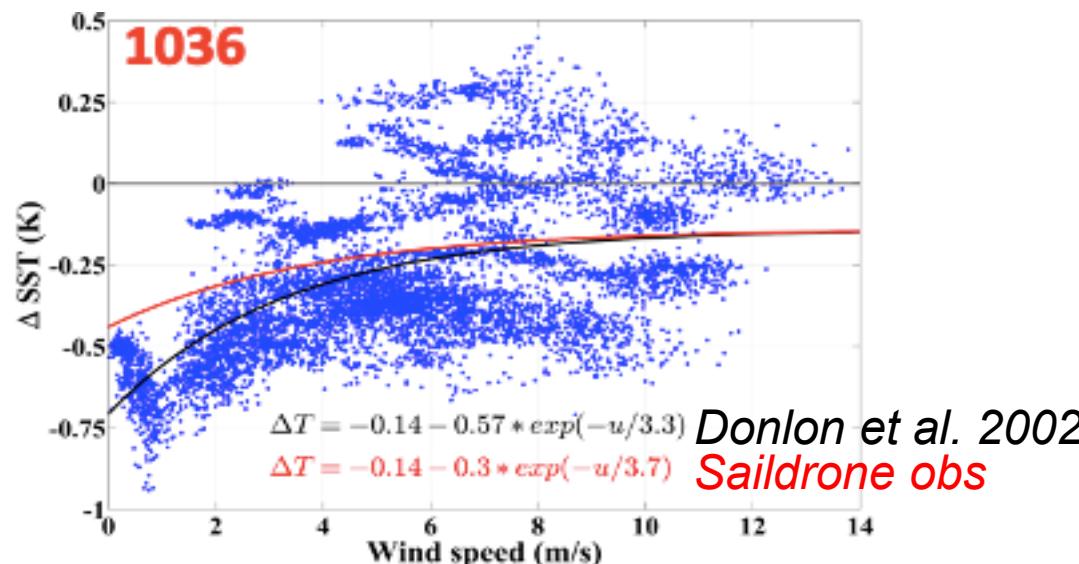
U of Miami research: Saildrone SST_{skin}

- Step 1: Correct for downward sky IR emission with an upward-looking radiometer.
- Step 2: $\Delta(\text{SST}_{\text{skin}} - \text{SST}_{\text{subsurface}})$ vs. wind speed.

High winds should = well-mixed i.e. small Δ . Yes! But:

- There's still a lot of **noise!**
- Doesn't match *Donlon et al. (2002)*

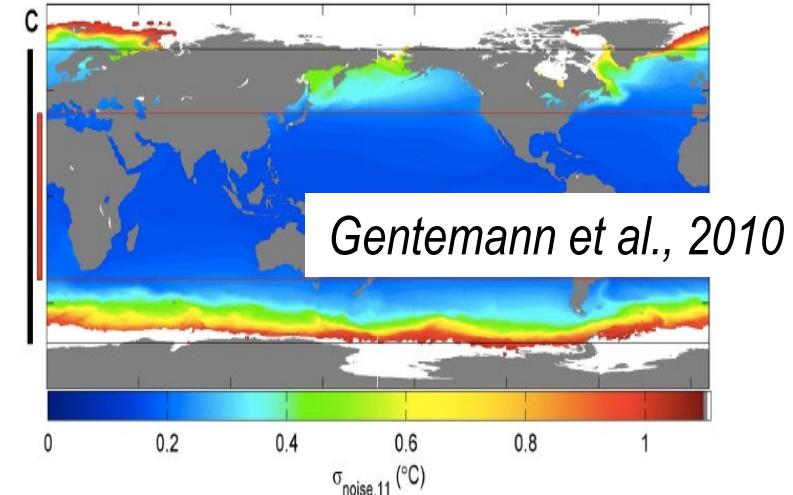
Chong Jia &
Peter Minnett



U of Miami research: Atmos correction

Polar atmospheres are **dry!**

- Reduce the ***noise floor error*** ($\text{NE}\Delta\text{T}$) in dry atmospheres by *spatial averaging of cloud-free pixels in 5x5.*

