JPSS Snow and Ice Products (+ Polar Winds and a Climate Data Record)

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JPSS-CPO Arctic TIM, 29 March 2017

JPSS Snow and Ice Products

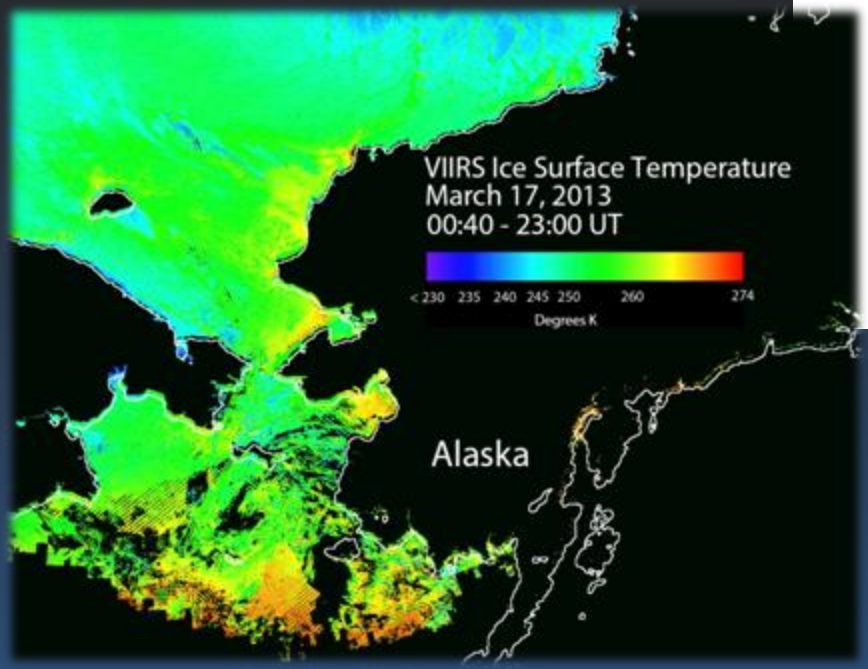
NPP/JPSS VIIRS

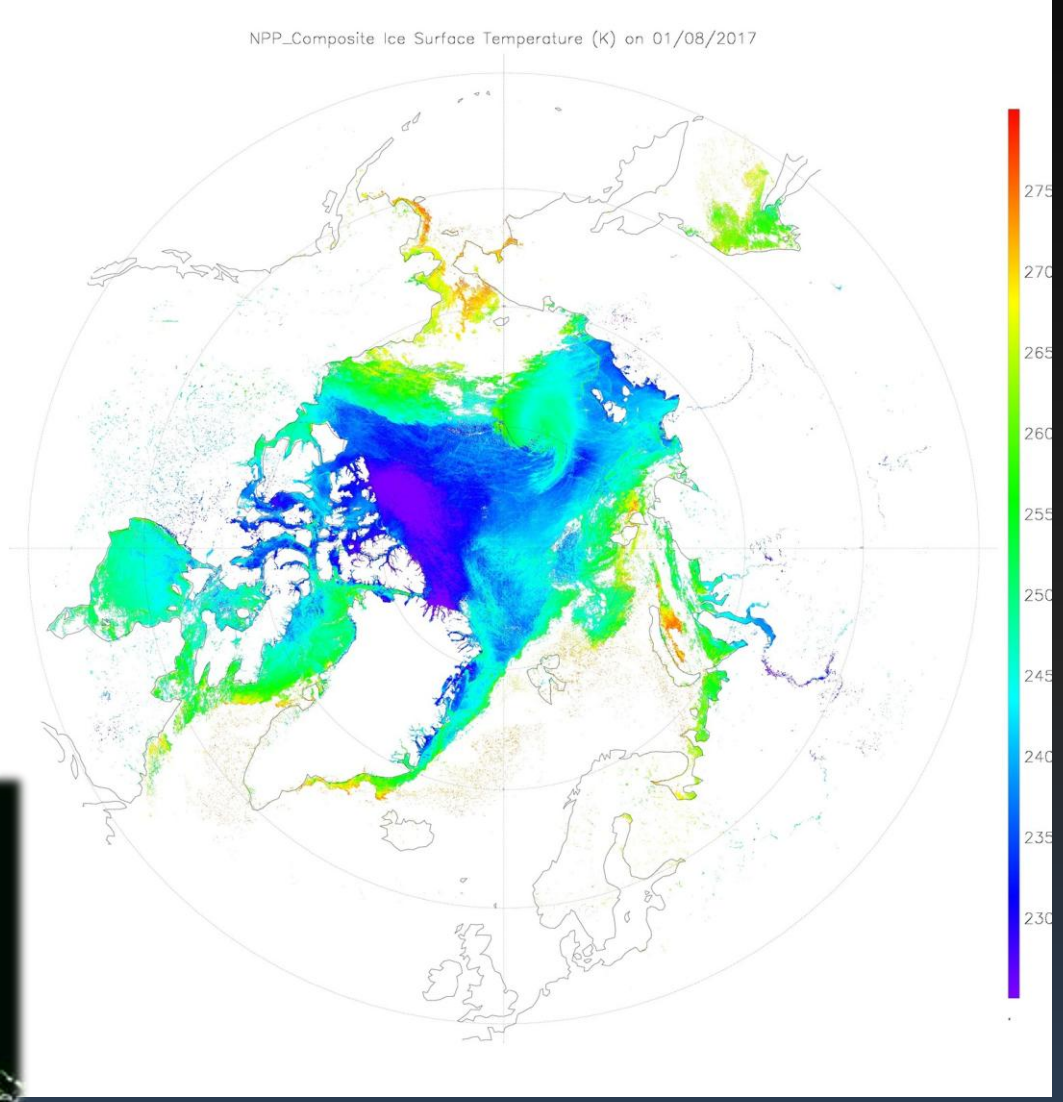
- Snow cover (binary)
- Snow fraction
- Ice thickness and age
- Ice concentration
- Ice surface temperature
- Ice motion (experimental)
- Sea ice leads (future)
- Polar winds

