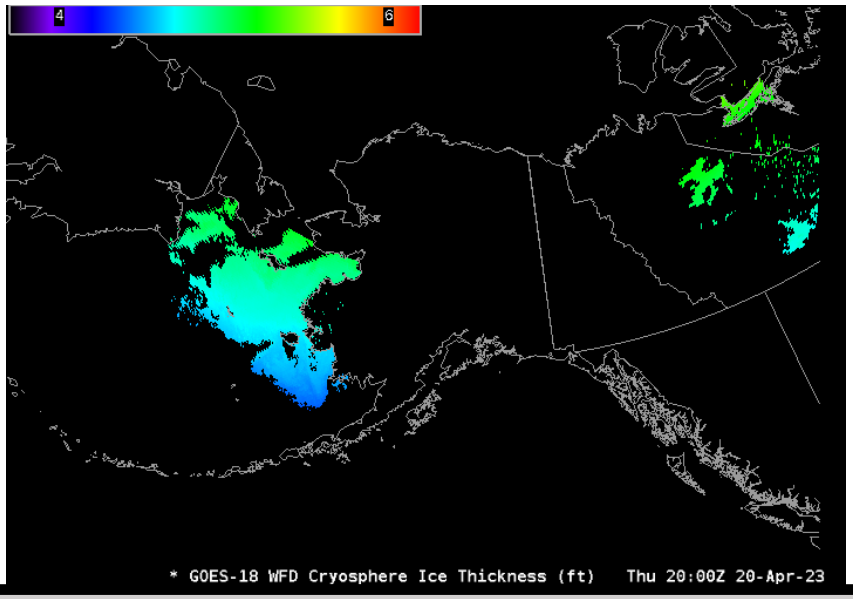
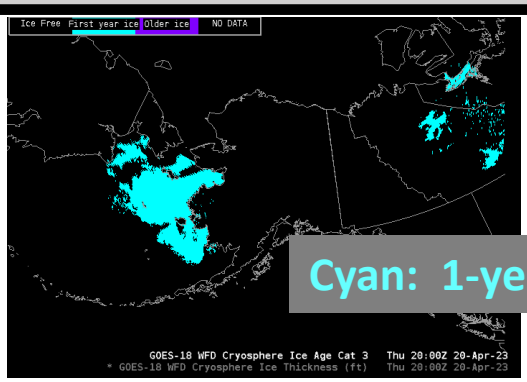
Ice Age/Ice Thickness Quick Guide

Why is Ice Age/Ice Thickness important?

Ice Thickness controls heat and moisture transport into the atmosphere, and is therefore a critical climate variable, and it is also a critical need for shipping and fisheries management. Different categories of ice can be characterized by their defined thickness: New and Nilas (up to 10 cm), Grey (10-15), Grey-White (15-30), Thin/Medium/Thick First-year (30-70, 70-120, 120-180, respectively), Old Ice (>180 cm thick), Second-year Ice, Multi-year Ice)
Satellite data products used in the computation of thickness include cloud information and ice surface temperature. Individual band data are not used.



Ice Thickness, GOES-18 at 2000 UTC, 20 April 2023; Ice Age shown below



Cyan: 1-year ice

Useful Links

Advanced Theoretical Basis Document: (Link)

CIMSS Satellite Blog Post that includes VIIRS Ice Thickness (Link)

Operational Information

Ice Age and Thickness: Information created for every pixel that is ice-covered.

How? The AVITA (ABI/VIIRS Ice Thickness and Age) algorithm uses a One-dimensional Thermodynamic Ice Model (OTIM) to estimate evolving ice properties. Ice age is based on thickness .

Resolution: Full pixel-sized resolution: 2-km resolution at nadir. At a 60-degree zenith angle, resolution is around 5 km.

ABI Bands: This product does not directly use any ABI bands; it does rely on Level 2 products such as cloud mask and ice surface temperature.

Things to keep in mind

OTIM Validation: The ATBD contains validation information showing agreement between OTIM estimates and satellite and buoy thickness measurements

Daytime use: Algorithm uncertainties increase in the daytime due to complexities in ice/snow optical properties in the solar spectrum.

Algorithm specifications: Capable of retrieving daytime and nighttime sea and lake ice thickness under both clear and cloudy sky conditions The accuracy of input parameters (snow depth, surface air humidity, temperature, and wind), will affect the accuracy of ice thickness estimates.

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July 2023