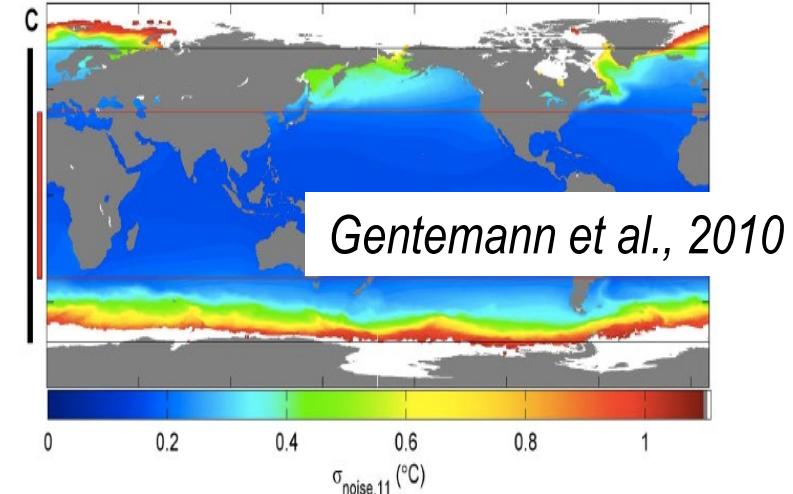


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Chong Jia and Peter Minnett



R2019 Aqua SST Matchup Database (2009.7): $\text{abs}(\Delta\text{BT} < 0.3\text{K})$. Best quality retrievals. Values in K

#	Center pixel BT				Mean BT in 5*5 Array			
	Mean	Median	STD	RSD	Mean	Median	STD	RSD
630	-0.035	-0.050	0.578	0.431	-0.015	-0.015	0.3	0.432
Number of clear pixels ≥ 13								
472	0.024	0.033	0.471	0.381	0.047	0.026	0.449	0.337

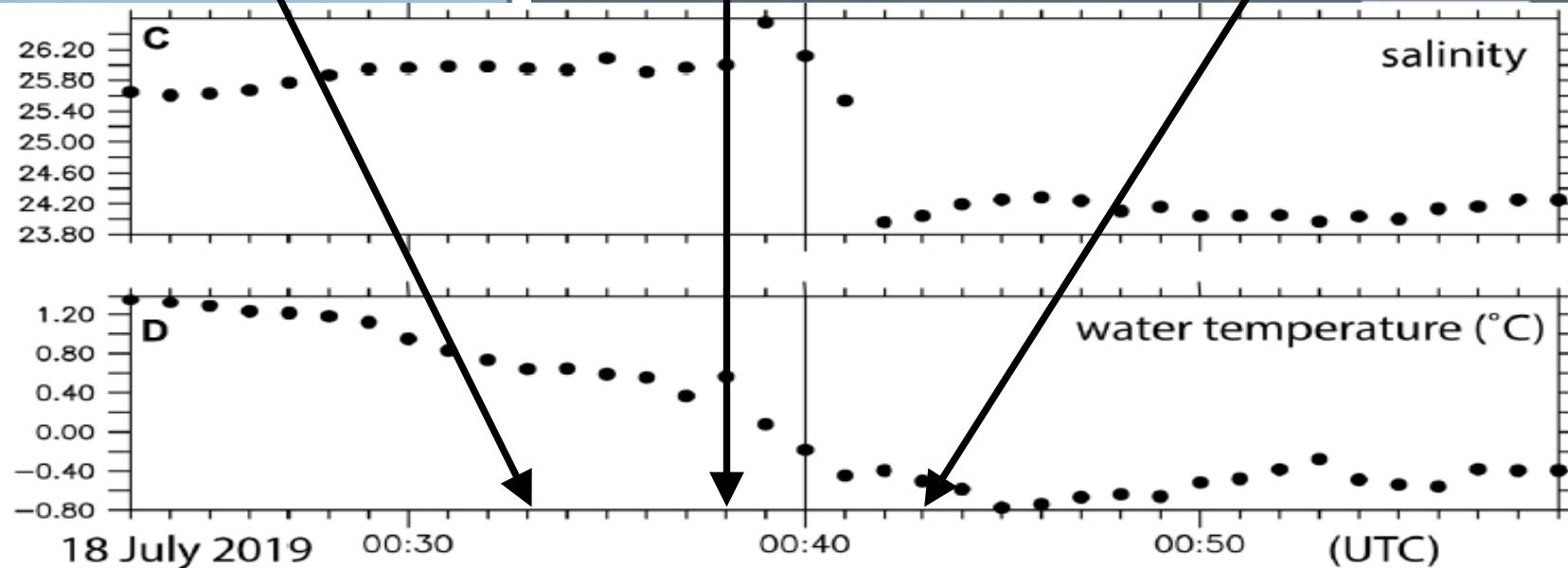
OK Better

U of WA research: In situ Arctic SST

Q: Can real time Saildrone SST & SSS be used to avoid the ice edge?

