



SEA ICE LEADS

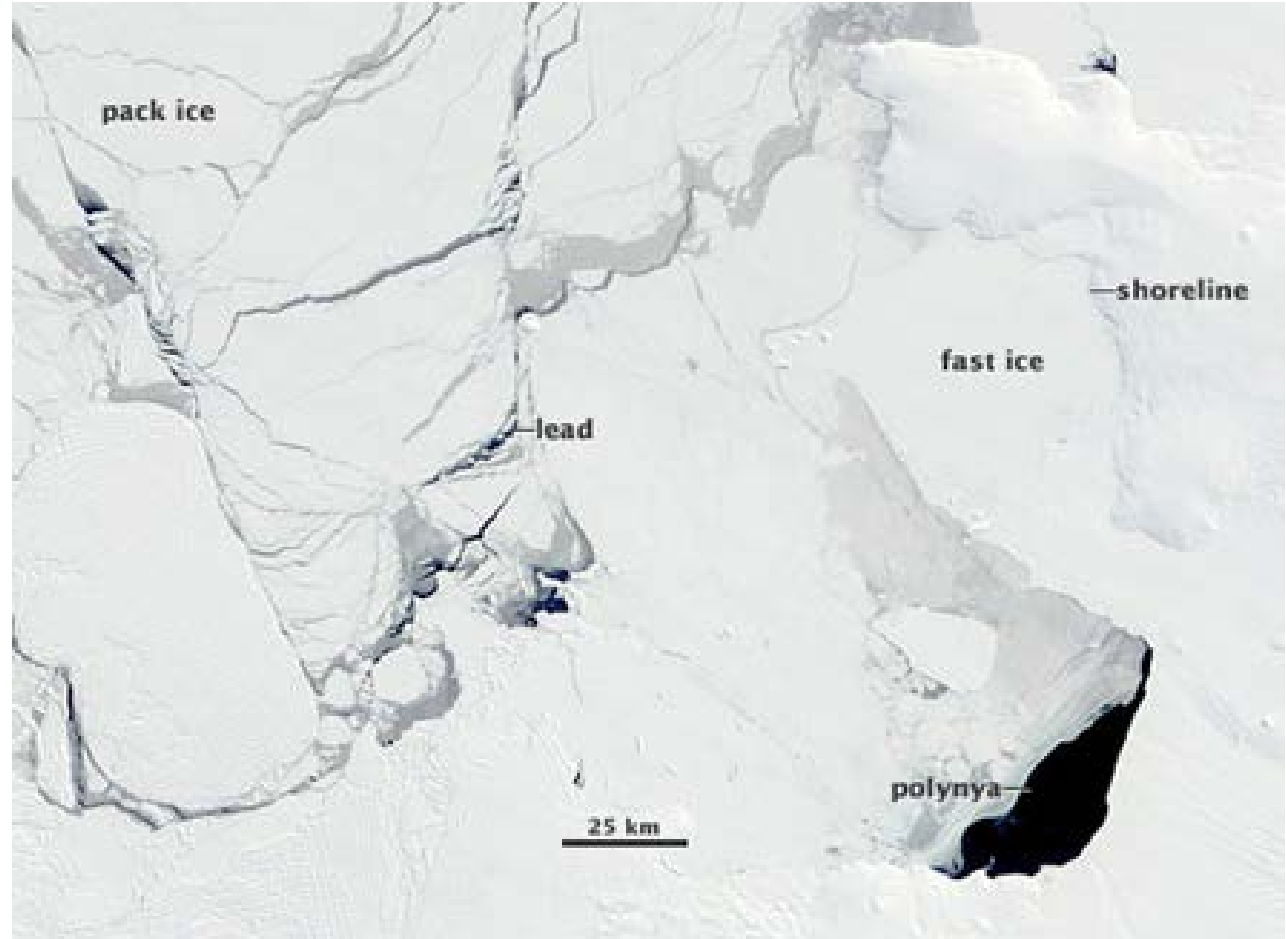
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Background &

- Leads are elongated fractures in the sea ice cover. They form under atmospheric and oceanic stresses (Smith et al., 1990).
- Leads provide a source of heat and moisture to the Arctic atmosphere (Alam and Curry 1995, Maykut, 1987).