AMSR-2 on GCOM-W1

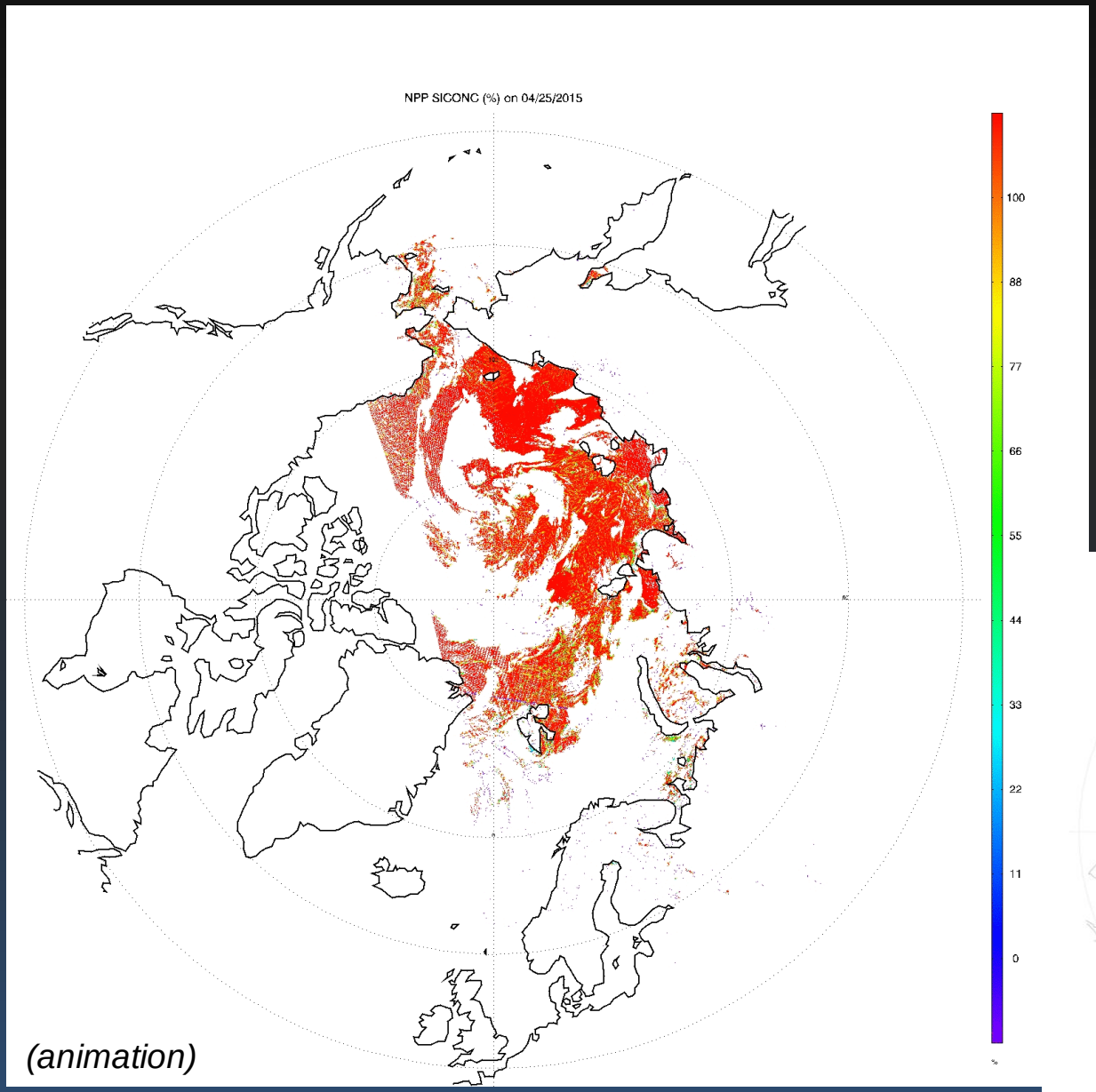
- Snow cover
- Snow depth
- Snow water equivalent (SWE)
- Ice characterization
  - Ice age class (first-, multi-year)
  - Ice concentration
- Ice motion (experimental)

VIIRS Ice Surface Temperature



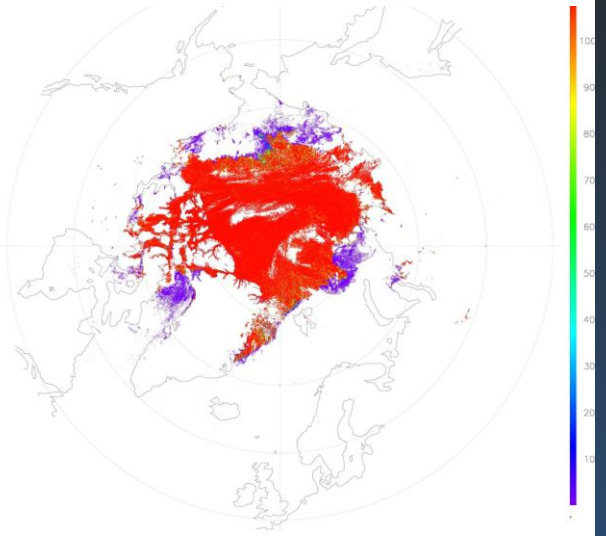


VIIRS Ice Concentration

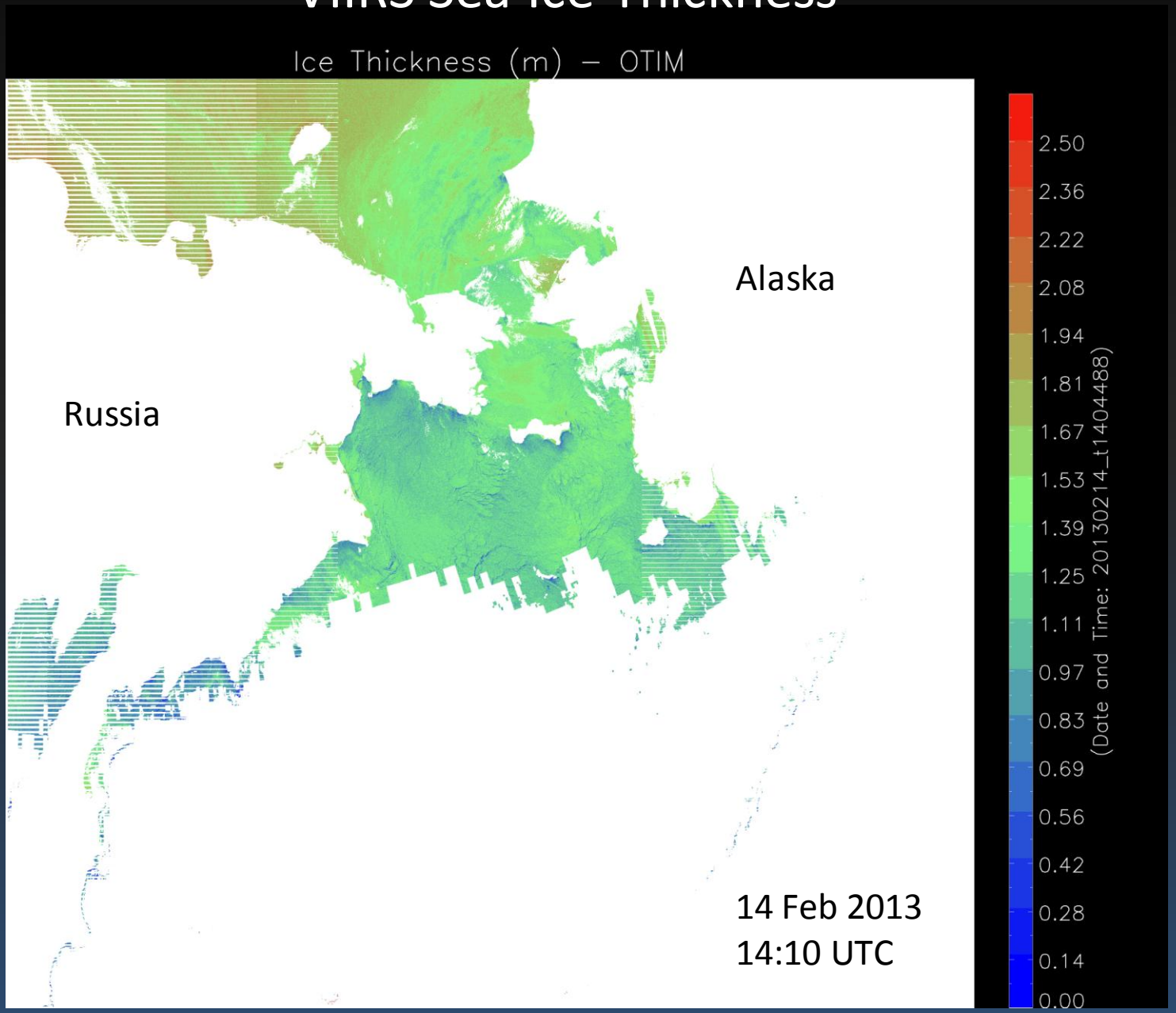


(animation)

