Sea Ice in High Resolution Simulations

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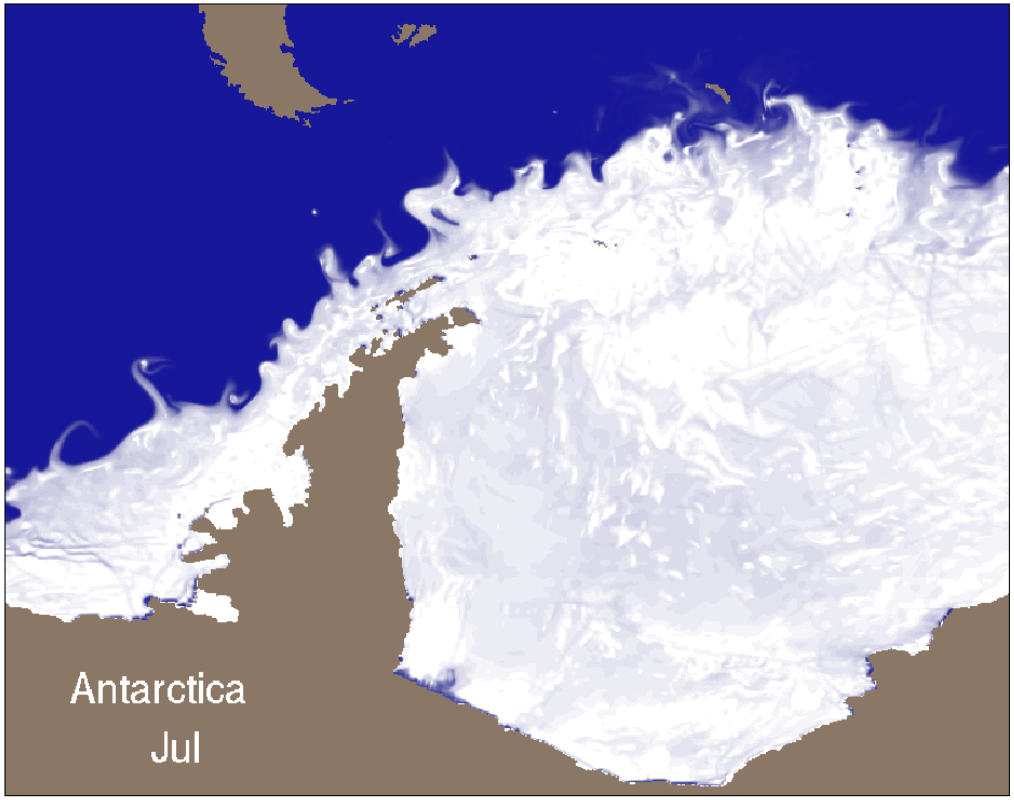
Thanks to Peta-Apps team, lead by Jim Kinter,
Grand Challenge team, lead by Dave Bader,
and Dave Bailey