(From earthobservatory.nasa.gov)

Objective

- Identify the spatial and temporal distributions of sea ice leads (fractures) in the Arctic
- Study trends in the lead distributions and properties (concentration, width, and orientation)

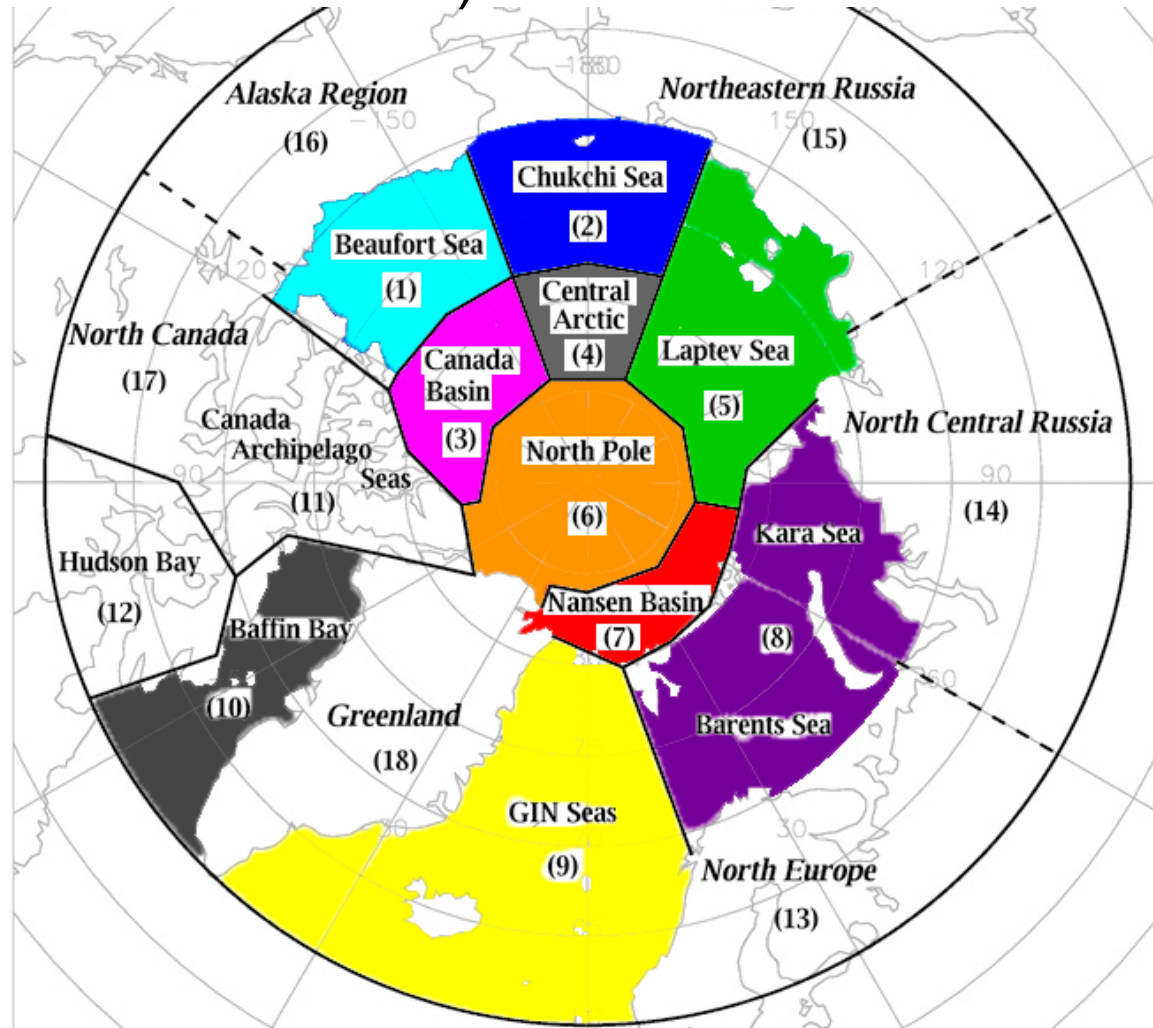


Image credit: National Ice Center

