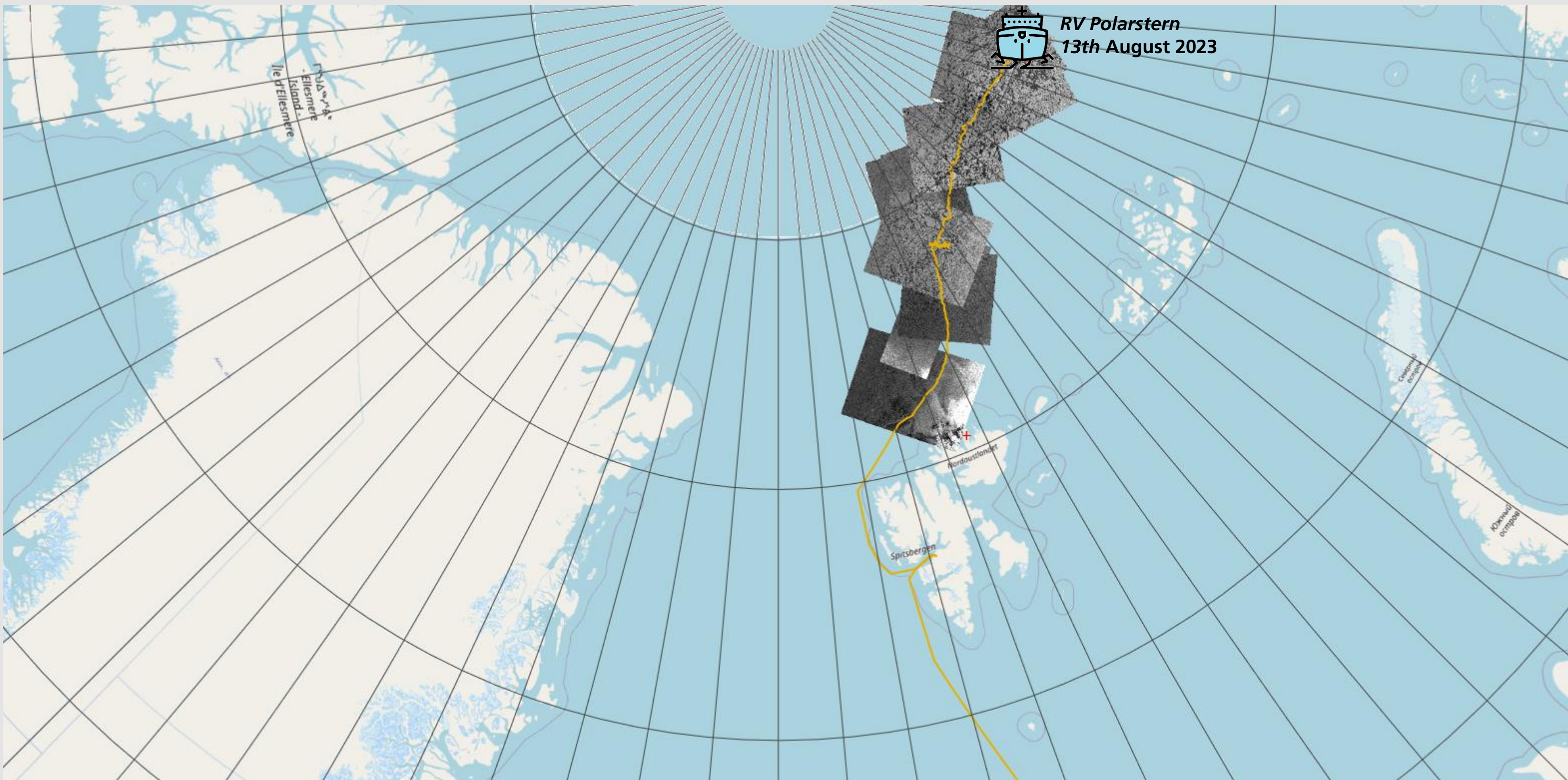
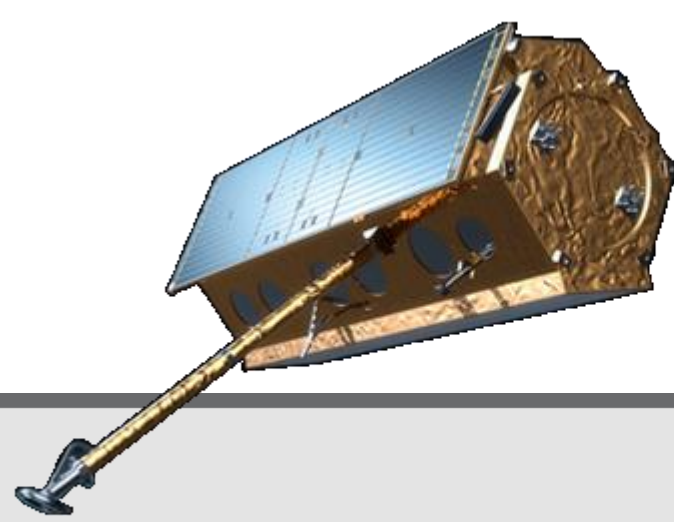


