Topics (T)
Understanding and Predicting the Climate Change for our Planet (1)

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MONITORING OF SEA ICE CONCENTRATION, AREA, AND EXTENT IN THE POLAR REGIONS : 40+ YEARS OF DATA FROM EUMETSAT OSI SAF AND ESA CCI

Abstract

The 40+ years long time-series of Arctic and Antarctic sea-ice extent (SIE) and area (SIA) are headline indicators of climate change. The interested public follows their seasonal evolution and record low and high values on online trackers, and climate scientists benchmark their model systems against them. These climate indicators are based on multi-mission data records of sea-ice concentration (SIC), themselves derived from brightness temperature measurements by passive microwave missions since the 1970s.

Over the past few years, we conducted a coordinated RD effort from the EUMETSAT Ocean and Sea Ice Satellite Application Facility (OSI SAF) and the ESA Climate Change Initiative (CCI) programme. It has resulted in a collection of state-of-the-art sea-ice concentration climate data records, and their operational extensions. Version 3 of this data was released in 2022, and was successfully transferred to the Copernicus Marine (CMEMS) and Climate Change Service (C3S). The previous version (released in 2017) informed the IPCC Assessment Report 6 cycle, and is used in the C3S reanalyses.

In this contribution, we introduce the latest version of these SIC CDRs. We present key elements of the algorithm baseline as well as characteristics of the products. The algorithm baseline was designed to ensure climate consistency across the satellite missions, and to avoid potential artificial trends in the input and auxiliary data. The algorithms include 1) dynamical tuning of the algorithms and their tie-points, 2) reduction of the retrieval uncertainties using Radiative Transfer Models, and 3) per-pixel uncertainties. Specific RD during CCI+ project led to an improved spatial resolution of the SIC data record, exploiting the near-90 GHz imagery channels available since the early 1990s. The product files are designed with several user communities in mind, and allow e.g. accessing more “raw” SIC data (before the last filters are applied) for easing Validation and Data Assimilation. We finally present results from an evaluation of our SIC records and a comparison to those from other data providers.