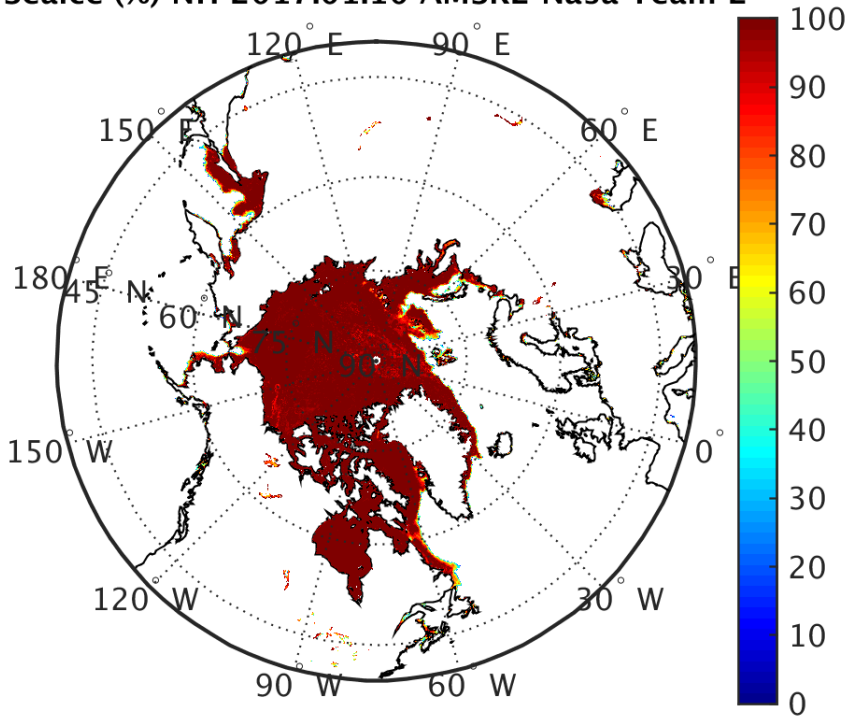
Weekly Composite, 27 Oct 2016

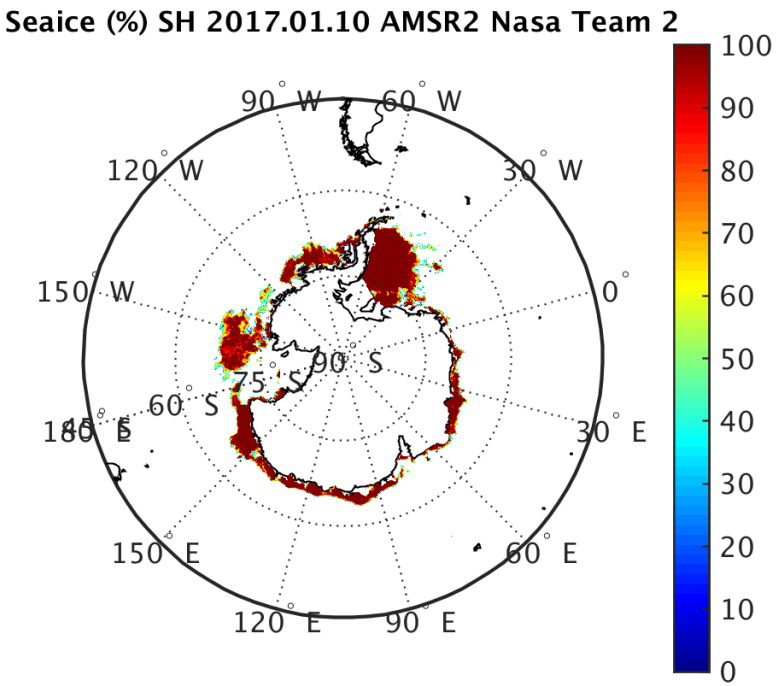


VIIRS Sea Ice Thickness



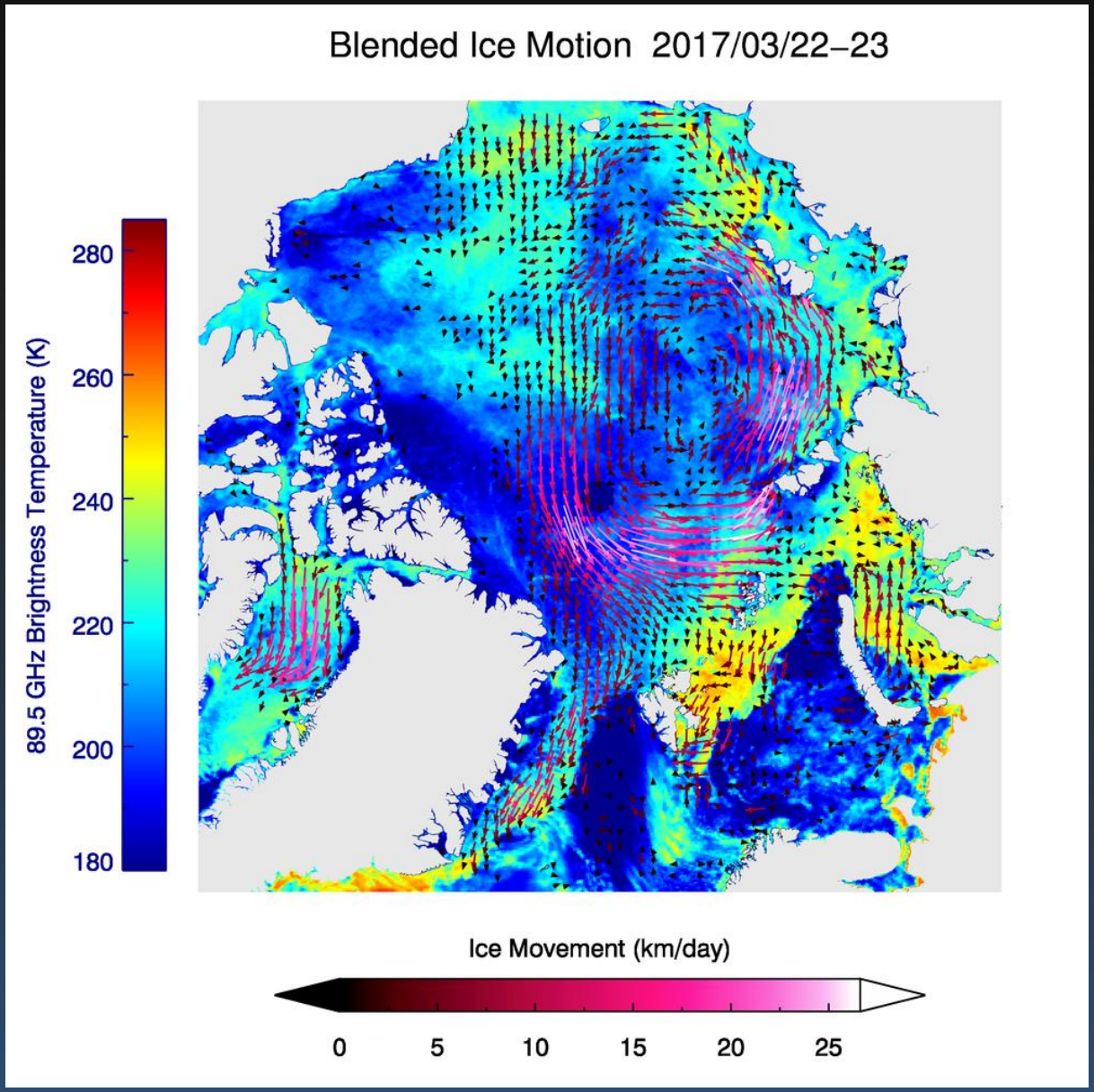