NEAR REAL-TIME DELIVERY OF SEA ICE INFORMATION RETRIEVED FROM SPACEBORNE SYNTHETIC APERTURE RADAR



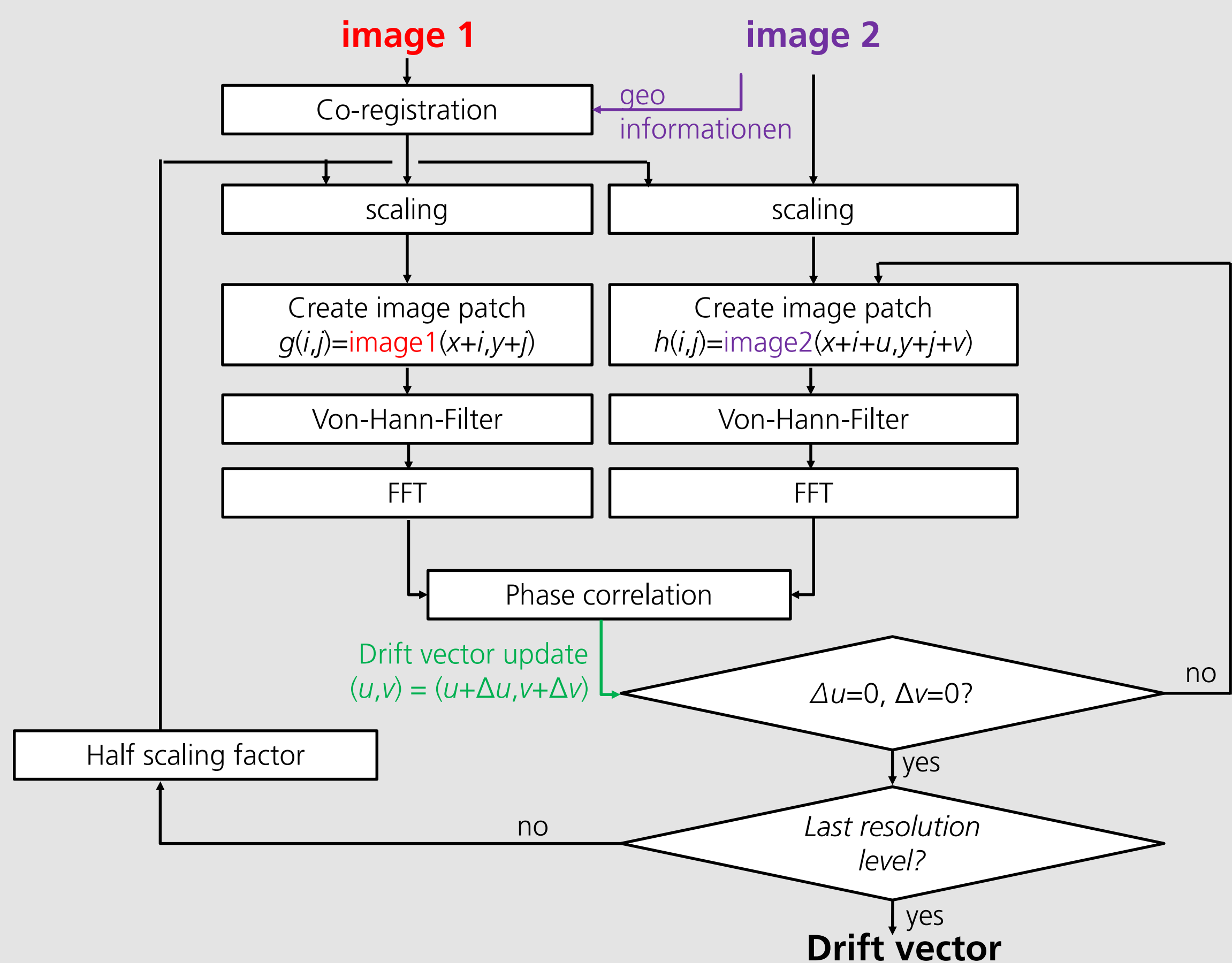
TerraSAR-X data acquired along the ship course of *RV Polarstern* during research expedition P5138 (here: leg from 3th August to 13th August 2023). At high latitudes, daily acquisitions are possible due to the sun-synchronous orbit of TerraSAR-X.

