

EGU24-12907, updated on 07 Feb 2025

<https://doi.org/10.5194/egusphere-egu24-12907>

EGU General Assembly 2024

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Advancing Sea Surface Salinity R&D: The Pi-MEP Initiative for Satellite Salinity Data Validation and Exploitation

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The Pilot-Mission Exploitation Platform (Pi-MEP) for salinity (<https://www.salinity-pimep.org/>) is an initiative originally meant to support and widen the uptake of ESA Soil Moisture and Ocean Salinity (SMOS) mission data over the ocean. Since its beginning in 2017, the project aims at setting up a computational web-based platform focusing on satellite sea surface salinity data validation, supporting also process studies over the ocean. It has been designed in close collaboration with a dedicated science advisory group in order to achieve three main objectives: 1) gathering all the data required to exploit satellite sea surface salinity data, 2) systematically producing a wide range of metrics for comparing and monitoring sea surface salinity products' quality, and 3) providing user-friendly tools to explore, visualize and exploit both the collected products and the results of the automated analyses.

Over the years, the Pi-MEP has become a reference hub for the validation of satellite sea surface salinity missions products (SMOS, Aquarius, SMAP), being collocated with an extensive in situ database (e.g. Argo float, thermosalinographs, moorings, surface drifters, saildrones and equipped marine mammals) and additional thematic datasets (precipitation, evaporation, currents, sea level anomalies, sea surface temperature, etc.). Co-localized databases between satellite products and in situ datasets are systematically generated together with validation analysis reports for 30 predefined regions. The data and reports are made fully accessible through the web interface of the platform. The datasets, validation metrics and tools of the platform are described in detail in Guimbard et al., 2021. Several dedicated scientific case studies involving satellite SSS data are also systematically investigated by the platform, such as major river plumes monitoring, mesoscale signatures in boundary currents, or spatio-temporal evolution in challenging regions (high latitudes, semi-enclosed seas, and the high-precipitation region of the eastern tropical Pacific).

Since 2019, a partnership to sustain the Salinity Pi-MEP project has been agreed between ESA and

NASA, encompassing R&D and validation over the entire set of satellite salinity sensors. The two Agencies are now working together to widen the platform features on several technical aspects, such as triple-collocation software implementation, additional match-up collocation criteria and sustained exploitation of data from dedicated in-situ field campaigns (e.g., SPURS, EUREC4A).

In this talk, we will showcase the main results of the latest phase of the project, with the recent distinctive focus on the representation errors characterization of the various satellite salinity missions.

Guimbard, S.; Reul, N.; Sabia, R.; Herlédan, S.; Khoury Hanna, Z.E.; Piollé, J.-F.; Paul, F.; Lee, T.; Schanze, J.J.; Bingham, F.M.; Le Vine, D.; Vinogradova-Shiffer, N.; Mecklenburg, S.; Scipal, K. & Laur, H. (2021) The Salinity Pilot-Mission Exploitation Platform (Pi-MEP): A Hub for Validation and Exploitation of Satellite Sea Surface Salinity Data Remote Sensing 13(22):4600 <https://doi.org/10.3390/rs13224600>