AMSR2 Ice Concentration



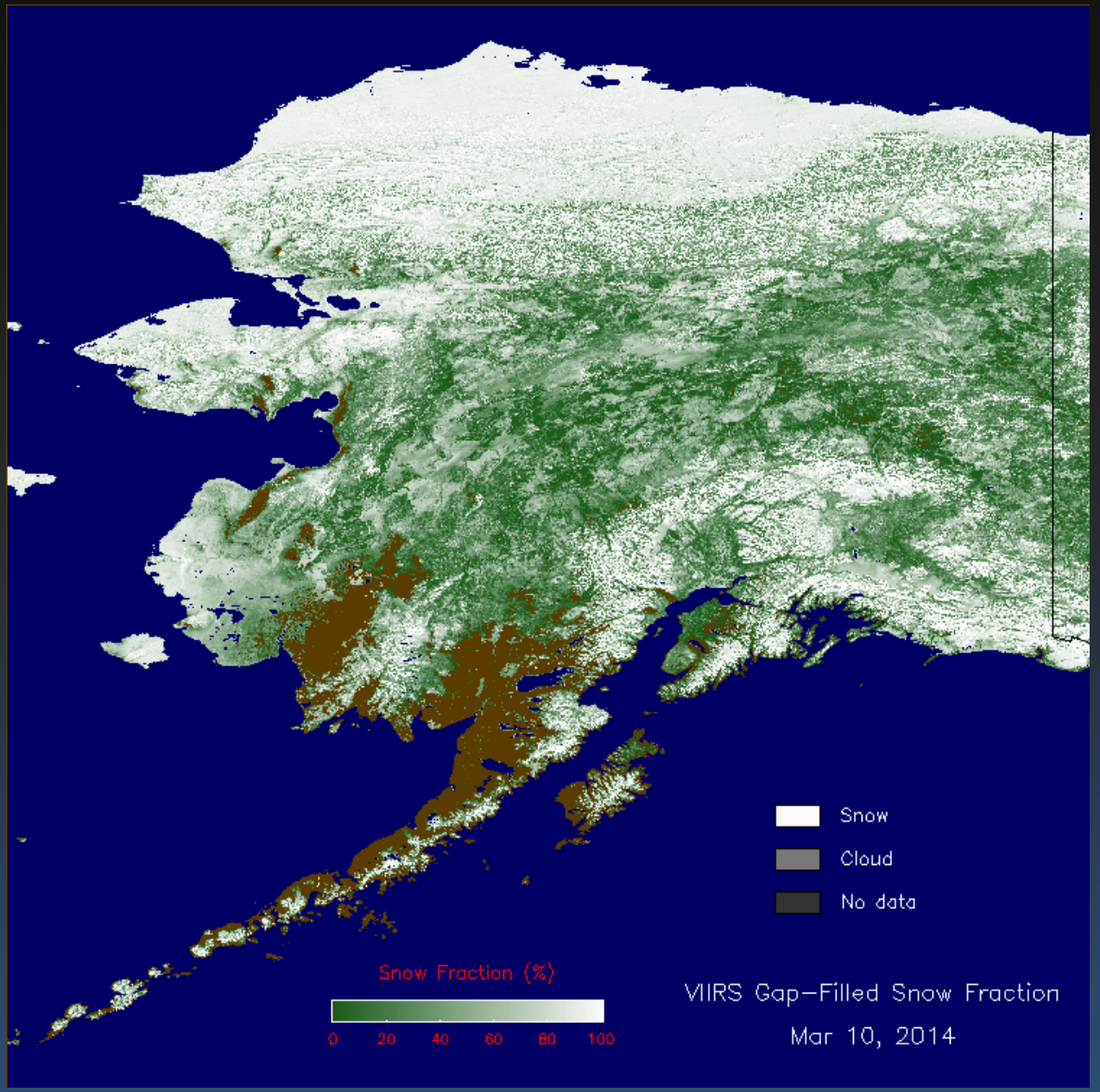


AMSR2 snow and ice products are running daily at CIMSS (http://stratus.ssec.wisc.edu/gcom/rtproducts)