TerraSAR-X satellite provides high-resolution X-band data for use in climatology, environmental and disaster monitoring, hydrology, geology, oceanography and cartography.

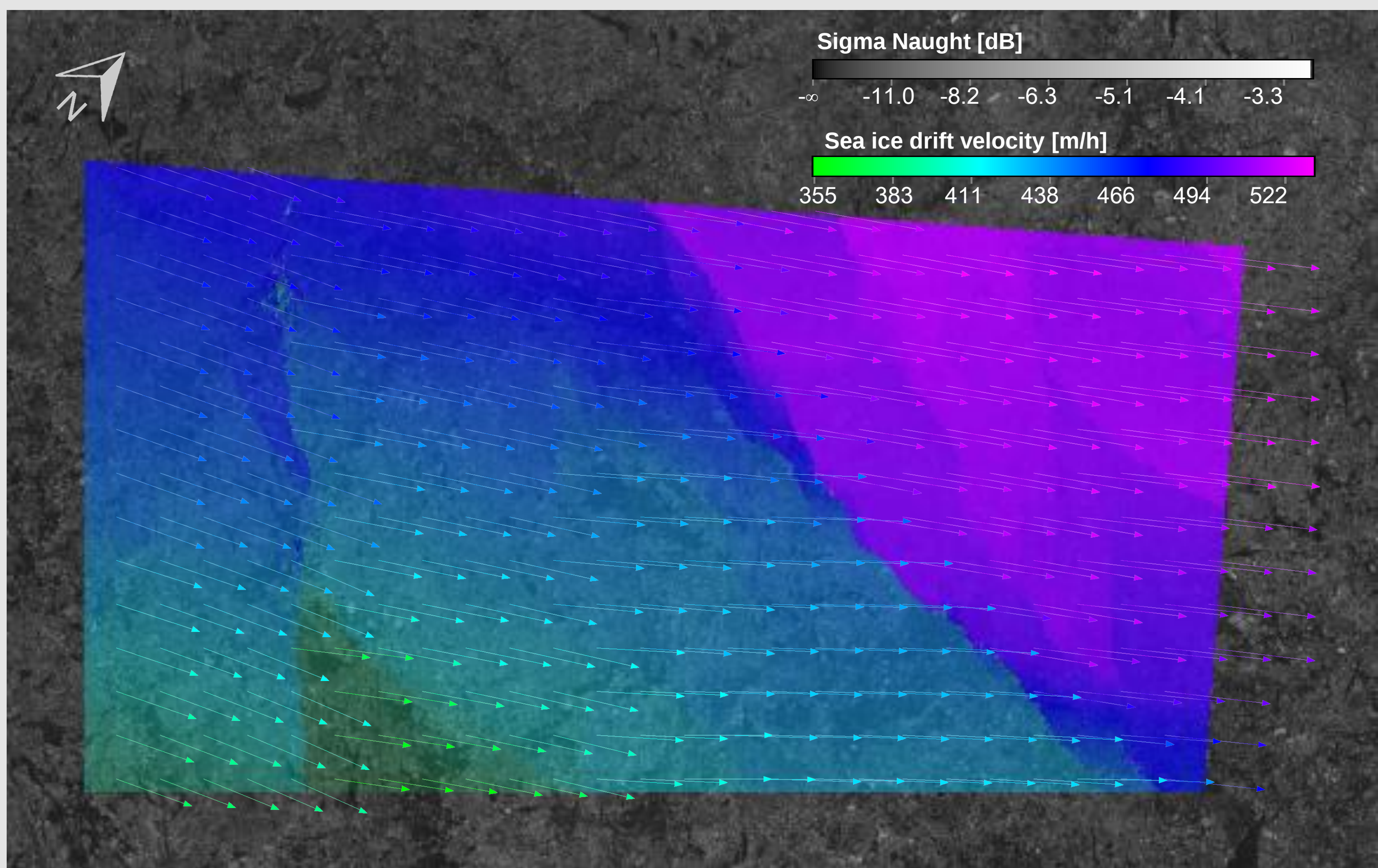
- Quick facts:**
- 514 km altitude
 - 15 orbits per day
 - sun-synchronous repeat orbit
 - 15°-60° incidence angle range
 - task on demand
 - delivery in near real-time