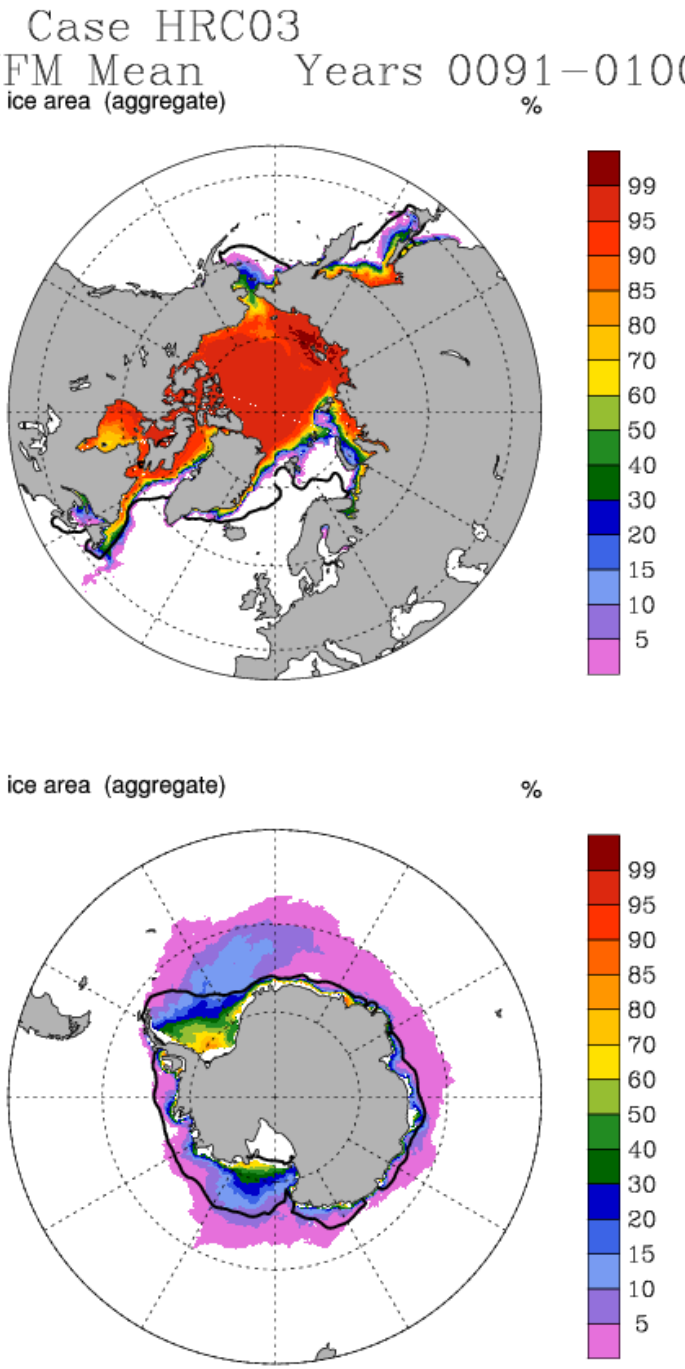


CCSM3.5 (ish)

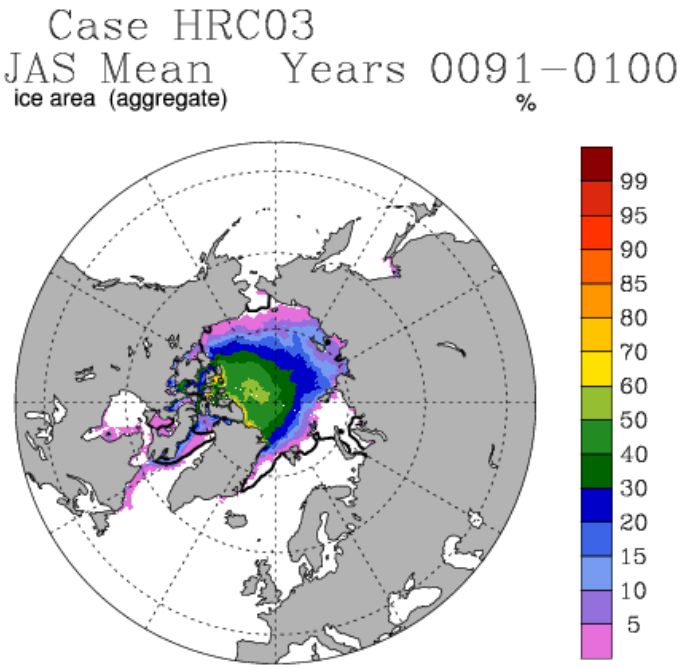
0.1 resolution ocean and sea ice
0.5 resolution atmos and land