AMSR2 + VIIRS Blended Ice Motion



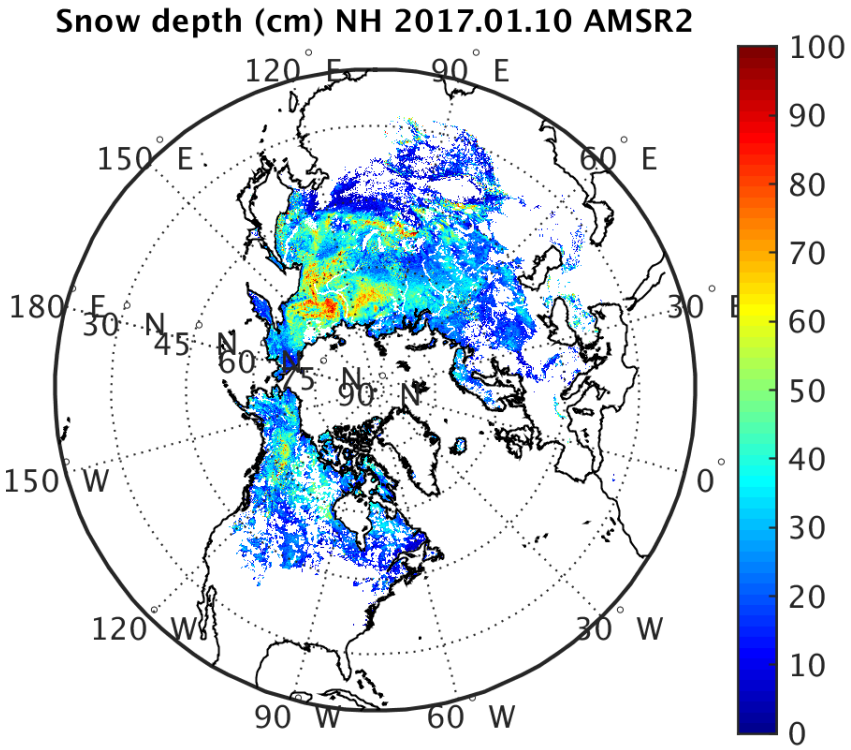
VIIRS Snow Fraction

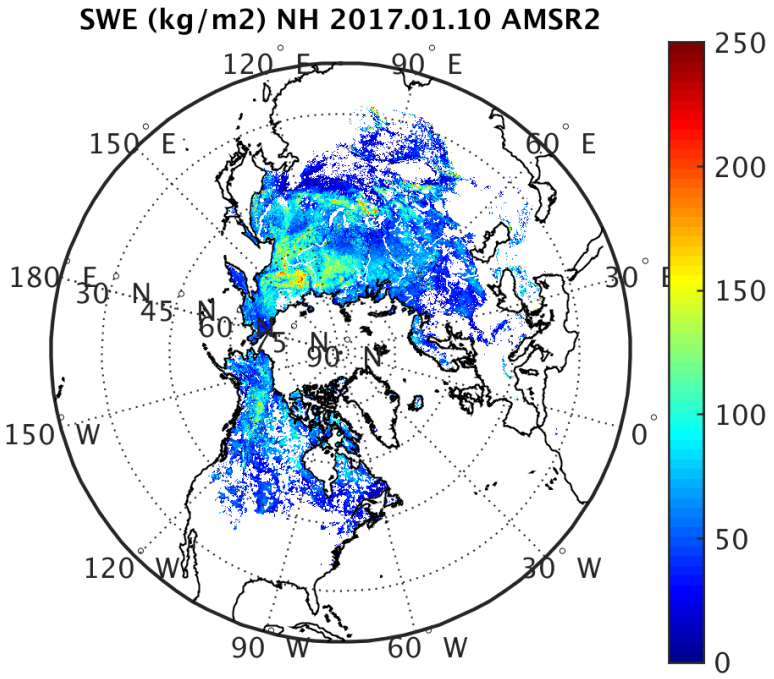


Some artifacts exist due to the cloud mask

(animation)

AMSR2 Snow Depth and Snow Water Equivalent (SWE)



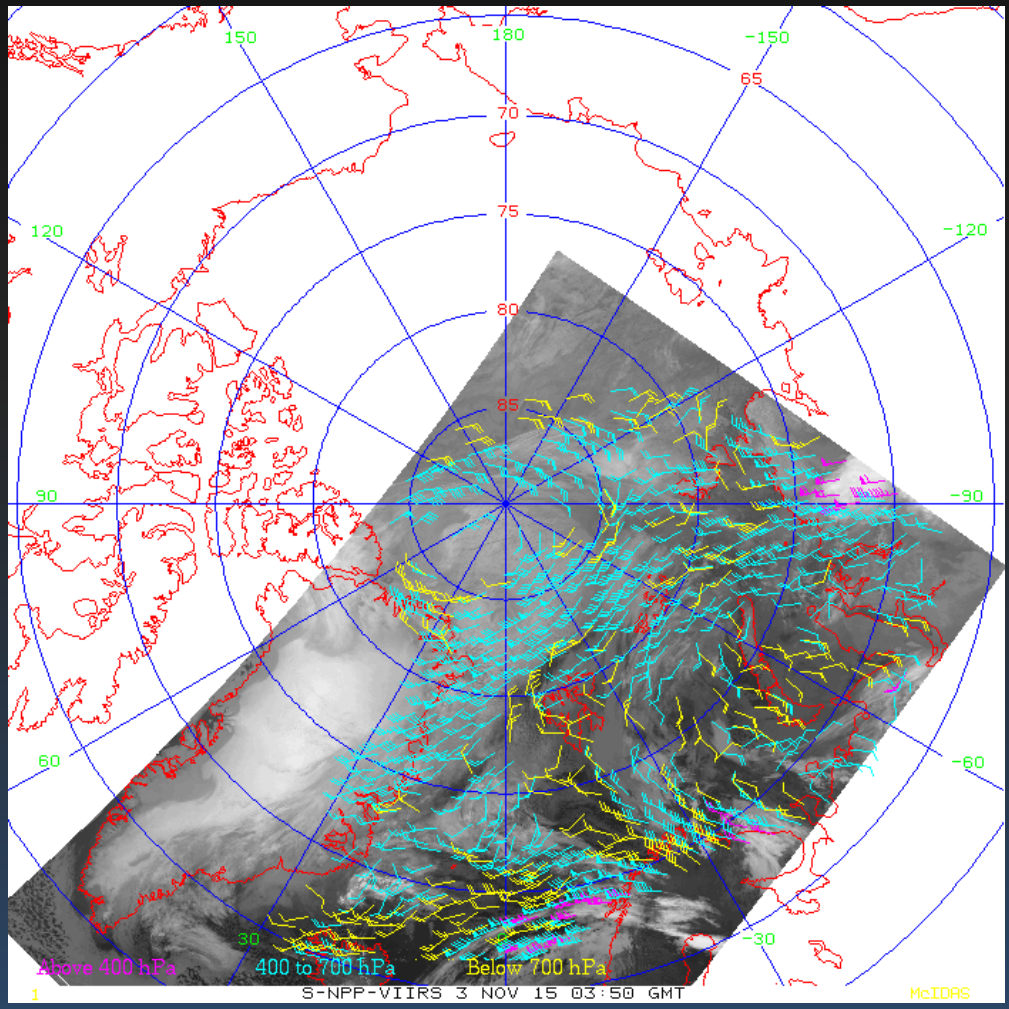


VIIRS Polar Winds (VPW)

VIIRS Polar Winds are derived by tracking clouds features in the VIIRS longwave infrared channel (Band M15, 10.8um)

- Wind speed, direction, and height are measured throughout the troposphere, poleward of approximately 65 degrees latitude, in cloudy areas only
- Wind information is generated in both the Arctic and Antarctic regions

MODIS and AVHRR polar winds are also available.



