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# Detention and quantification of wave trends in Southern Italy


CNR ISAFOM

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## Introduction

An analysis of a 41-year long wave time series (1979-2020) was carried out in Southern Italy aimed at identifying ongoing trends of the significant wave height, peak period and mean wave direction. Synthetic wave data were deduced from the hindcast database MeteOcean by University of Genoa. A trend analysis has been performed on the mean and maximum values assessed at annual and seasonal scale through the Mann-Kendall non-parametric test for a significance level equal to 90%. Moreover, the application of the Theil-Sen estimator allowed to quantify the magnitude of the increase/decrease of the wave parameters (this is a more powerful tool than linear regression methods in the trend slope evaluation in the presence of outliers in the series).

## Wave climate

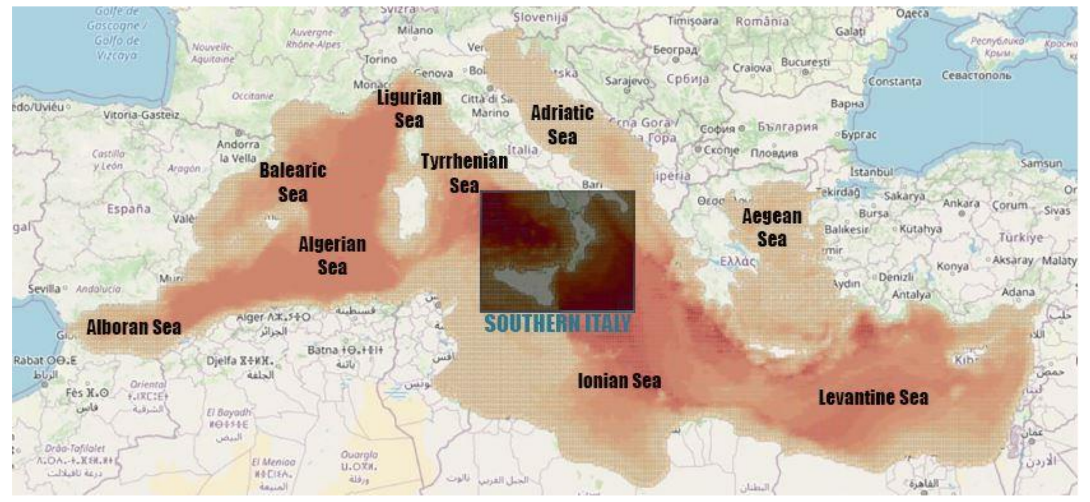


*Figure 1. Map of the Mediterranean Sea, including the denomination of the marginal seas, the water depths and the study area.*

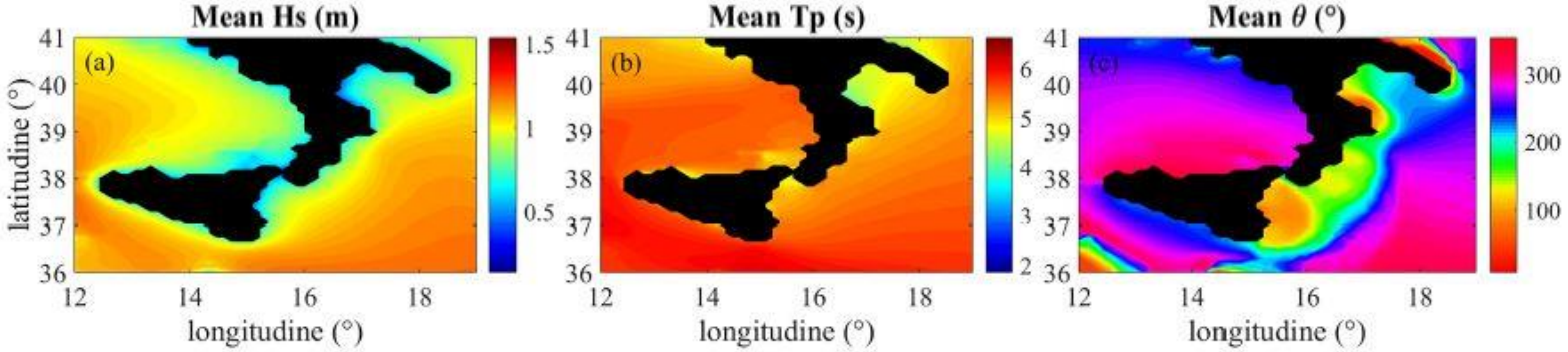


*Figure 2. Spatial distribution of the mean annual values of Hs (a), Tp (b) and $\theta$ (c).*