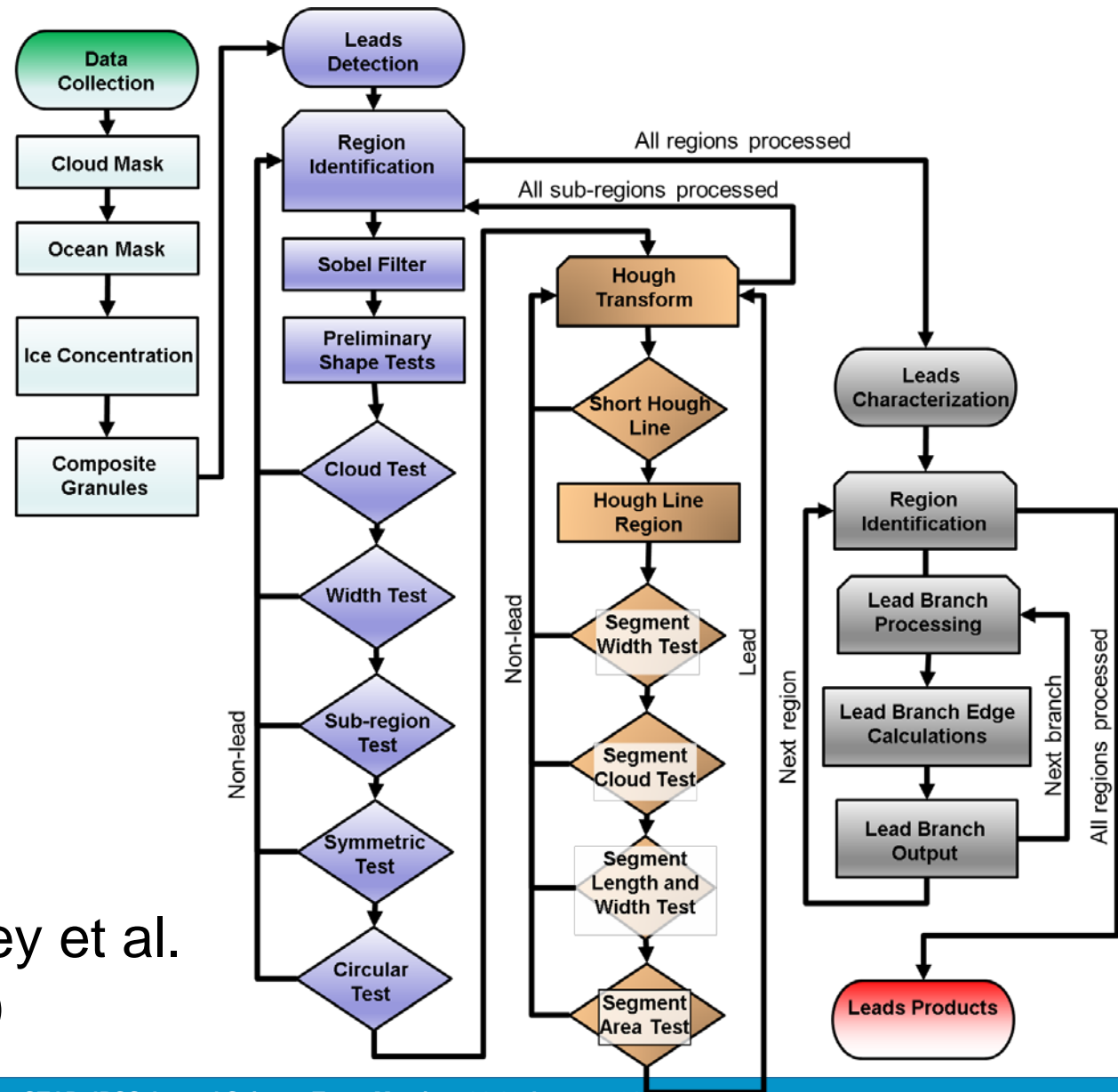
Study Area

2003 - 2017: MODIS (AQUA & TERRA)

- January - April
- 10 polar regions
 - Beaufort Sea
 - Chukchi Sea
 - Canada Basin
 - Central Arctic
 - Laptev Sea
 - North Pole
 - Nansen Basin
 - Kara & Barents Sea
 - GIN Seas
 - Baffin Bay