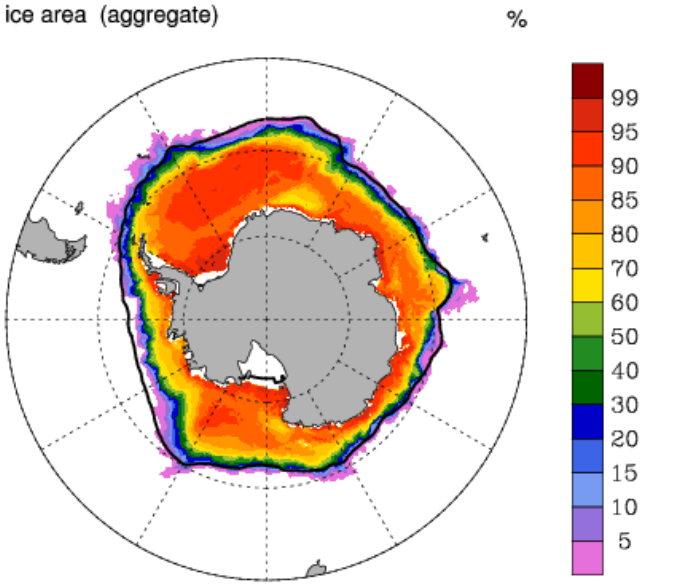
~150 year run on Kraken

JFM
Ice Concentration



JAS
Ice Concentration

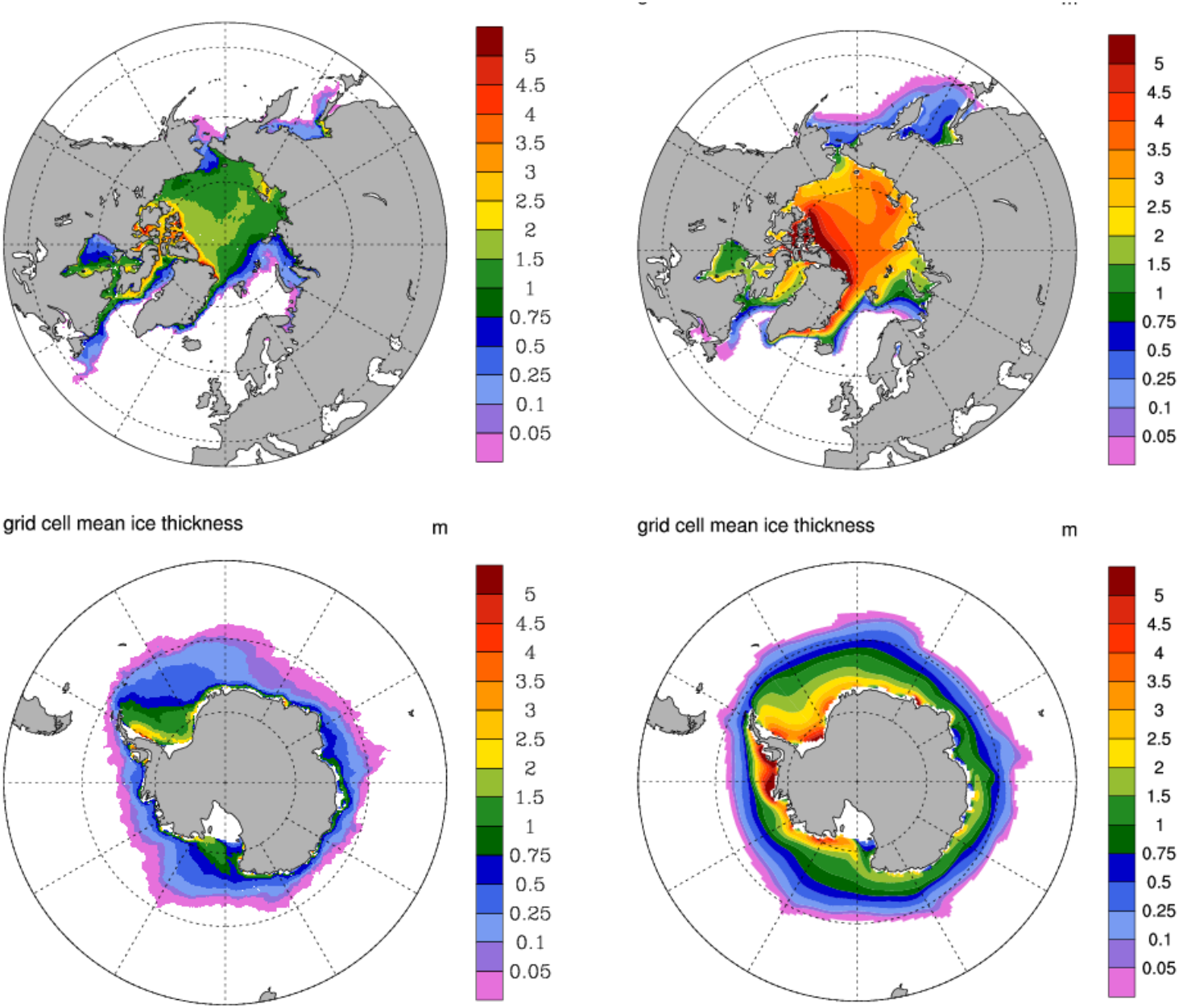




HIRES CCSM3.5

1 Deg CCSM4

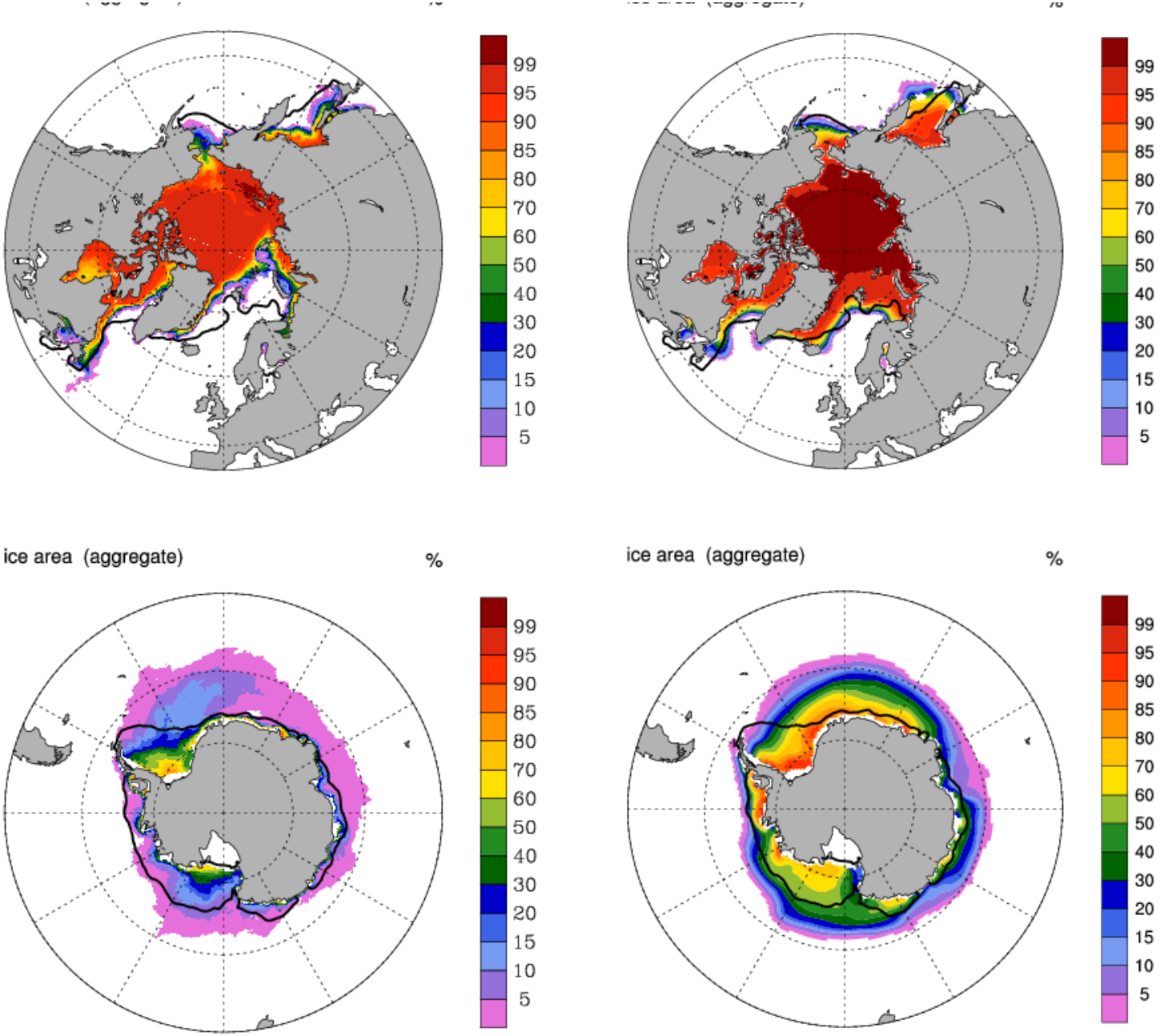
