BLENDED VIIRS+MICROWAVE ICE CONCENTRATION

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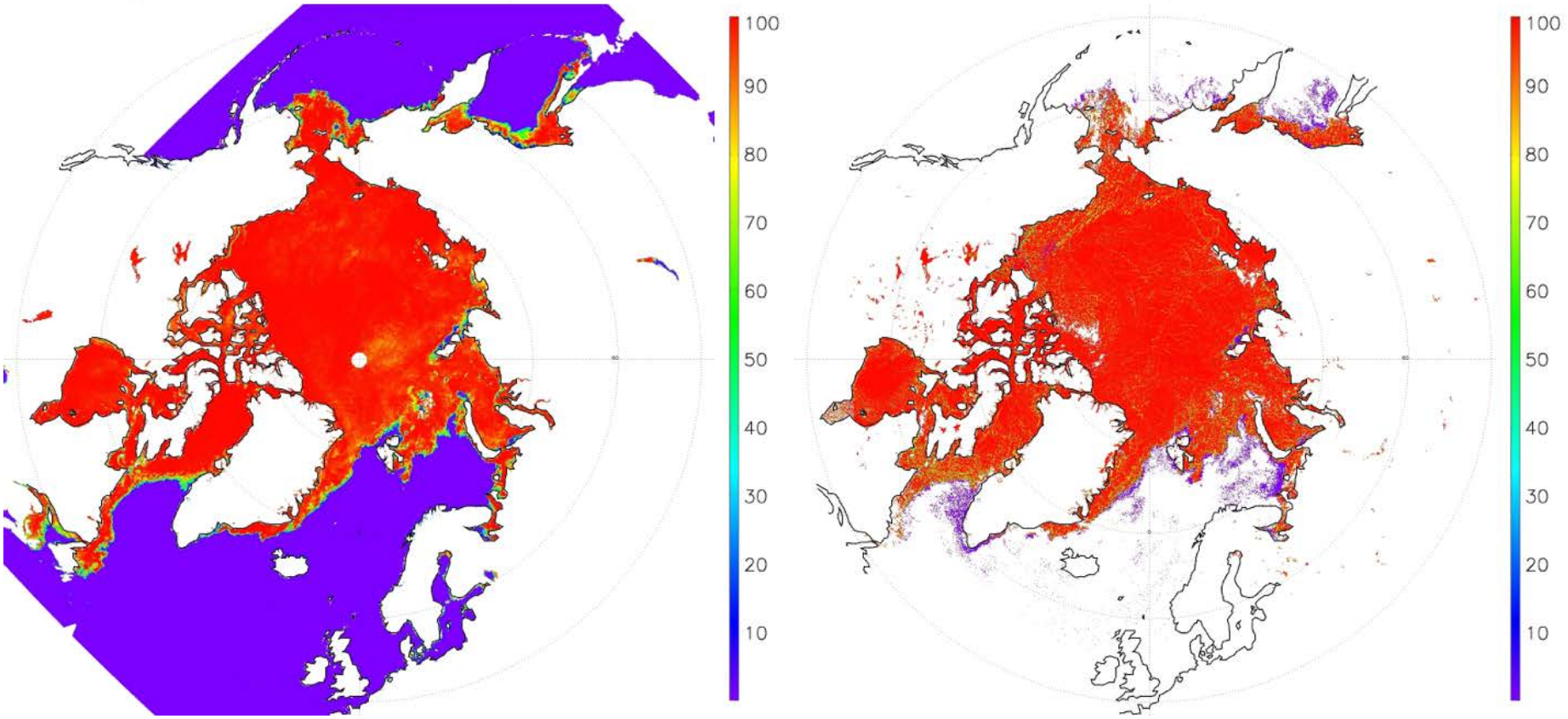
Ice Concentration Team

PI	Organization	Team Members	Roles and Responsibilities
J. Key	NESDIS	Y. Liu (UW/CIMSS) R. Dworak (CIMSS)	Algorithm Development and cal/val Ice concentration cal/val

Motivation



Ice concentration from SSMIS (left) and a daily ice concentration composite from VIIRS (right) over the Arctic on February 20, 2015.