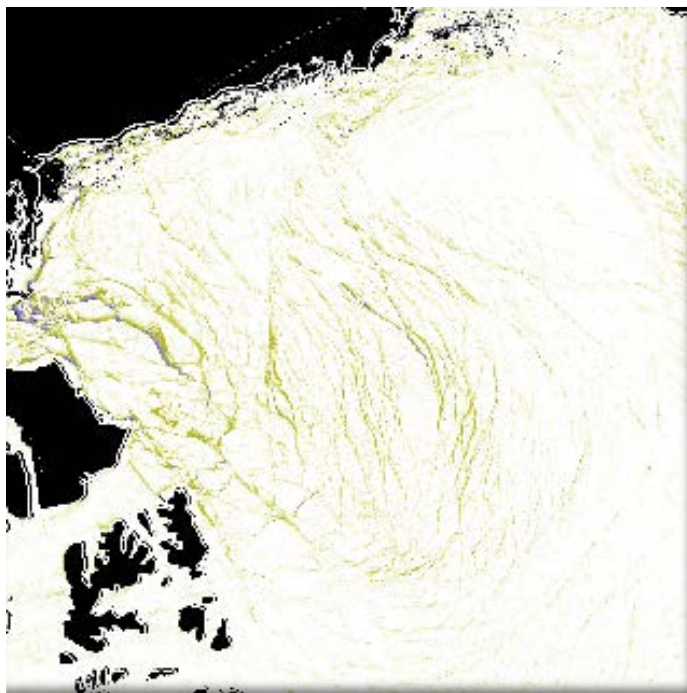


Algorithm Description



Adapted from Key et al.
(1993 and 1994)

- VIIRS consistent along-swath resolution results in better ice concentration retrievals
 - More detail in sea ice concentration results in more leads detected



Feb 9, 2016
Sea Ice
Concentration
VIIRS
MODIS



Leads Detection

- Lead detect appears as red the day it is detected.
- To show movement, leads fade from white to black on days it is not detected