AMJ Thickness

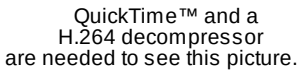


HIRES CCSM3.5

LOWRES CCSM3.5

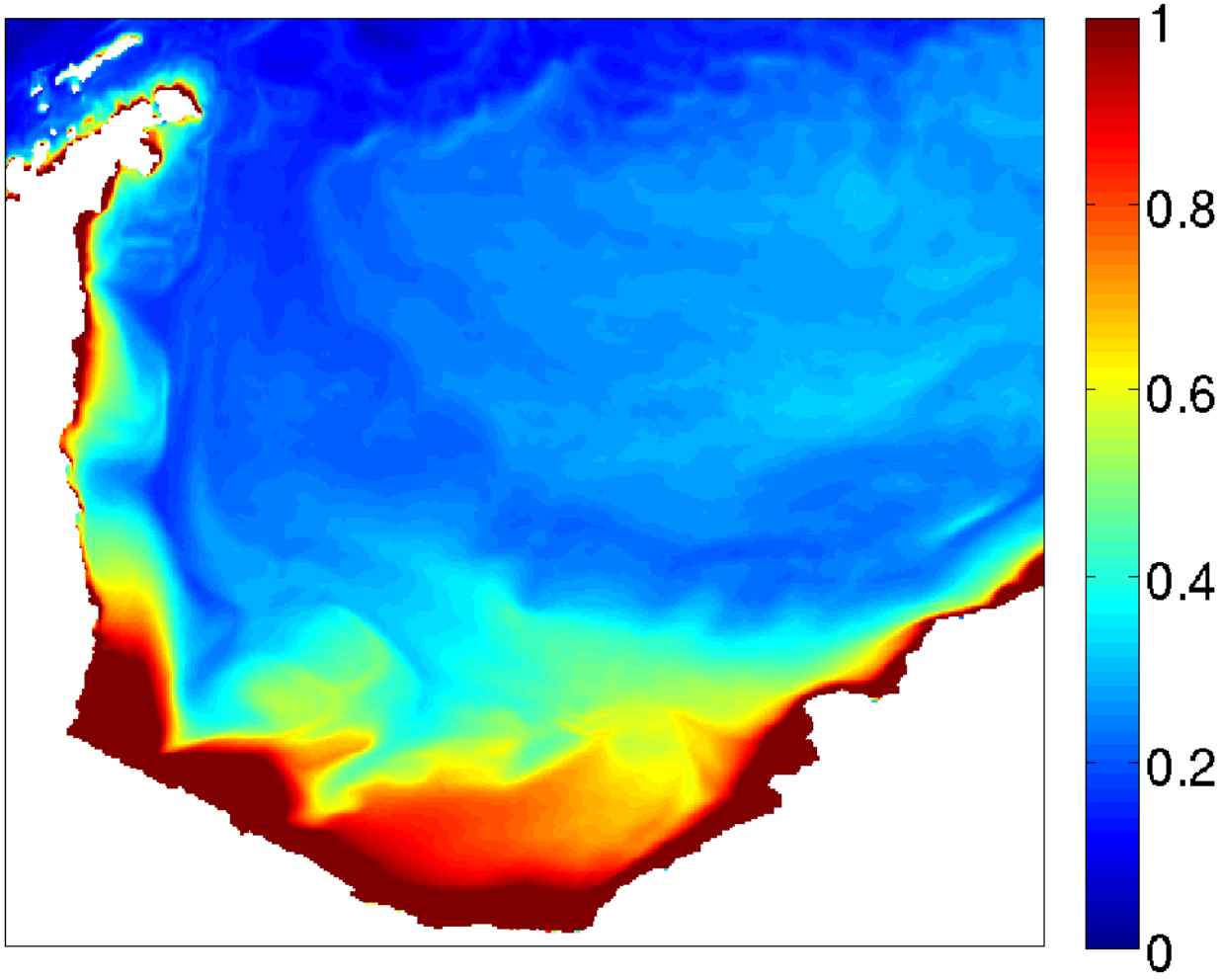
JFM Ice Concentration




QuickTime™ and a
H.264 decompressor
are needed to see this picture.