Sea ice drift retrieval

A new software processor that derives high resolution sea ice drift vector fields from subsequent SAR images is implemented and validated [2].



The core of our sea ice drift retrieval is a phase correlation method executed iteratively in a hierarchical Gaussian image pyramid [2].



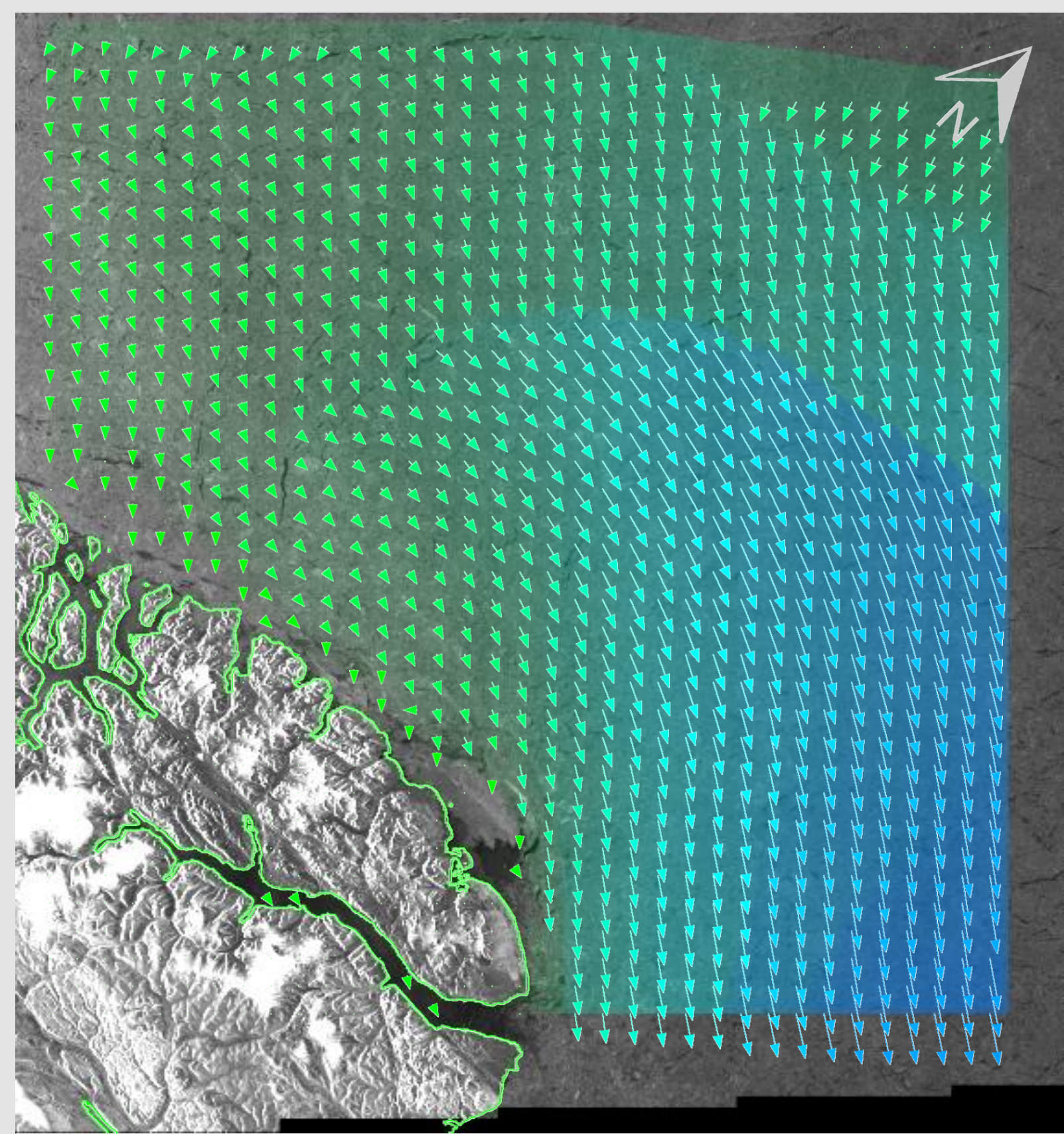
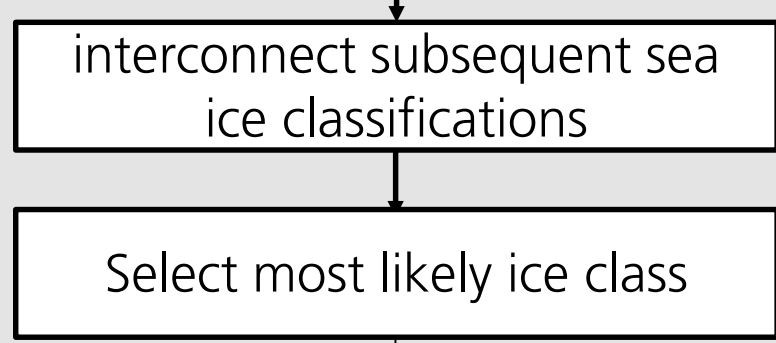
Sea ice drift retrieved from a TerraSAR-X image pair acquired on 26th and 27th Jan. 2020 during *RV Polarstern* expedition MOSAiC, facing a storm event in Arctic Ocean at 87°N. The background shows TerraSAR-X HH data from 27th Jan. 2020 in grey scale, calibrated to sigma naught. Overlaid colors represent retrieved sea ice drift velocity in 264 m resolution and arrows illustrate sea ice drift vectors (5 km spacing).

The retrieved sea ice drift vector field makes convergence, divergence and sheering zones visible in a very fine scale.