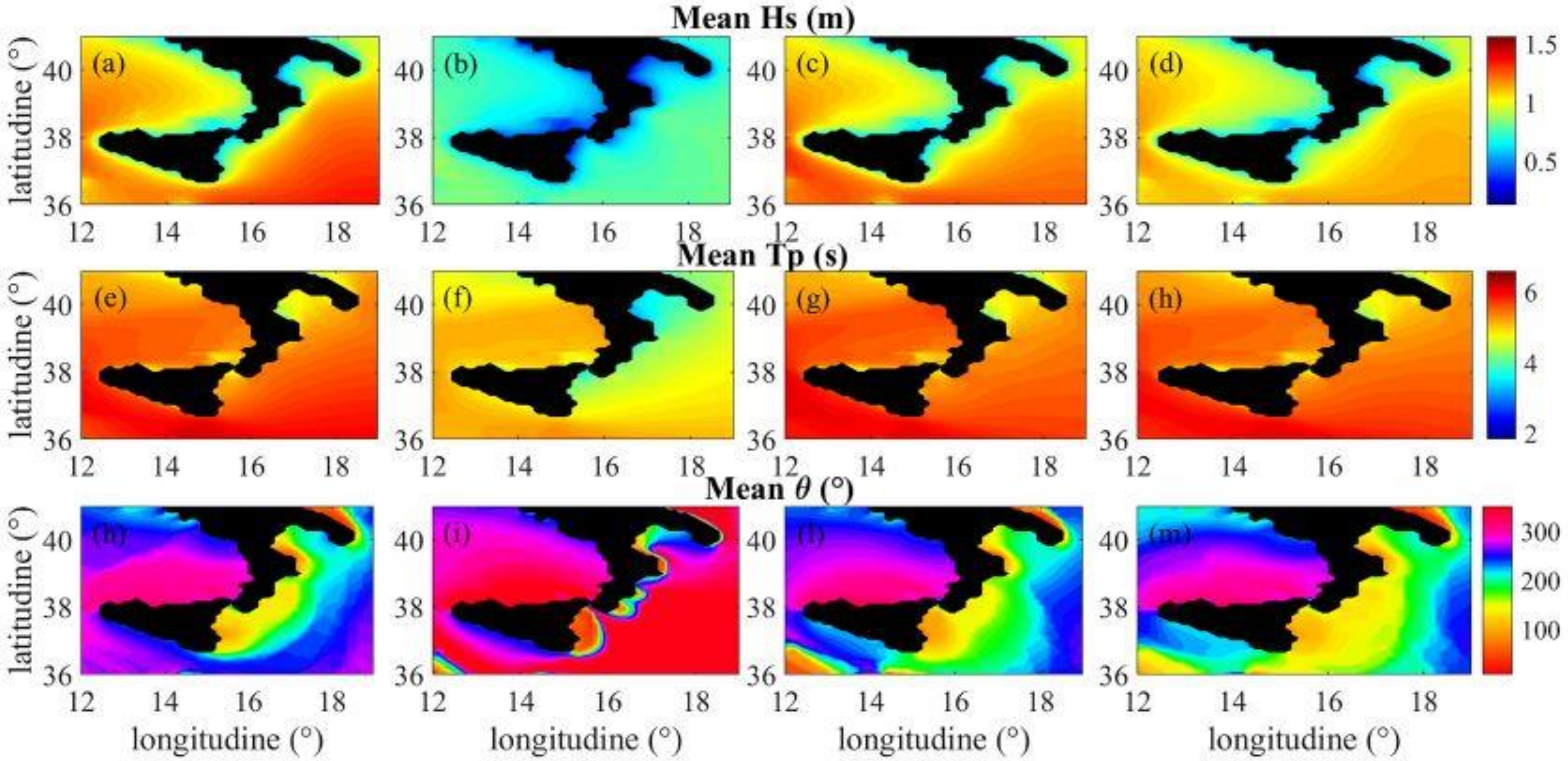


*Figure 3. Spatial distribution of the mean seasonal values of Hs, Tp and $\theta$. (a) winter Hs; (b) spring Hs; (c) summer Hs; (d) autumn Hs; (e) winter Hs; (f) spring Hs; (g) summer Hs; (h) autumn Hs; (i) winter Hs; (l) spring Hs; (m) summer Hs; (n) autumn Hs;*