Average Growth Rate of Sea Ice (cm/day) ☐

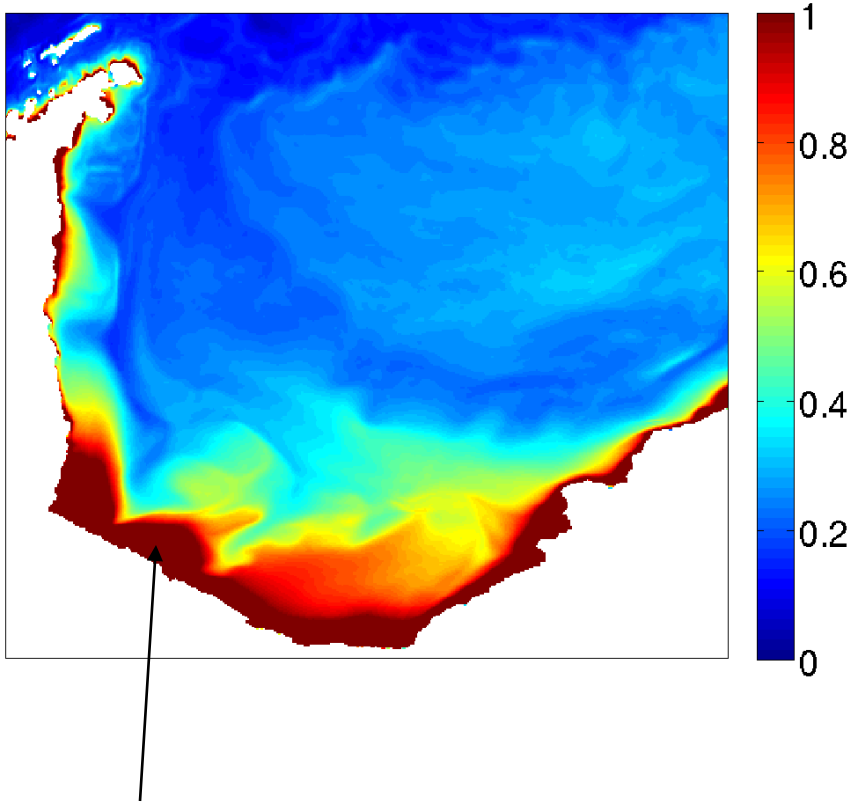
HIRES CCSM3.5



(not net growth = growth - melt, it is just plain growth)

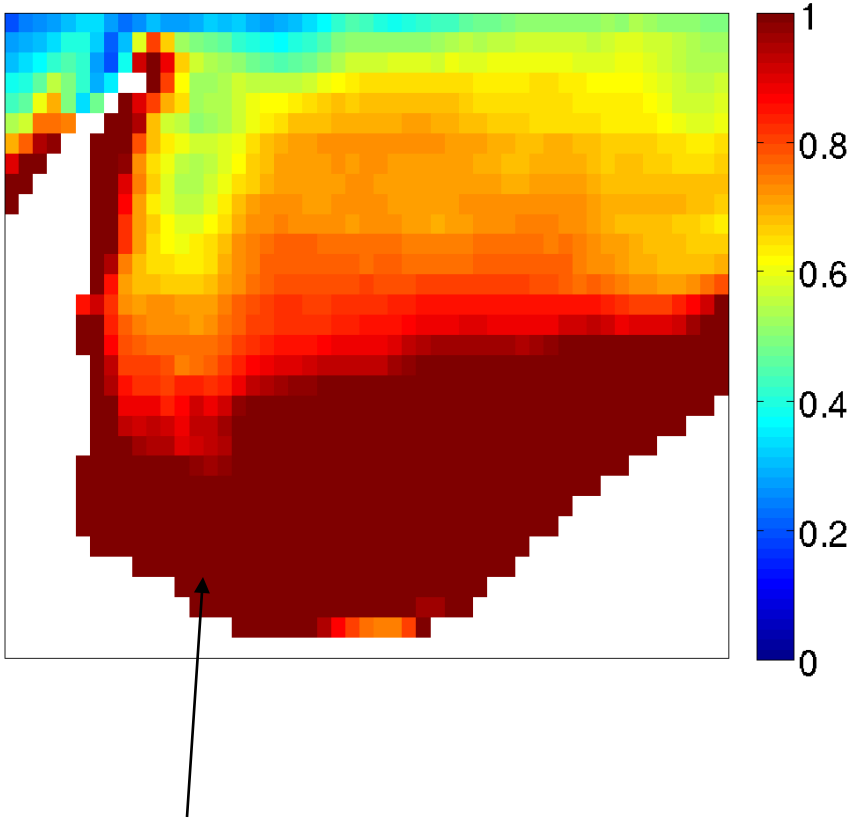
Average Growth Rate of Sea Ice (cm/day) ☐

