

Sea ice information

An electronic charting system (MapViewer) on board of RV Polarstern enables users to visualize sea ice information from satellites and models. Data are made available from different providers through a request software in near-real time. The system administrator on board is responsible for the maintenance and setup of the MapViewer and the request software. Following data products are available per default. Others must be ordered in advance.

Default products

AMSR2 Sea Ice Concentration ([Driftnoise.com](http://driftnoise.com))

Sea Ice Concentration data sourced from the Japan Aerospace Exploration Agency, provided by [Driftnoise.com](http://driftnoise.com). Sea ice concentration images for the Arctic and Antarctic are generated hourly from the 6km spatial resolution [AMSR2](http://driftnoise.com) data. A running composite is a combination of multiple swaths of data; the latest swath extends the data of the previous composite image. For more information please contact Thomas Krumpen (Thomas.Krumpen@awi.de).

Sentinel 1 ([Driftnoise.com](http://driftnoise.com))

Images from the high resolution radar sensor on board the Sentinel-1 satellites are provided by [Driftnoise.com](http://driftnoise.com). The Sentinel-1 ESA mission comprises a constellation of two polar-orbiting satellites, operating day and night performing C-band synthetic aperture radar imaging, enabling them to acquire imagery regardless of the weather. Sentinel-1 works in a pre-programmed operation mode to avoid conflicts and to produce a consistent long-term data archive built for applications based on long time series. A software at AWI (<http://framsat.driftnoise.com/>) continuously monitors the ship position. If new scenes are available, images are centered around the ship and send on board. In addition, users can setup monitoring jobs, e.g. to investigate accessibility of different regions. For more information please contact Thomas Krumpen (Thomas.Krumpen@awi.de).

Radarsat Constellation Mission ([Driftnoise.com](http://driftnoise.com))

The RADARSAT Constellation Mission (RCM) is a three-spacecraft fleet of Earth observation satellites operated by the Canadian Space Agency. The RCM's goal is to provide data for climate research and commercial applications including oil exploration, fishing, shipping, etc. The primary goal of RCM is to provide continuous C-band SAR data with a higher frequent area coverage especially in the Arctic. If new scenes are available, images are centered around the ship and send on board. For more information please contact Christine Wesche (christine.wesche@awi.de).

Moderate-resolution imaging spectroradiometer (MODIS) ([Driftnoise.com](http://driftnoise.com))

The Moderate Resolution Imaging Spectroradiometer (MODIS) is a satellite-based sensor used for earth and climate measurements. There are two MODIS sensors in [Earth orbit](http://driftnoise.com): one on board the [Terra](http://driftnoise.com) (EOS AM) satellite, launched by [NASA](http://driftnoise.com) in 1999; and one on board the [Aqua](http://driftnoise.com) (EOS PM) satellite, launched in 2002. With its high temporal resolution although low spatial resolution, MODIS data are useful to track changes in the sea ice coverage over time. If new scenes are available, images are centered around the ship and send on board. For more information please contact Christine Wesche (christine.wesche@awi.de).

Sea Ice Drift (past 48 h from OSI-SAF)

The low resolution sea ice drift product from the EUMETSAT OSI SAF. Ice motion vectors with a time span of 48 hours are estimated by an advanced cross-correlation method (the Continuous MCC, CMCC) on pairs of satellite images. Several single-sensor products are available, along with a merged (multi-sensor) dataset. Data is made available once per day. For more information please contact Thomas Krumpen (Thomas.Krumpen@awi.de) or check http://osisaf.met.no/p/ice/lr_ice_drift.html.

Ice Drift, Concentration and Thickness Forecast (TOPAZ)

The TOPAZ system is an ocean forecasting system developed under the TOPAZ project in EC Framework V. The TOPAZ project was finished in 2003. The lessons learned in that project were carried into the MERSEA Strand 1 and MERSEA-IP projects, where the TOPAZ system has been run in a operational mode, providing weekly forecasts of ocean currents, ocean temperature and ice conditions in the Atlantic and Arctic Oceans. Presently the model system used to provide forecasts covers the North Atlantic, Nordic and Arctic seas. It is based on the HYCOM ocean model and includes a sea-ice model. The TOPAZ system assimilates sea surface heights, surface temperature and sea ice concentrations on a weekly basis using the Ensemble Kalman Filter. Updates on board are made available

once per day. Following parameters are provided: Sea ice drift, sea ice concentration, sea ice thickness for the next 5 days. For more information please see <http://marine.copernicus.eu/>

Sentinel-3 SLSTR satellite imagery sea ice classification ([Driftnoise.com](http://driftnoise.com))

Sentinel-3 is an [Earth observation heavy satellite series](#) developed by the [European Space Agency](#) as part of the [Copernicus Programme](#). Each Sentinel-3 satellite uses multiple sensors to measure topography, temperature, marine ecosystems, water quality, pollution, and other features for ocean forecasting and environmental and monitoring. SLSTR (Sea and Land Surface Temperature Radiometer) determines global sea-surface temperatures to an accuracy of better than 0.3 K (0.3 °C; 0.5 °F). It measures in nine spectral channels and two additional bands. A single pixel classification with 500 m spatial resolution will result in a continuous classification in 16 main classes. For more information please contact Christine Wesche (christine.wesche@awi.de)

Upon request: TerraSAR-X of the German Aerospace Center (DLR)

TerraSAR-X images are high-resolution radar satellite data from polar orbiting satellites, operating day and night with a X-band synthetic aperture radar. The images are taken upon request that needs to be placed by the expedition leader no later than 17 hours before the requested time. After recording, the data are downloaded by the next possible down link to the receiving station. After the reception of the data, the images are pre-processed and compacted to a zip-file with a size of max. 2 MB. The zip-file contains a georeferenced png (only usable for GIS when the related xml and wld is in the same folder) and is send via email or ftp download link to the expedition leader and the MapView pull software. Mean delivery delay is between 30 min and 2 hours. For image requests, the expedition leader contacts: i) Paul Wachter (paul.wachter@dlr.de) for the Southern Ocean, or ii) Suman Singha (suman.singha@dlr.de) for the Arctic Ocean. Images from the German TerraSAR-X satellite are distributed commercially and are restricted to license agreements between the user and the German Aerospace Center (DLR). AWI has signed a license agreement for images requested for the voyages against the background to support a smooth operation. Additional requests can be made by contacting the respective person named above or via AWI contact person Christine Wesche (christine.wesche@awi.de)

Ice radar

A X-band radar manufactured by Rutter Inc. is a fixed device onboard of the Polarstern. The highly resolved radar images around the ship body are used for navigation purposes and can also be visualized as a layer in the MapViewer charting system for additional information of the users.

Ice reconnaissance via helicopter

Ice reconnaissance is often accomplished by helicopter because satellite data usually have a regional resolution too low for ship's navigation.