CONSIGLIO NAZIONALE DELLE RICERCHE
ISTITUTO DI SCIENZE MARINE

CICLO DI SEMINARI

21 Marzo 2024 – ore 14:30

TEAMS LINK

Harmony ESA Earth Explorer 10 Mission: ISMAR contributions to the mission definition and science studies.
SST gradients in 'nozze coi fichi secchi' mode

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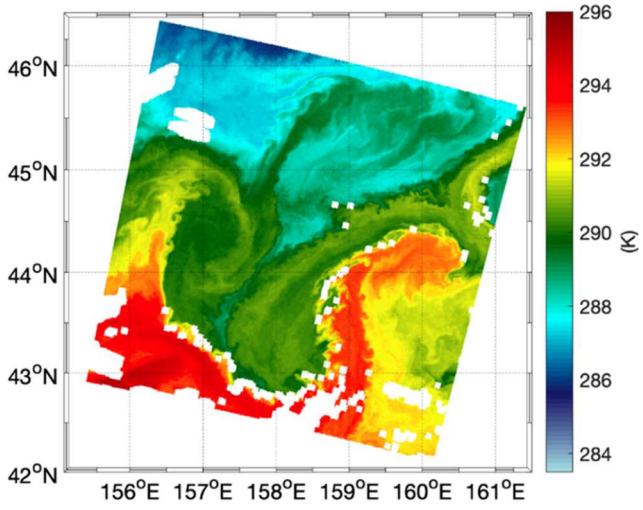

Abstract

Harmony is the European Space Agency (ESA) Earth Explorer 10 satellite mission. Its science objectives cover several applications related to solid earth, the cryosphere, upper-ocean dynamics and air–sea interactions. The mission consists of 2 twin satellites, flying in constellation with the Copernicus Sentinel 1 (C or D) spacecraft. Each Harmony satellite hosts a C-band receive-only radar and thermal infrared (TIR) secondary payload. The TIR imager, based on microbolometer technology, acquires at 5 different satellite zenith angles: 3 narrow-band channels (≃1 km spatial sampling distance (SSD)) and a panchromatic (PAN, 8–12 μm) channel (≃300 m SSD). From an ocean dynamics/air–sea interaction perspective, the mission will provide the unique opportunity to observe simultaneously the signature of submesoscale upper-ocean processes via synthetic aperture radar and TIR imagery. After presenting the scientific context in terms of ocean processes where a contributions from Harmony are expected and a short technical description of the satellite mission, the seminar will describe the ISMAR past and on-going contributions to the mission definition through a set of different activities. In particular, we will focus on the potential of Harmony in retrieving spatial features related to sea surface temperature (SST) gradients from the high-resolution PAN channel, relying on top-of-atmosphere (TOA) observations. Compared to a standard SST gradient retrieval, our approach does not require atmospheric correction, thus avoiding uncertainties/spurious features due to inter-channel co-registration and radiometric consistency, with the possibility of exploiting the higher resolution of the PAN channel. The investigations were carried out simulating the future Harmony TOA radiances (TARs), as well as relying on existing state-of-the-art level 1 satellite products. Analyses based on existing satellite products suggest that the clear-sky TOA observations, in a typical mid-latitude scene, allow the reconstruction of up to 85% of the gradient magnitudes found at the sea-surface level.