HIRES CCSM3.5



~25% frazil ice production

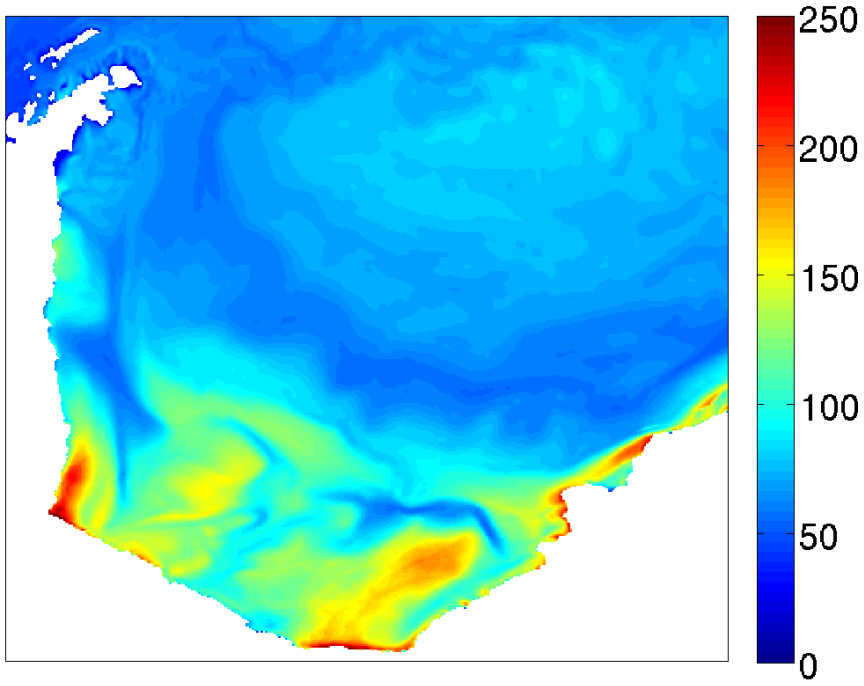
1 deg CCSM3



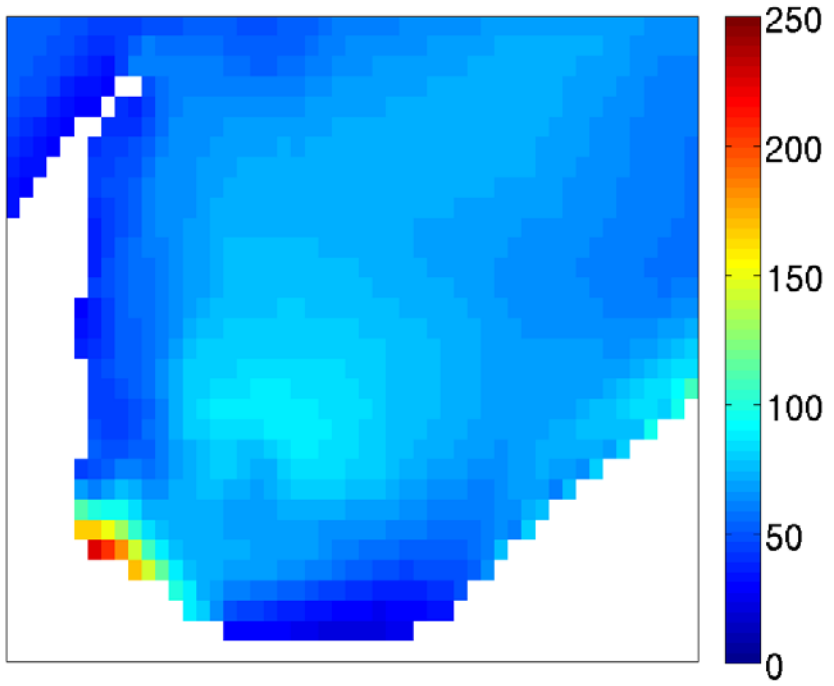
Almost no frazil ice production

Average Mixed Layer Depth (m) ☐

HIRES CCSM3.5

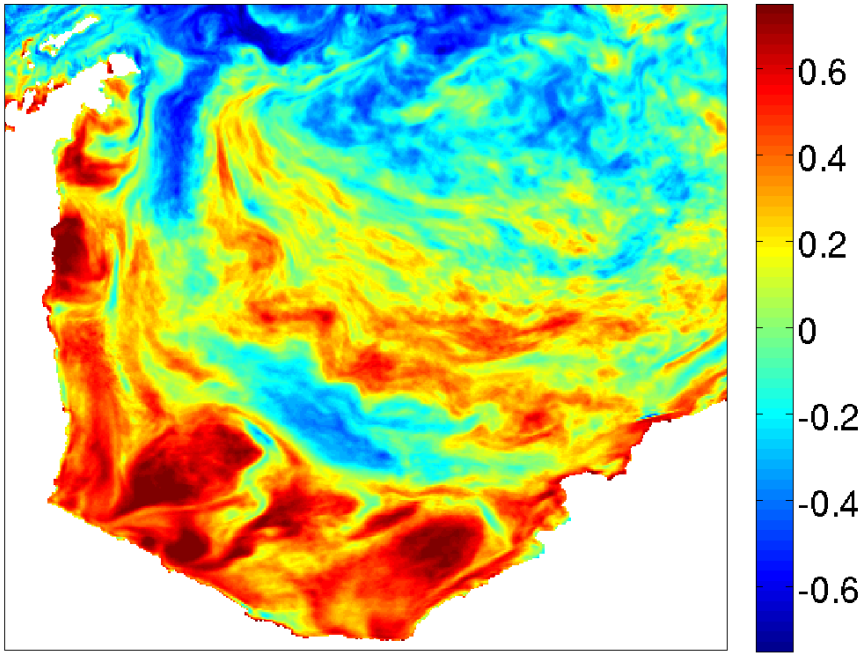


1 deg CCSM3

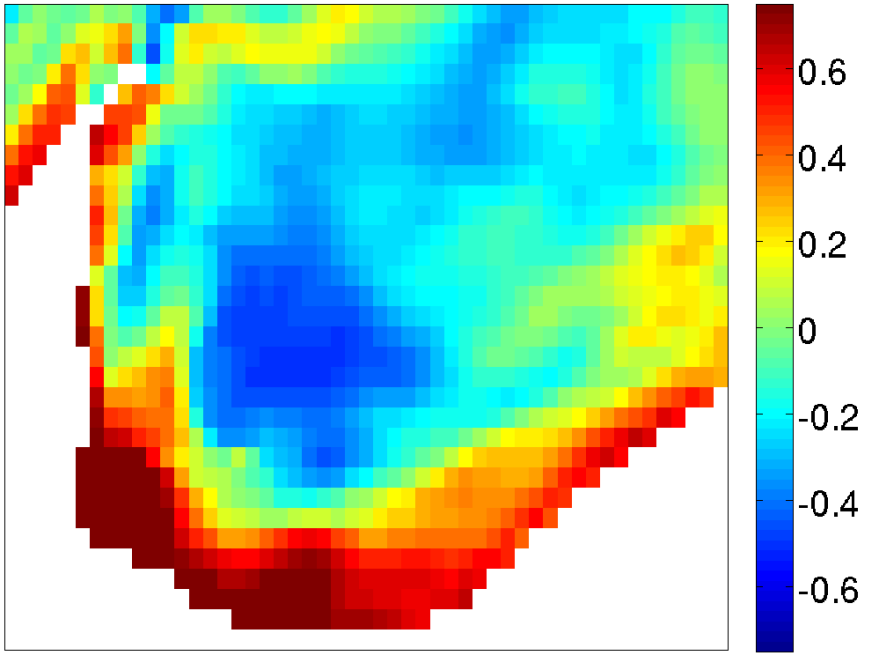