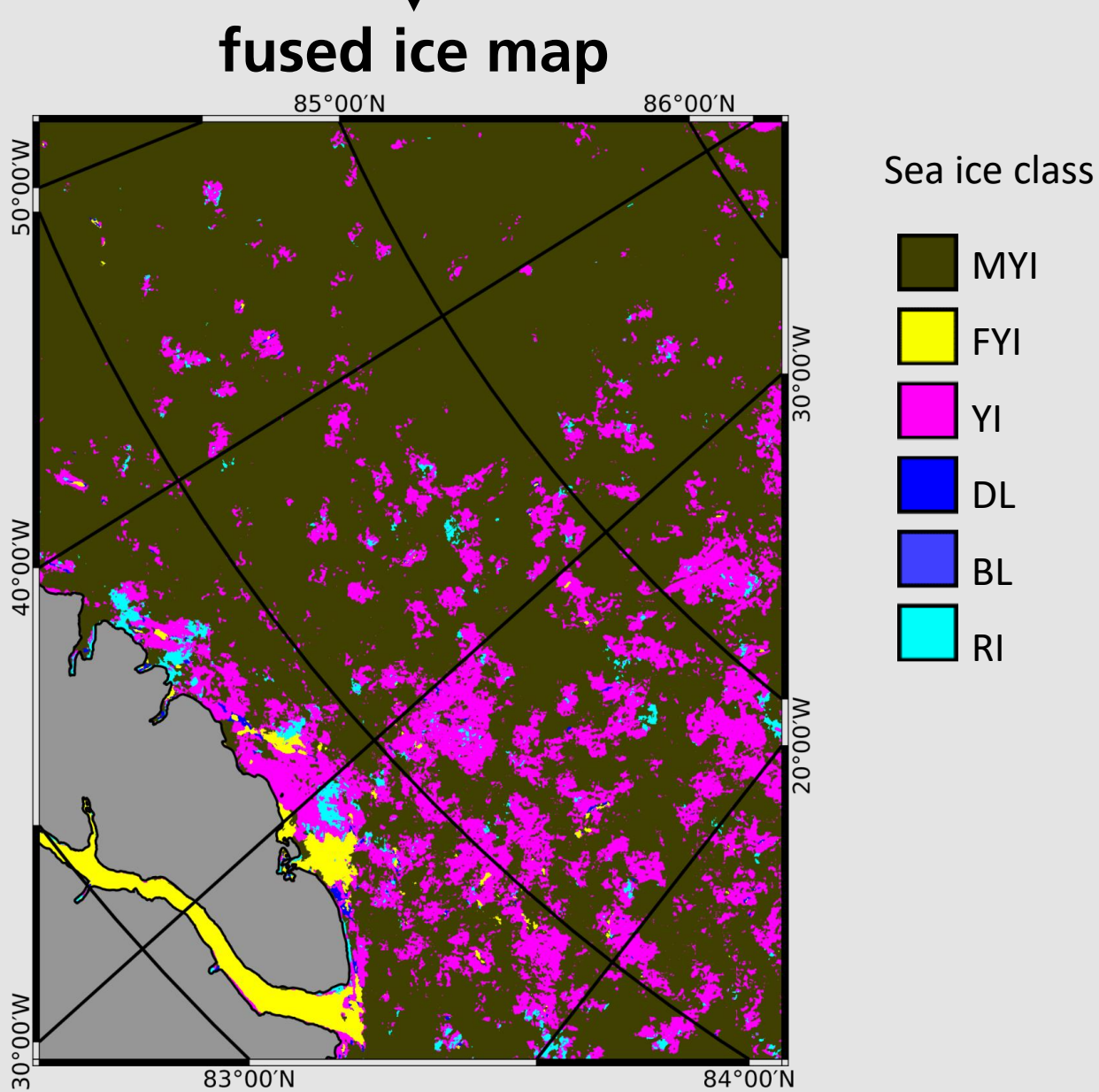
Furthermore, it is used for a multi-temporal sea ice classification. Basic idea is to track sea ice from one SAR acquisition to the next and collect all possible information about the ice.

Multi-temporal sea ice classification

Individual sea ice classification results of subsequent SAR images are fused considering the underlying drift vector field [1, 2]. This approach is intended to increase stability and reliability of the classification.



Sea ice drift retrieved from a Sentinel-1 image pair acquired on 6th and 7th Dec. 2021. Colours represent retrieved sea ice drift velocity in 500 m resolution and arrows illustrate sea ice drift vectors (10 km spacing).



Sea ice classification based on two (drift-compensated) Sentinel-1 acquisitions reduces misclassifications.