1. VIIRS product shows more details than passive microwave product
2. VIIRS show more realistic ice concentration around the North Pole

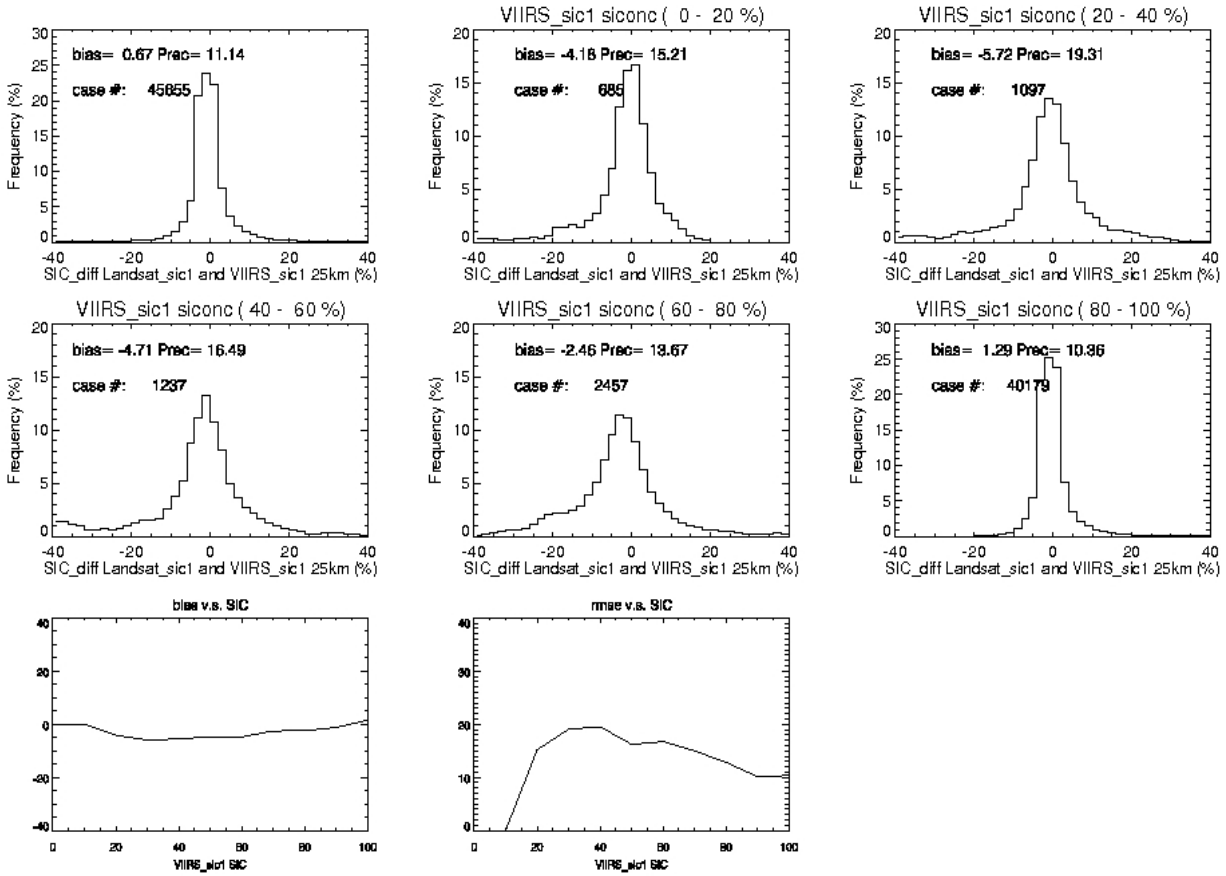
Algorithm Overview

The Best Linear Unbiased Estimator (BLUE) is then applied to derive the final ice concentration under clear sky conditions:

$$ICE\_CONC = \left(\frac{\sigma_2^2}{\sigma_1^2+\sigma_2^2}\right)\times(ICE\_CONC_1 - D_1) + \left(\frac{\sigma_1^2}{\sigma_1^2+\sigma_2^2}\right)\times(ICE\_CONC_2 - D_2)$$

where ICE_CONC, ICE_CONC1, and ICE_CONC2, are optimized ice concentration, and ice concentrations from the two products; D1 and D2 are measurement accuracy; σ1 and σ2 are the measurement precision.

Algorithm Overview



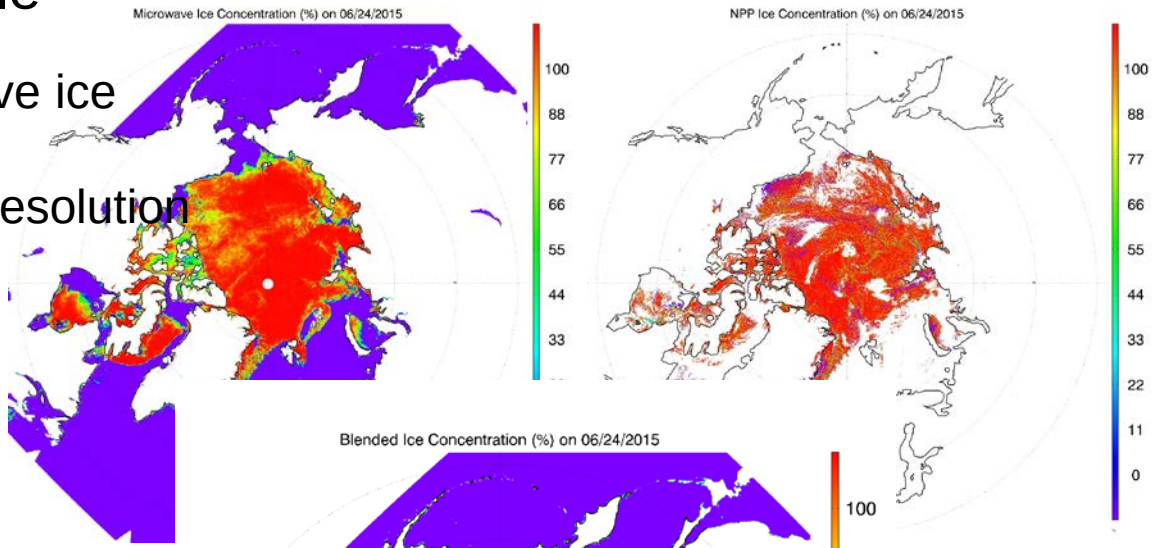
Comparison of VIIRS and Landsat ice concentrations for different concentration ranges/bins. Also shown are the differences overall (upper left) and the bias and root-mean-square (RMS) difference as a function of VIIRS ice concentration (bottom row).

Same comparisons are made for AMSR2 ice concentration.

