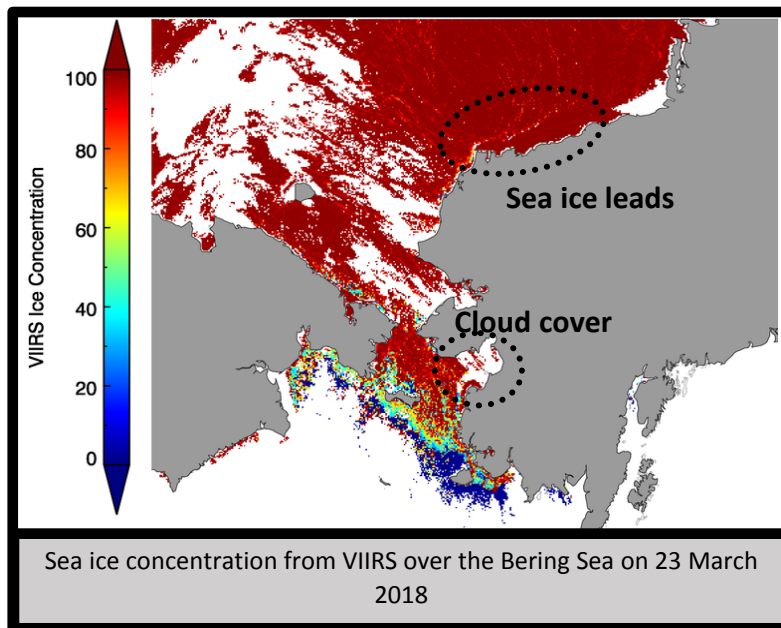


Why is VIIRS Ice Concentration Important?

Over ocean and inland water bodies, changes in sea ice impact the surface energy balance. The fraction of an area that is covered by ice is given by the VIIRS Ice Concentration product. Ice information is important for planning commercial transportation, water management, and damage control. Data from VIIRS (on Suomi-NPP and NOAA-20) are used to produce 750-m resolution ice concentration plots for the Arctic and Antarctic, including inland waters. This product comes at a much higher spatial resolution than typical passive microwave sea ice products.



How is VIIRS Ice Concentration Created?

Ice concentration for each pixel (F_p) can be calculated by :

$$F_p = (B_p - B_{water}) / (B_{ice} - B_{water})$$

where B_{water} is the reflectance of pure water pixels (or surface temperature at nighttime), B_{ice} is the reflectance (surface temperature) of pure ice pixels, and B_p is the observed reflectance (surface temperature) of the pixel over which ice concentration will be calculated. In this algorithm, reflectance at $0.64 \mu\text{m}$ (VIIRS Band M5) is used.

Impact on Operations

Primary Application: Accurate retrievals of ice concentration have great socioeconomic value due to its impact on fisheries, hunting, herding, transportation, and agriculture.

Application: Long-term records of ice concentration are valuable for climate change studies, as sea ice affects energy and moisture and heat exchange between the atmosphere and underlying water.

Application: Modeling studies require accurate sea ice retrievals for proper atmospheric circulation.

Limitations

Limitation: Ice concentration is not retrieved if less than 10% of all pixels in a search window are not covered by ice.

Limitation: Some clouds have similar spectral signatures as ice, and can interfere with this algorithm if not completely masked out. No retrievals can be carried out for cloudy pixels.

Limitation: Multiple overpasses are required to form a composite image, which is still susceptible to clouds causing missing data.