Correlation of Ice Growth and Mixed Layer Depth ☐

HIRES CCSM3.5



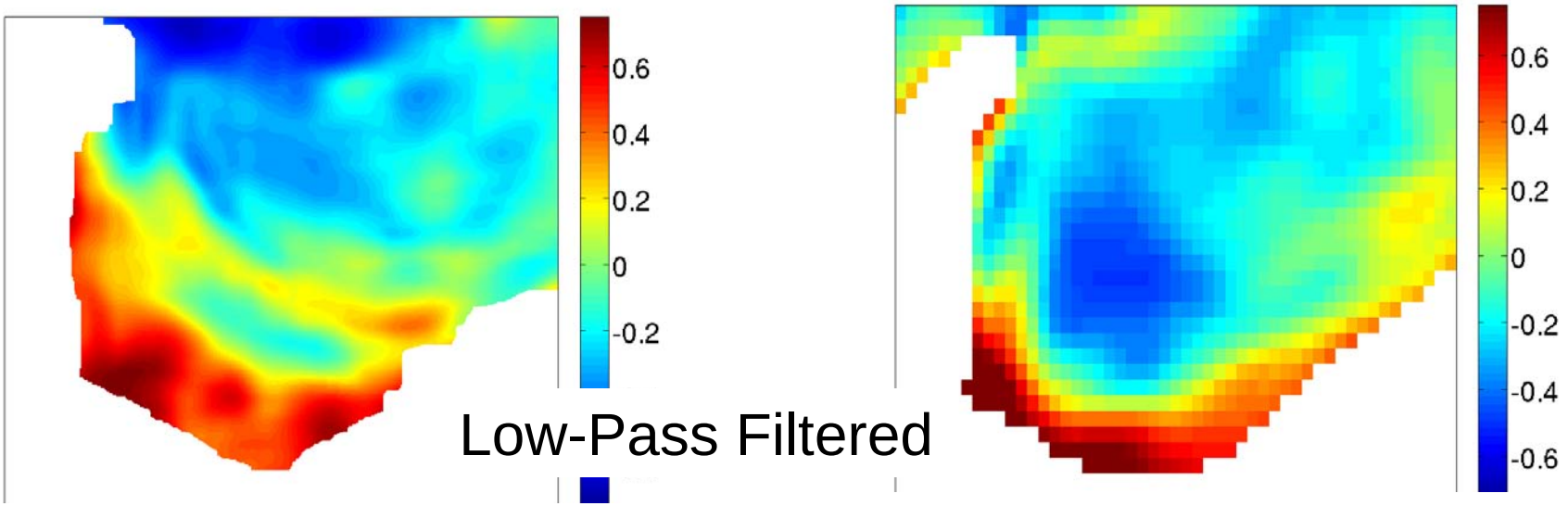
1 deg CCSM3



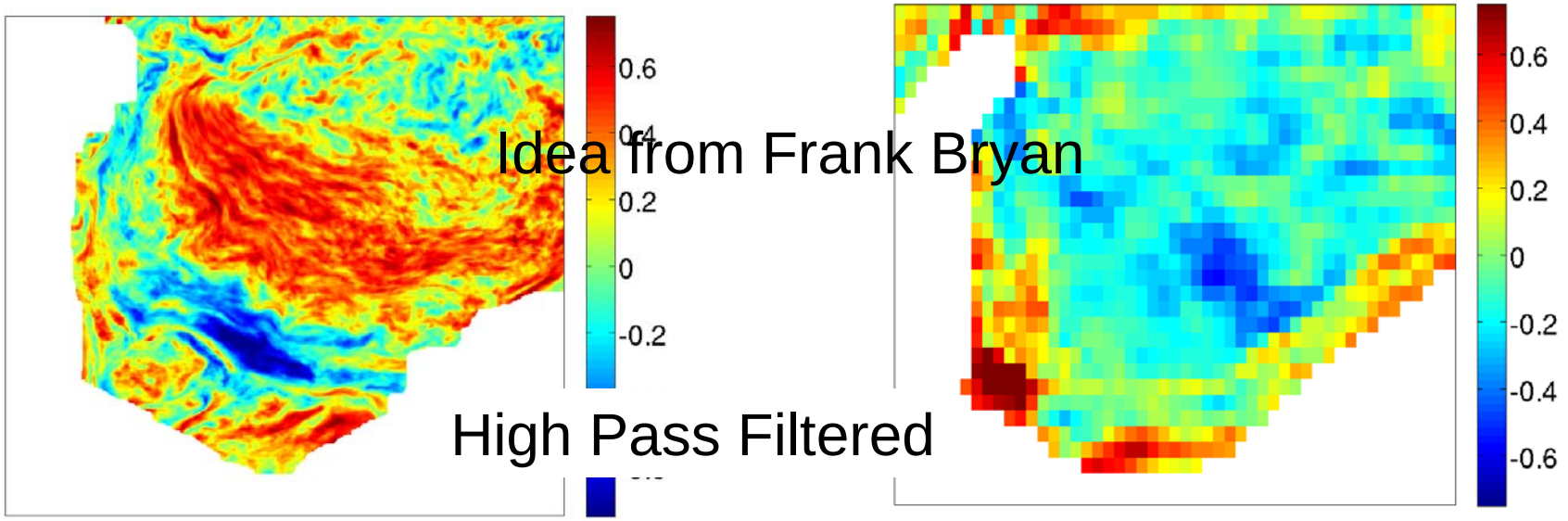
Correlation of Ice Growth and Mixed Layer Depth ☐

HIRES CCSM3.5

1 deg CCSM3



Low-Pass Filtered



Idea from Frank Bryan

High Pass Filtered

Summary

The Arctic could use some more ice

Small-scale interactions between ice growth and mixing are positively correlated (growth forcing mixing)

In contrast away from the coast the gyre-scale interactions are negatively correlated (mixing inhibits growth)

Analyzing these runs is more time consuming than I ever imagined