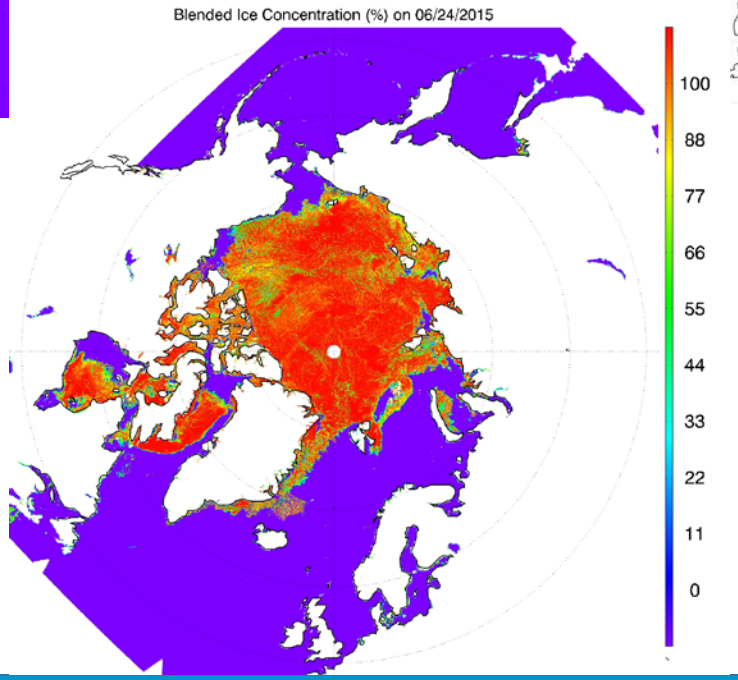
Algorithm Overview

Blended sea ice concentration from passive Microwave and infrared/visible

Passive microwave ice concentration:
Con: low spatial resolution
Pro: all-weather



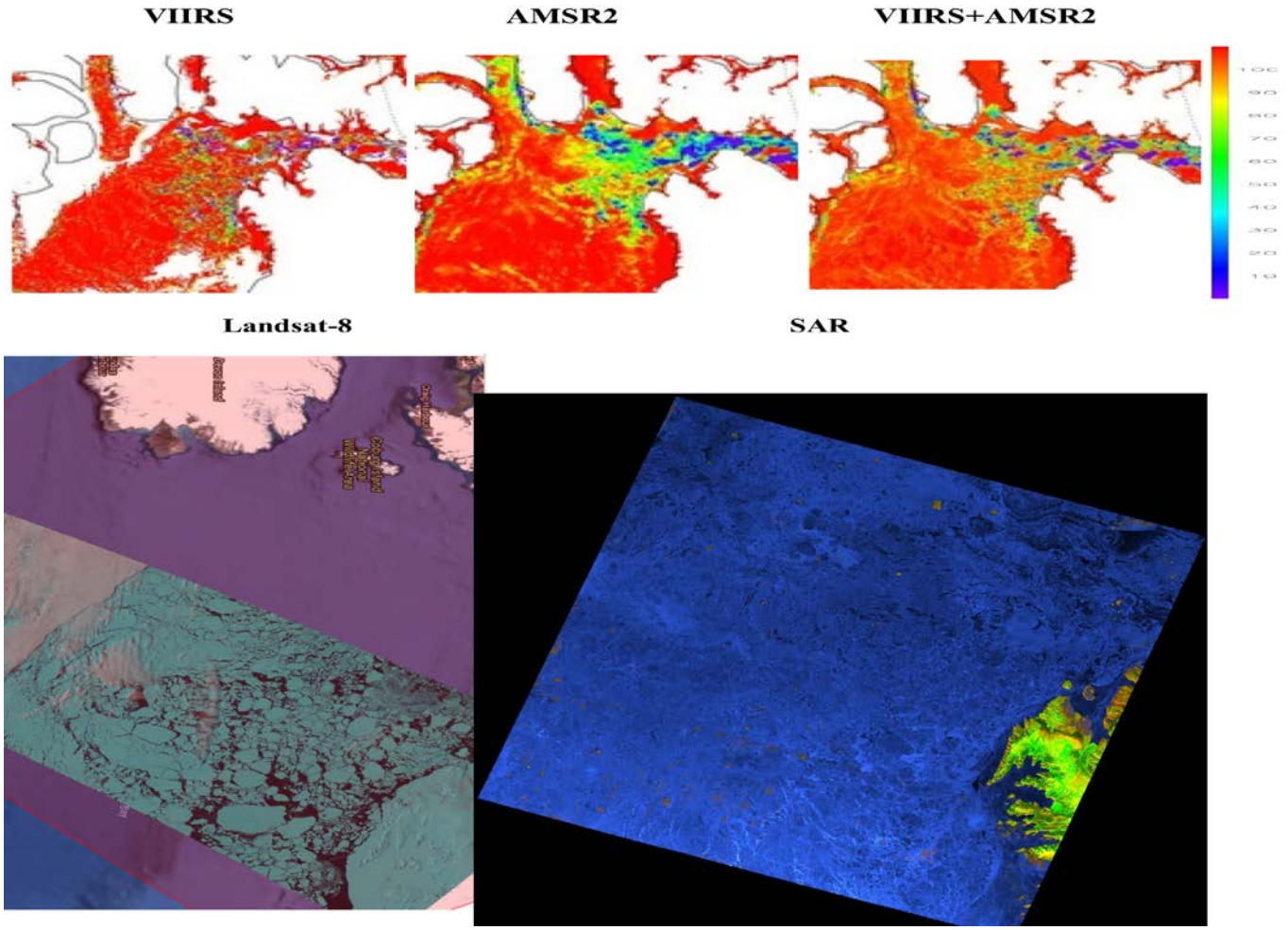
Passive infrared/visible ice concentration:
Con: clear-sky only
Pro: high spatial resolution



