Consiglio Nazionale delle Ricerche
ISMAR - Istituto di Scienze Marine
Sede Secondaria di Roma
Via Fosso del Cavaliere 100
00133 Roma, Italy
Tel +39 06 45488634 Fax +39 06 45488291
direzione@ismar.cnr.it
C.F. 80054330586 - P.IVA 02118311006

Seminar

Daniele Ciani
Research Scientist
CNR-ISMAR

11:30 12 Mar 2020 - Aula IB09

Title

Ocean Applications for the Copernicus Imaging Microwave Radiometer (CIMR) Mission

D. Ciani[1] R. Santoleri[1], G.L. Liberti[1], C. Prigent[2], C. Donlon[3] & B. Buongiorno Nardelli[4]

Abstract

The Copernicus Imaging Microwave Radiometer (CIMR) is a candidate single payload satellite mission of the European Copernicus Expansion program (2026+ timeframe). CIMR will embark a conically scanning multi-frequency MW radiometer aimed at providing high spatial resolution imagery with global coverage and sub-daily revisits. This will enable to estimate a set of ocean, sea-ice and land variables. One of the expected valuable contribution of CIMR for oceanographic applications is to guarantee continuity in remote Sea Surface Salinity (SSS) measurements in the near future, currently provided by the Soil Moisture and Ocean Salinity (SMOS) and Soil Moisture Active Passive (SMAP) missions.

We evaluated the impact of CIMR for monitoring the global SSS using Level-4 (gap-free) analysis processing. At present, the SMOS SSS are used in the framework of the Copernicus Marine Service (CMEMS) to provide global, mesoscale-resolving SSS operational products. This is achieved via combination with in situ SSS and high-resolution sea-surface temperature (SST) through a multivariate optimal interpolation (OI).

An Observing System Simulation Experiment (OSSE) based on the CMEMS MERCATOR global operational model was implemented to quantify the CIMR expected impact within the CMEMS SSS products. The MERCATOR SSSs were used to generate synthetic *in situ* and CIMR SSS and, at the same time, they provided a reference gap-free SSS field. Relying on the OI algorithm, and taking into account the CIMR products expected uncertainties, we demonstrated that the combined use of *in situ* and CIMR observations improves the global SSS retrieval compared to a processing ingesting only *in situ* observations.

The improvements are observed in the 60% and 70% of the global ocean for the reconstruction of the SSS and of its spatial gradients, respectively. Moreover, the CIMR-based L4 SSS exhibited good performances in both the open ocean and coastal areas. We conclude that CIMR can guarantee continuity for accurate monitoring of the ocean surface salinity from space.

Quite interestingly, the all-weather capabilities of CIMR can be exploited for a wide variety of applications, going even beyond the study presented here. For example, the CIMR high-resolution SSS or SST could be used to extract the dynamical information found in the mesoscale features, allowing to infer the ocean surface currents from tracer observations.

[1] Consiglio Nazionale delle Ricerche, Istituto di Scienze Marine (CNR-ISMAR), 00133 Rome, Italy
[2]Laboratoire d'Études du Rayonnement et de la Matière en Astrophysique et Atmosphères (LERMA), 75014 Paris, France
[3] European Space Agency, ESA-ESTEC, 2201 AZ Noordwijk, The Netherlands
[4] Consiglio Nazionale delle Ricerche, Istituto di Scienze Marine (CNR-ISMAR), 80133 Naples, Italy