# Arctic+ Salinity

The ESA Arctic+ Salinity project (Dec 2018 – June 2020) will contribute to reduce the knowledge gap in the characterization of the freshwater flux changes in the Arctic region.

Sea Surface Salinity (SSS) is a key indicator of the freshwater fluxes and an important variable to understand the changes the Arctic is facing. However, salinity in-situ measurements are very sparse in the Arctic region. For this reason, remote sensing salinity measurements (currently provided by L-band radiometry satellites, SMOS and SMAP) are of special relevance for this region. The retrieval of SSS in the Arctic represents a challenge, because brightness temperatures measured by L-band satellites are less sensitive to salinity in cold waters. An additional drawback consists in the presence of sea ice, that contaminates the brightness temperature and must be adequately processed.

The **objectives** of this project are the following:

1. Develop a new algorithm and novel approaches with the aim of producing the best quality validated SMOS SSS product in the Arctic region with its corresponding accuracy. Additionally, SMOS and SMAP data will be combined with the aim to improve the radiometric accuracy and the characterization of the product biases and stability.

2. Generate a long-term salinity dataset from 2011 up to date to be publicly offered to the scientific community. The products will be daily distributed with a temporal resolution of 9 days and a spatial resolution of 25Km (EASE Grid 2.0).

3. Assess the relation between the dynamics of SMOS salinity with respect to land freshwater fluxes (Greenland and glacier flows) and ocean freshwater fluxes (rivers and E-P balance)

using model outputs. This has the objective to quantify the freshwater fluxes through SSS products.

4. Assess the impact of the new SSS satellite data in a data assimilation system (the TOPAZ4 system, both in forecast and reanalysis mode) with the idea that if an improvement is demonstrated the assimilation of SMOS & SMAP products in TOPAZ will be part of the new Arctic reanalysis and forecast products on the CMEMS portal.

5. Define a roadmap describing the future work to better characterize the freshwater fluxes for the Arctic regions. The output of this project will be of great benefit for the on-going ESA Sea Surface Salinity Climate Change Initiative (CCI) project, which started in February 2018.

The **outputs** of the project will be:

1. The distribution to the scientific community of the best-up-to-date sea surface salinity maps from SMOS and from the combination of SMOS and SMAP with their corresponding uncertainties.

2. Explore the feasibility and utility of assimilating the surface salinity maps product in the TOPAZ4 model.

The potential problem the project face is the scarce in-situ data availability in the area which is needed for a complete validation assessment. Other potential problems are the sea ice edge that has a direct effect to the brightness temperature and the RFI contamination. But several solutions have already been identified.

# Partners

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