AVHRR Polar Pathfinder-Extended (APP-x)

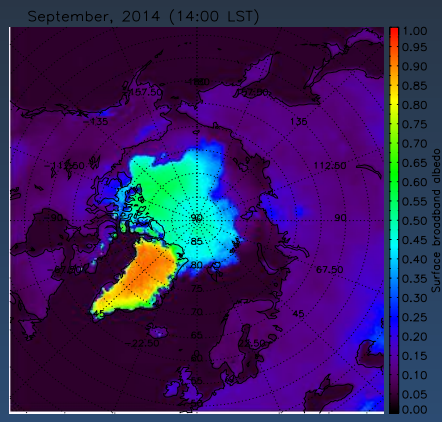
A Climate Data Record

APP-x contains 19 variables:

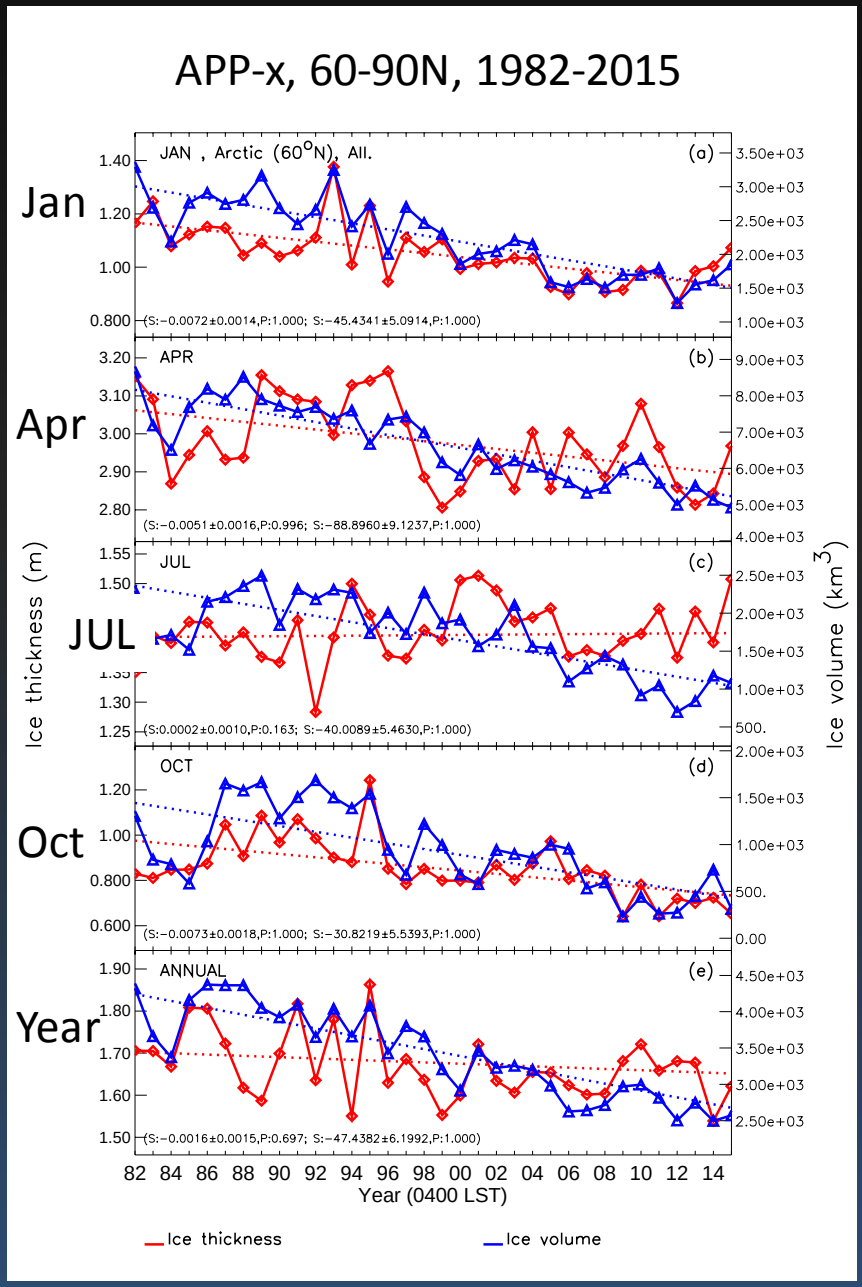
- Surface skin temperature, snow, ice, land
- Surface broadband albedo, all-sky
- Sea ice thickness
- Surface type
- Cloud mask
- Cloud particle thermodynamic phase
- Cloud optical depth
- Cloud particle effective radius
- Cloud top temperature
- Cloud top pressure
- Cloud type
- Up/down shortwave radiation at the surface
- Up/down longwave radiation at the surface
- Up/down shortwave radiation at the TOA
- Upwelling longwave radiation at the TOA
- Shortwave cloud radiative forcing at the surface
- Longwave cloud radiative forcing at the surface

APP-x characteristics:

- 1982 – present, updated daily
- Arctic and Antarctic
- 25 km resolution , EASE grid
- Twice daily centered on 04:00/02:00 (Arctic/Antarctic) and 14:00 local solar time
- Available from NCEI



APP-x: Arctic sea ice thickness and volume trends

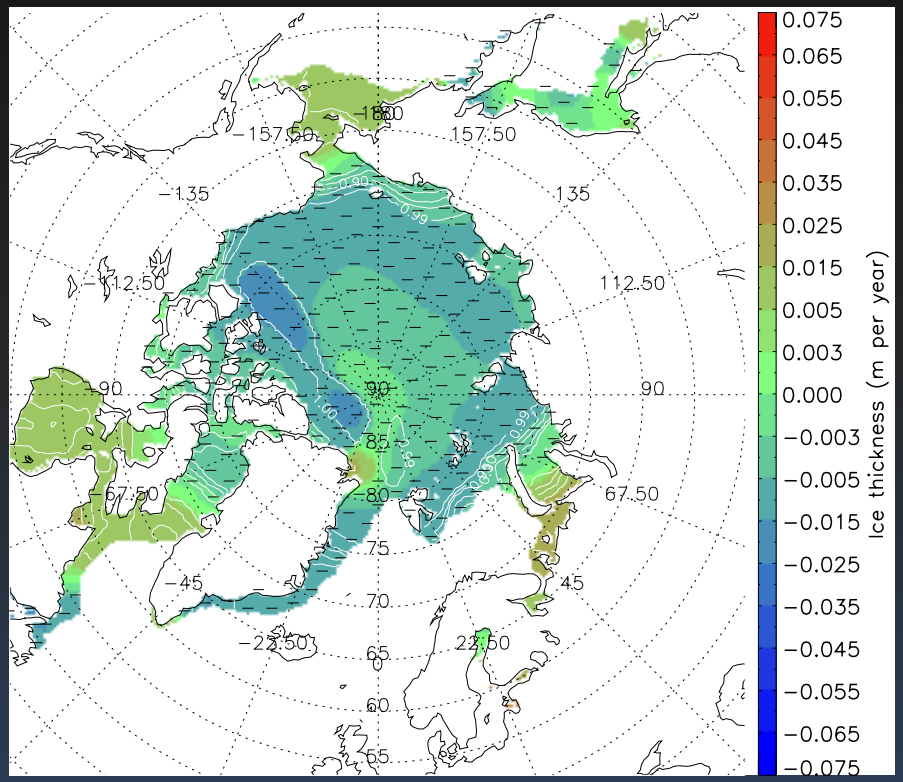


The first and second pairs of (S,P) in each panel are the trend and statistical significance level for ice thickness (red line) and ice volume (blue line).