Blended sea ice concentration at 1 km resolution on June 24, 2015 using AMSR-2 and the Suomi NPP VIIRS ice concentration products

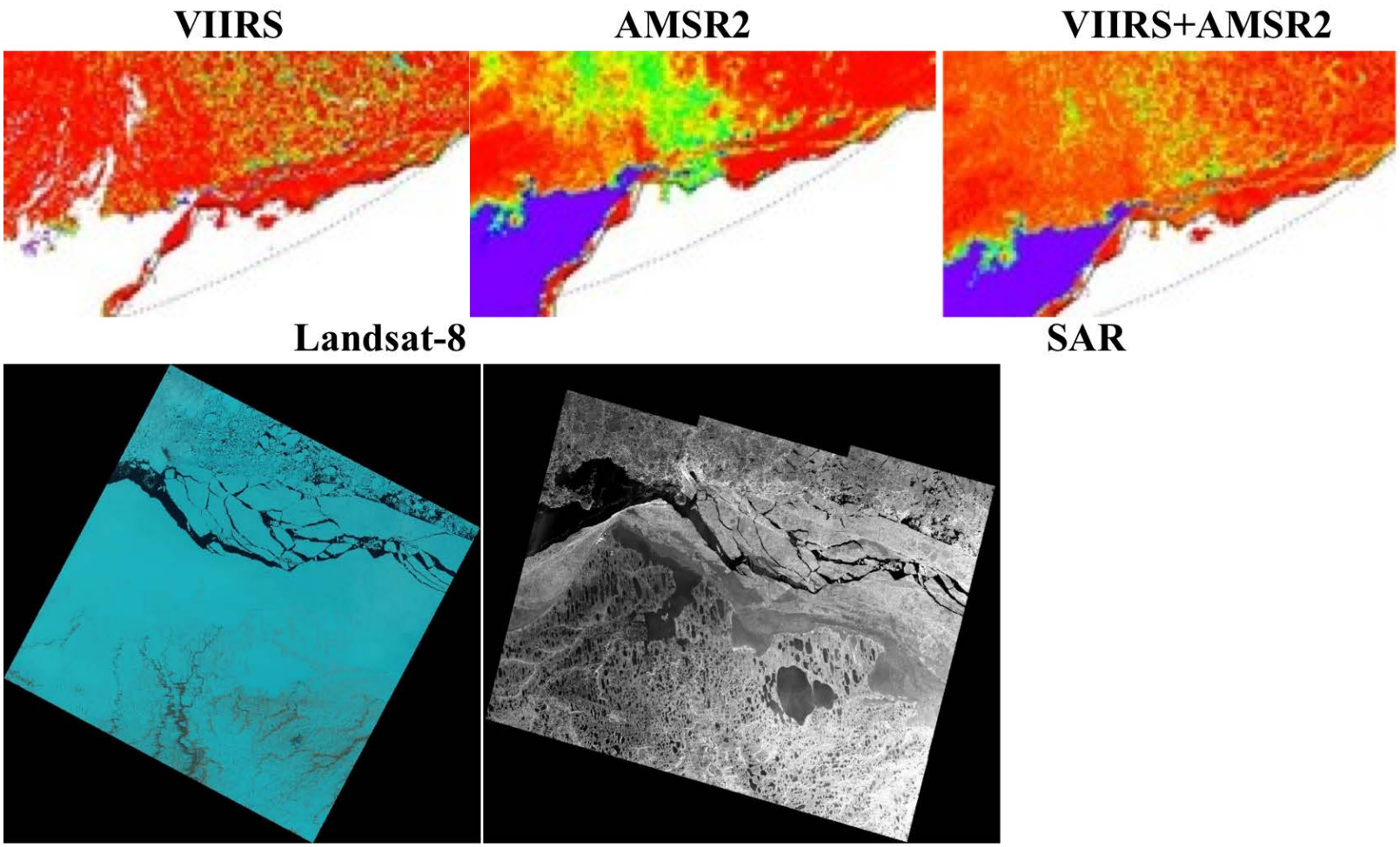
Blended ice concentration: high spatial resolution under all-weather conditions