## Trend analysis of mean annual values

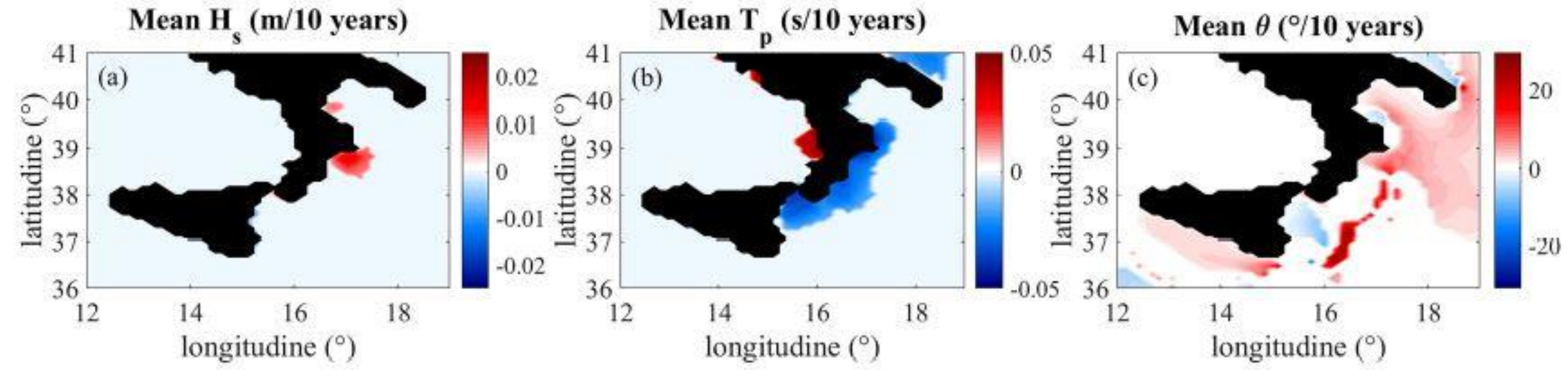


*Figure 4. Spatial distribution of the mean annual trend of Hs (a), Tp (b), and $\theta$ (c).*

## Trend analysis of mean seasonal values

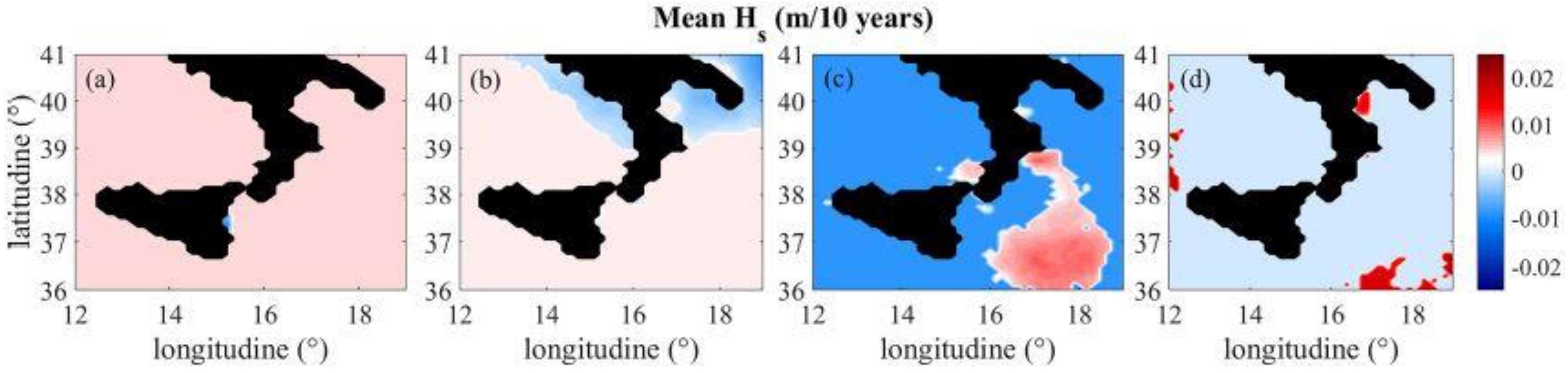


*Figure 5. Spatial distribution of the mean seasonal trend of Hs .(a) winter; (b) spring; (c) summer; (d) autumn.*