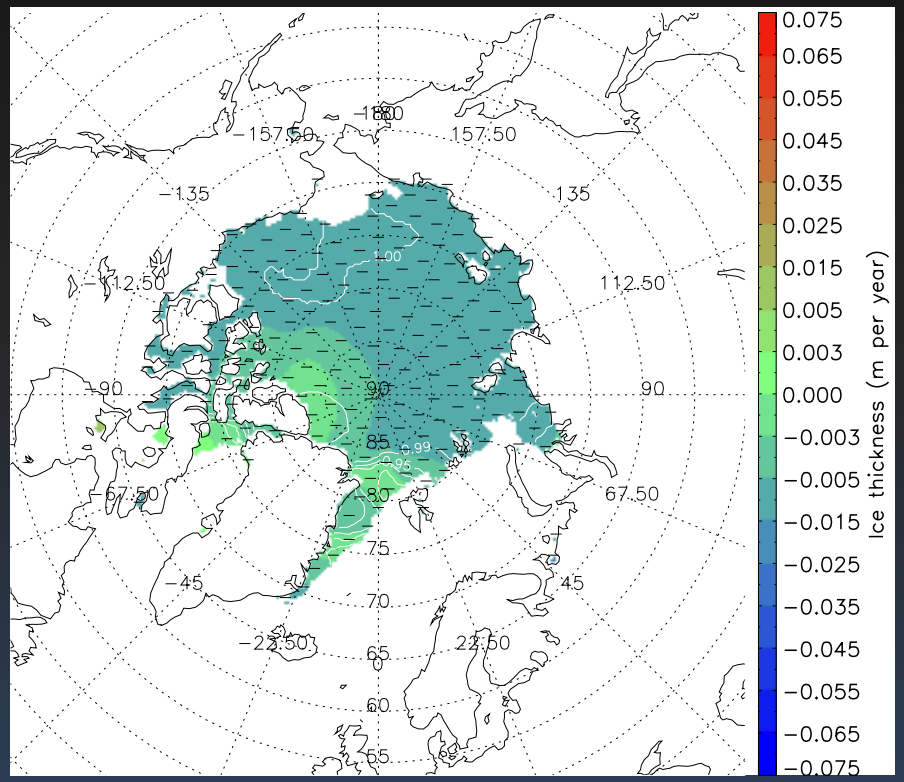
JAN=January, APR=April, JUL=July, OCT=October, ANN=Annual, S=Slope (trend in per year), P=Statistical significance level

Arctic Sea Ice Thickness Trends, 1982-2015

April

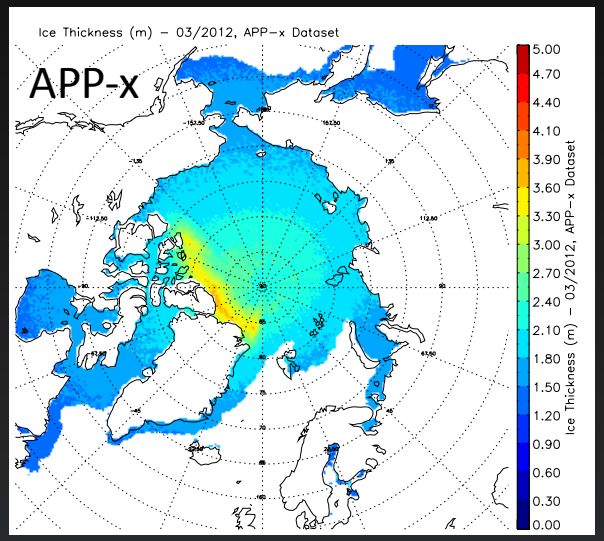


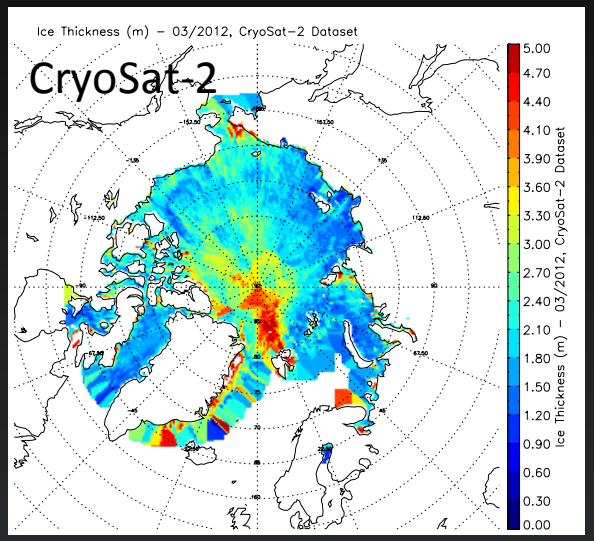
October

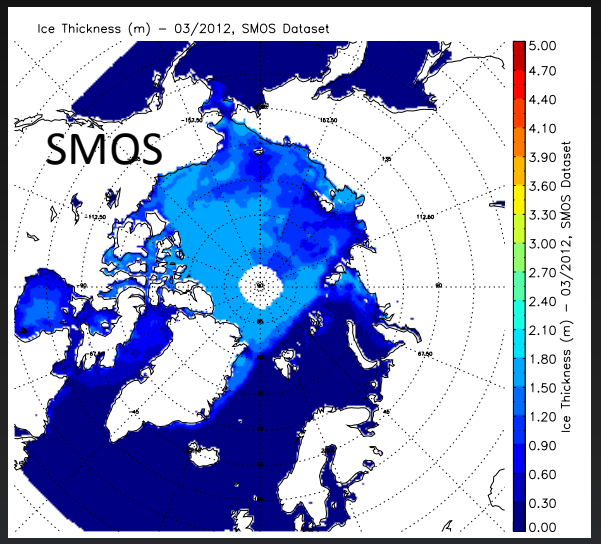


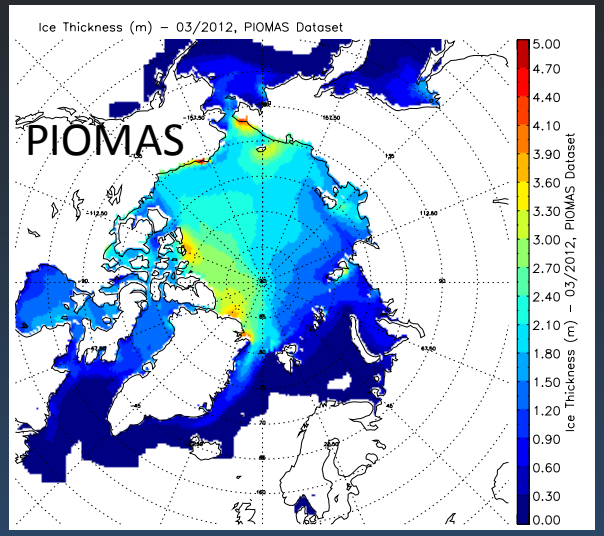
Arctic sea ice thickness trends in April (left) and October (right), 60-90N, 1982-2015. The dashed areas indicate declining trends in sea ice thickness. The white contour lines indicate the statistical significance level.