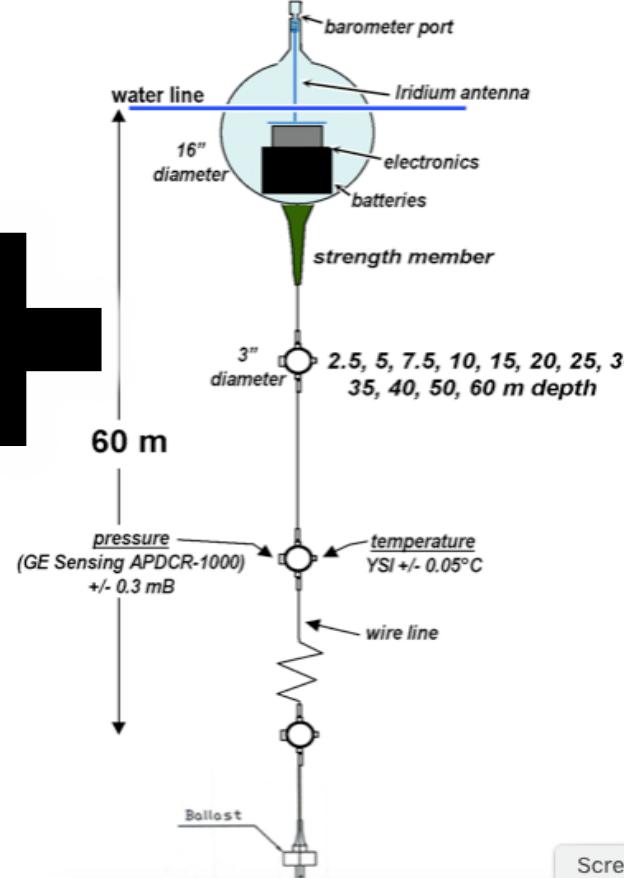
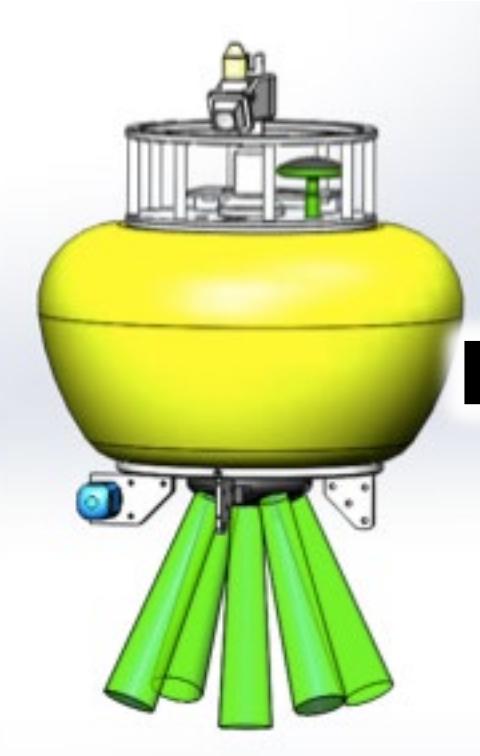
Chiodi et al., 2021

A: Nope 



U of WA research: In situ Arctic SST

Mike Steele & Jim Thomson



SWIFT buoy

waves +

UpTempO buoy
T(z) +



microSwifTS
waves, SST, SSS

High Latitude Task Team: Lots to do

- Continue to intercompare & improve gridded (L2, 3, 4)
HL SST & SST/IST
 - coordinate with Sea Ice Conc./Thickness (SIC/SIT)
- More *in situ* SST & IST observations
- Continue to improve (dry) atmos. corrections
- SST & SSS integration (& SST/SSS/SIC/SIT/IST)