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# Assessment of SMOS Salinity and SST in the Aegean Sea (Greece) and correlations with MODIS SST measurements. Exploring the SSS and SST correlation to 137Cs inventory

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A program concept has been developed to utilize sea surface salinity (SSS) and sea surface temperature (SST) information for the inventory of artificial radionuclides, which are conservative and part of the sea salinity. As a pilot study, activity concentrations of 137Cs in the Aegean Sea (Greece) are combined to SMOS and other satellite data so as to develop an innovative tool for the remote radioactivity detection either for routine observations and emergency recordings. The presented first results are a part of an effort to attempt for the integration in space and time of field measurements to the respective satellite observations of salinity variations by model simulations, which might be also applicable for the prediction of the radiological impact of potential accidental events.
The presented results involve the first assessment of SMOS SSS and SST measurements over the Aegean Sea. SMOS measurements are averaged over a surface of 40x40 sq km at an average distance of 100 km from the coastline. For this reason, totally thirty nine pixels from SMOS Level 2 data cover part of the Aegean Sea. Two time series are created that include all available measurements spanning December 2011 to current date, from descending and ascending passes, each one representing an acquisition frequency of about three days.
The average SSS values in the Aegean Sea are 37-38psu following no distinct seasonal pattern. A general trend of increasing values is observed from north to south. Noise and uncertainty in the measurements are most probably due to land and RFI contamination. High island density is combined with radiofrequency interferences generated by illegal man-made emissions. The latter is a detected common issue in specific areas worldwide, such as the Mediterranean Sea.
On the other hand, SST follows a clear typical seasonal variation pattern with maximum values observed in August and minimum ones around March and a general trend of increasing values from north to south. Additionally, for the same coordinates and for the same acquisition dates, we have retrieved SST (both at 4$\mu$m and 11$\mu$m) from MODIS Level 2 Ocean products. MODIS satellites provide nearly daily ocean color and SST measurements at 1km resolution with day and night coverage. Therefore, separate correlations are performed for AQUA or TERRA and day or night passes (when data exist). Despite significant differences in spatial resolution and acquisition time in the day, results show high correlation coefficients (r2 above 80%) between SMOS and MODIS SST.
Concluding, concerning SSS in regional seas such as the Aegean Sea, SMOS presents significant problems and difficulties to overcome. SSS comparisons with the corresponding AQUARIUS ones are foreseen. Concerning SST, values are highly correlated to similar ones from other satellite systems such as MODIS. Considering that SMOS acquisitions are insensitive to cloud cover and despite the relatively low spatial resolution, they present a considerable advantage compared to optical systems.
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