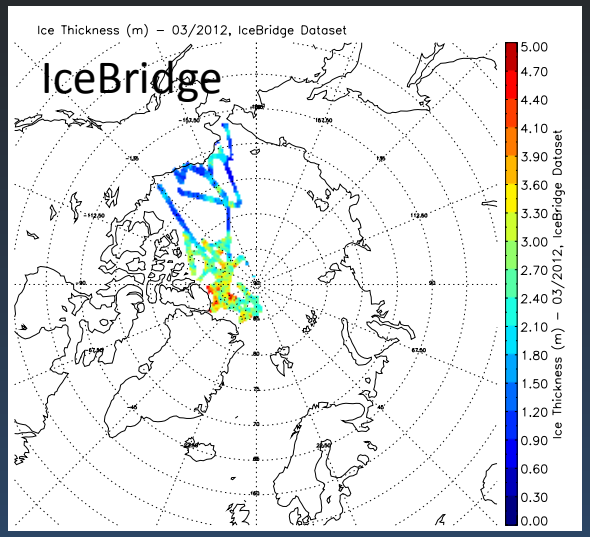
Satellite-Derived Ice Thickness Products

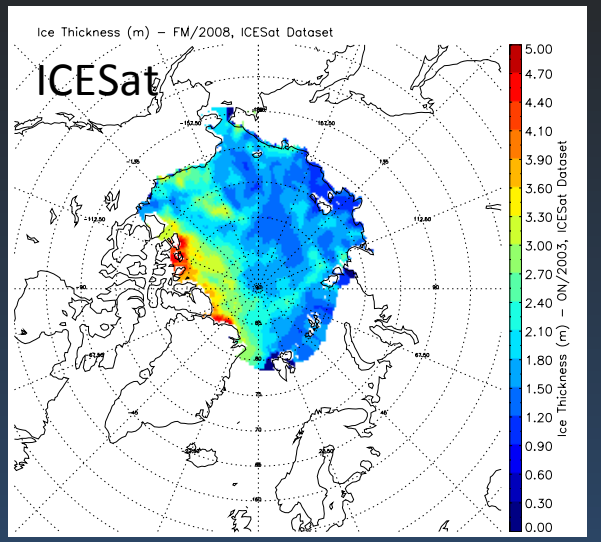






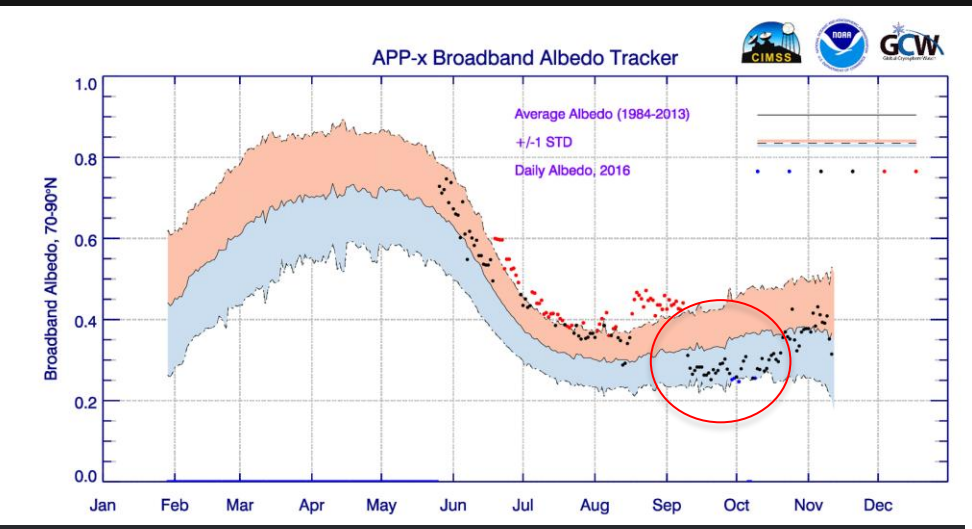


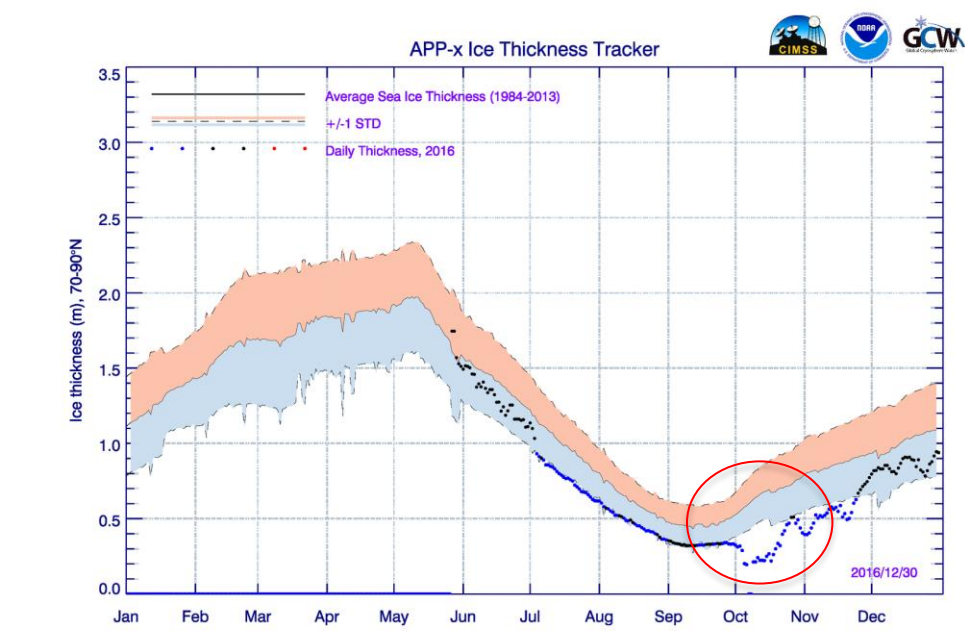


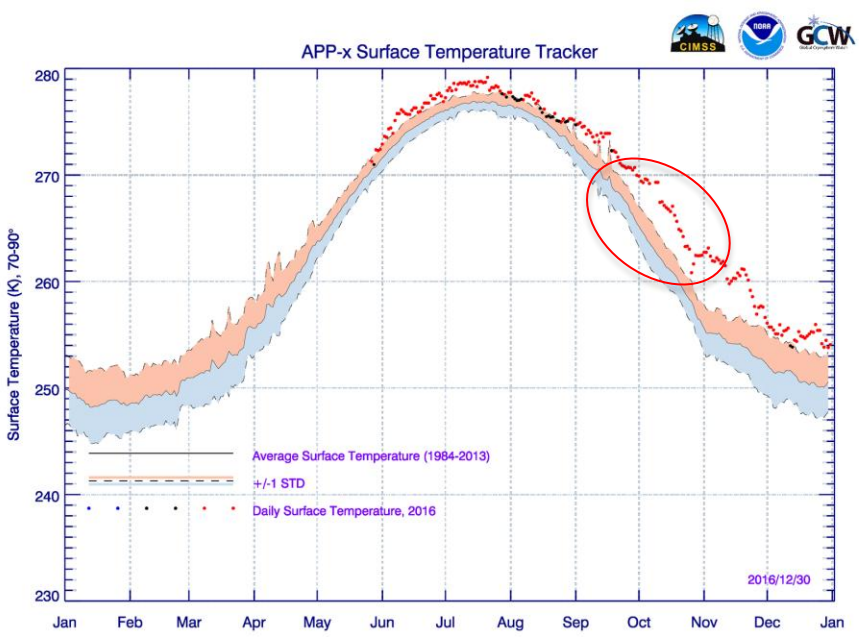


These are the monthly mean results for March 2012, except for ICESat sea ice thickness, which is a 34-day average from 2 February to 31 March 2008.

APP-x “Trackers”







Regional trackers are also being developed