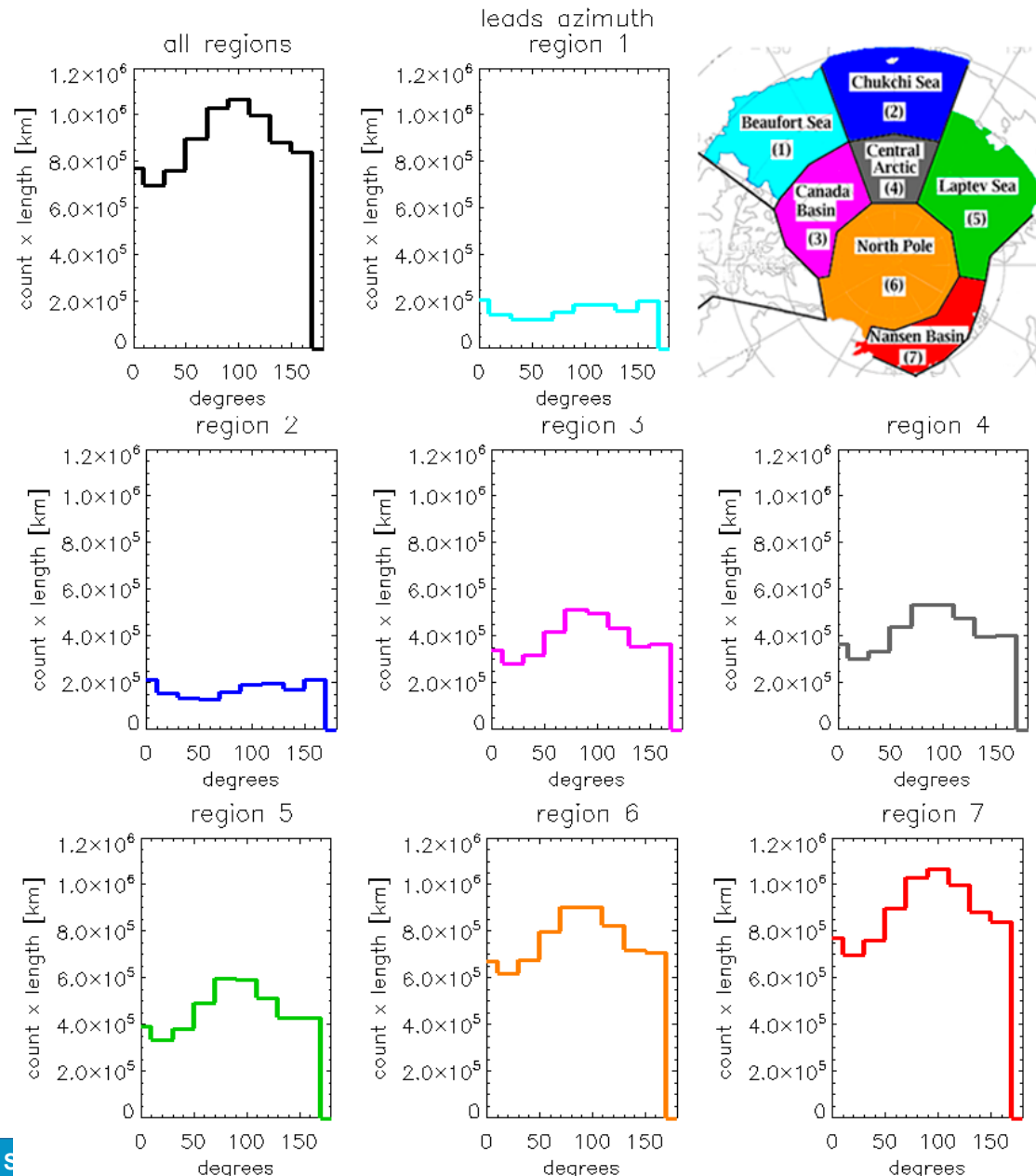
Feb 9-13, 2016

← VIIRS
MODIS ↓

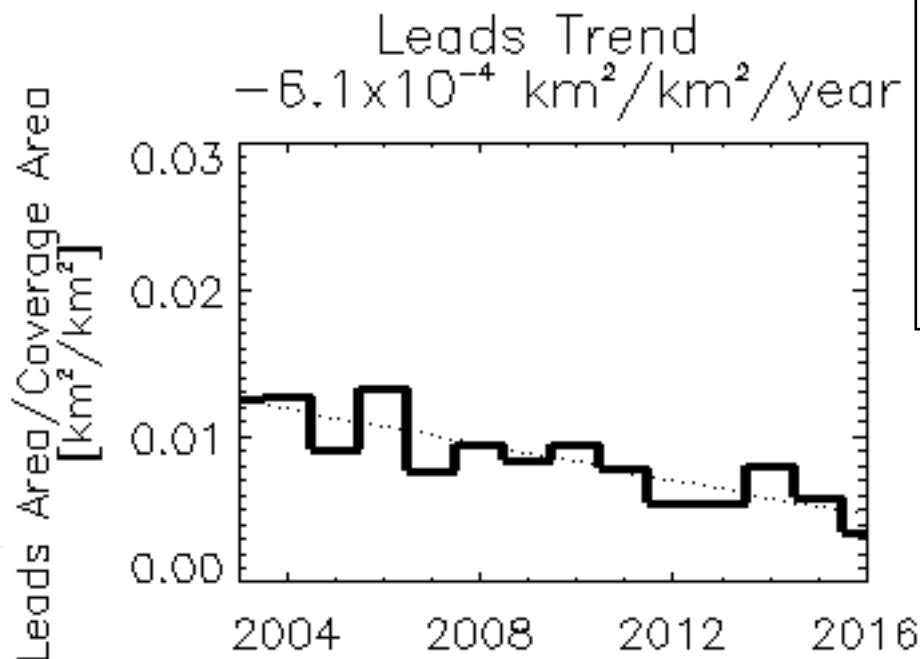
- VIIRS detects more leads in regions where MODIS scan angles are greater than 30°

MODIS Leads Characterization

- Identify object start and end point
 - Length (great-circle distance)
 - Orientation (shown)
- Area
 - Pixel count x pixel resolution
- Width
 - Area/length



- Slight decreasing trend in MODIS leads area
- Improved spatial coverage from VIIRS will help detect more leads where MODIS has poor spatial coverage



- 15 year archive
- Ongoing work
 - Investigate trends
 - Write documentation
- Future steps
 - Real-time product
 - Extend algorithm to VIIRS

Cloud coverage

-Blue/green

Leads

-Red on the day of detection

-Fade from white to grey