Performance



On May 11, 2017 over Baffin Bay VIIRS, AMSR2 and Blended SIC on top. Landsat-8 OLI/TIRS and SAR Sentinel-1B imagery on bottom

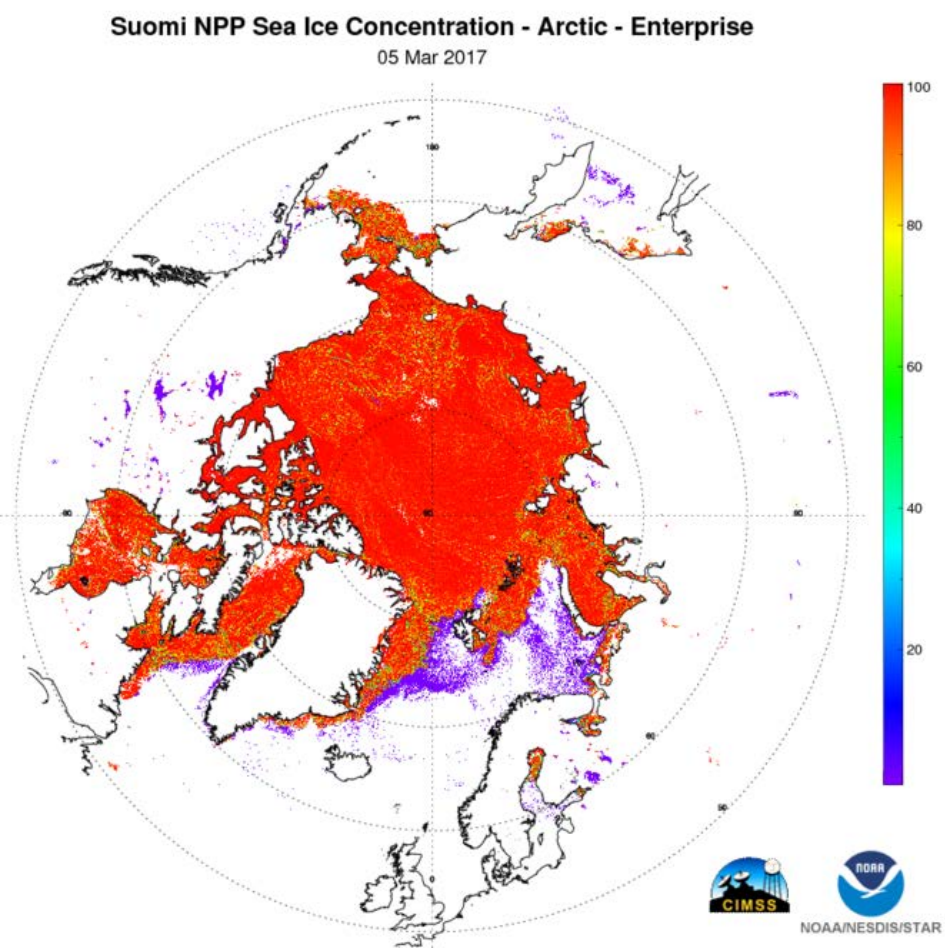
Performance

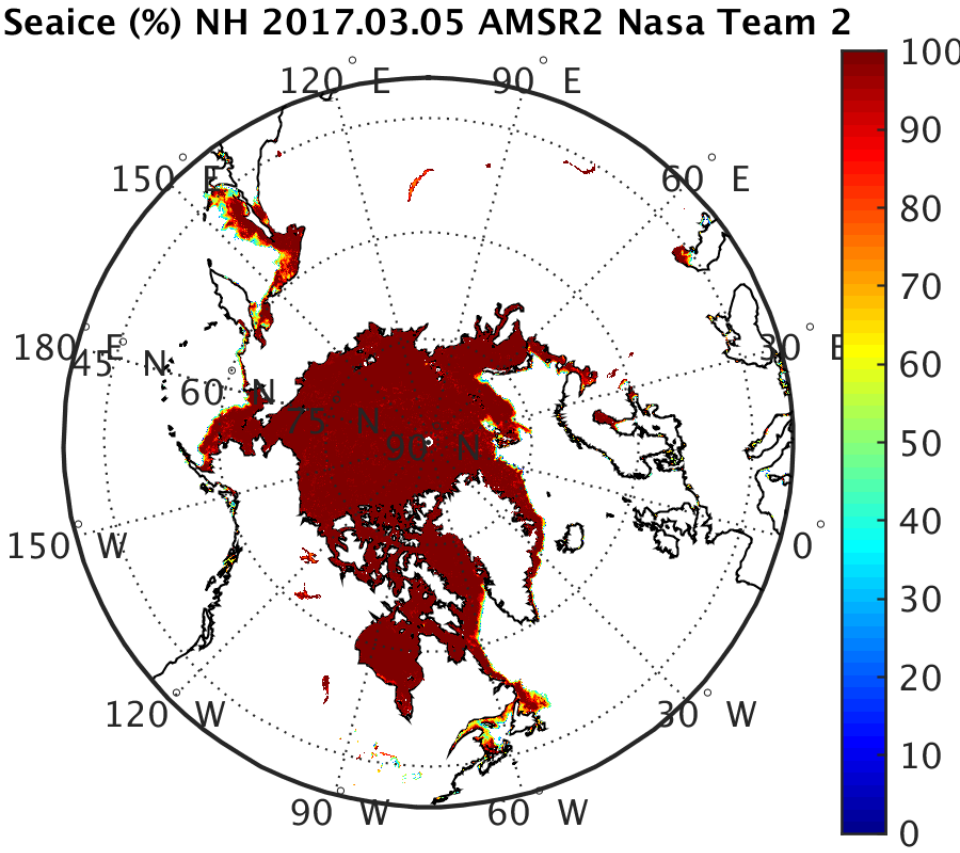


On May 27, 2017 near Alaskan Beaufort Sea Coast VIIRS, AMSR2 and Blended SIC on top. Landsat-8 OLI/TIRS and SAR Sentinel-1A imagery on bottom

Current Status

- Blended ice concentration is being generated daily for National Ice Center
- Data is in GeoTIFF format, over both Arctic and Antarctic





Daily Ice concentration (IC) composite from VIIRS (**left**); and IC AMSR2 (**right**) over the Arctic on March 5th 2017.

Current Status

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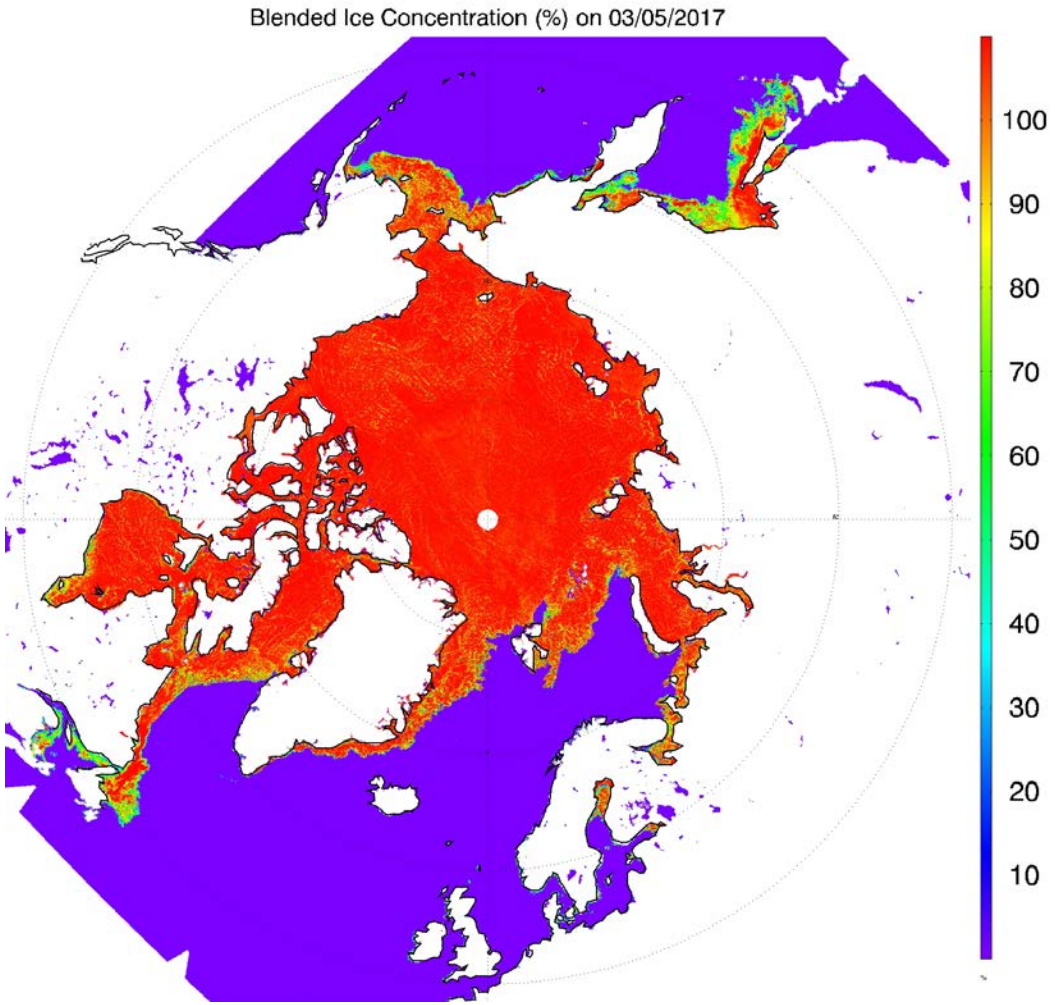

Blended Daily Ice concentration (IC) over the Arctic on March 5th 2017.

User Interaction

- Blended ice concentration is currently archived for National Ice Center for evaluation

Summary and Path Forward

- Blended ice concentration from VIIRS and passive microwave provides high spatial resolution ice concentration under all-weather conditions;
- This product can benefit operational applications, and long-term scientific studies;
- Further improvement and evaluation is needed with new ice concentration products from sensors with very high spatial resolution onboard the newly launched European satellites.