PRODUCT USER MANUAL

APPLICATION

Sub-regional Mediterranean Sea Indicators

From event detection to climate change

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SOCIB Balearic Islands Coastal Observing and Forecasting System

MINISTERIO DE CIENCIA E INNOVACIÓN | CSIC | GOVERN ILLES BALEARS

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https://apps.socib.es/subremed-indicators

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1. INTRODUCTION

The "Sub-regional Mediterranean Sea Indicators" tool is dedicated to the monitoring and visualization of multivariate and sub-regional ocean indicators in the Mediterranean Sea and around the Balearic Islands (see sub-regions in Figure 1). This operational product consists in providing continuous information about the ocean state and variability from daily (events) to interannual/decadal (climate) scales in a simple way that could be consulted by the scientific community, educators in marine science, decision-makers and environmental agencies.

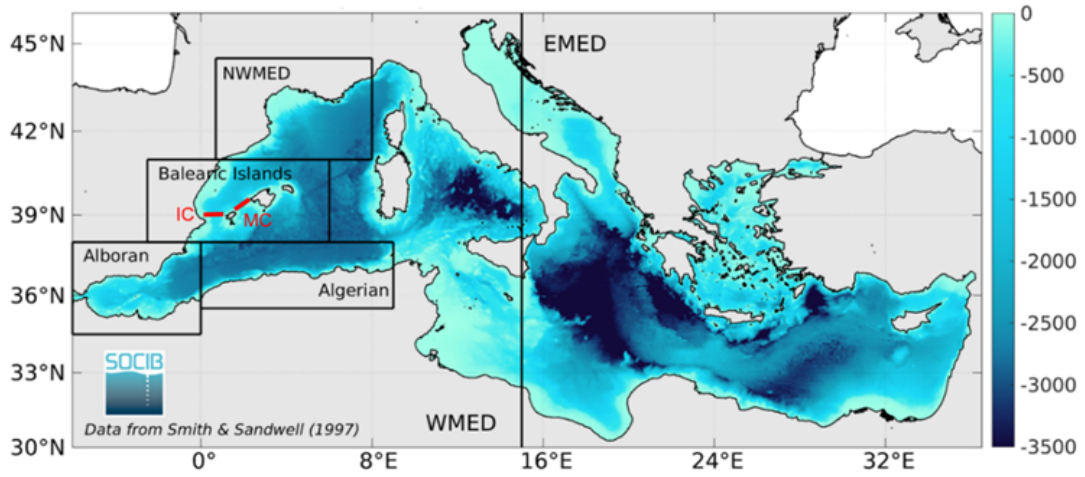

Figure 1: Bathymetry (in m) in the Mediterranean Sea with the sub-regions (black boxes) and sections (red lines) used for the indicators.

Regions of study:

- Mediterranean Sea
- Western and eastern parts
- Balearic Islands region, Cabrera Island National Park
- Adjacent basins of the Balearic Islands

Physical and biogeochemical ocean variables of interests:

- Surface data from satellite products (Copernicus Marine Service) (sea surface temperature, sea surface salinity chlorophyll-a concentration, currents, sea level and wind)
- Vertically integrated data from in situ observations (SOCIB, Met-Office) (heat and salt contents, mixed layer properties, water mass transports)

User-friendly diagnostics at various time scales (2D maps and time series) :

- Daily monitoring: ocean weather and extreme event detection
- Monthly monitoring: seasonal variability
- Annual monitoring: interannual/decadal variability

Important note: this visualization tool is evolutive. Ocean variables and sub-regions can be added according to user needs and relevance.

2. OCEAN INDICATORS

2.1. Ocean variables

ESSENTIAL OCEAN VARIABLES	
Ocean temperature	Sea surface temperature (SST) Sea surface temperature anomaly (SSTA)
Ocean salinity	Sea surface salinity (SSS) Sea surface salinity anomaly (SSSA)
Ocean color	Chlorophyll-a concentration (CHL) Chlorophyll-a concentration anomaly (CHLA)
Sea level	Sea level anomaly (SLA)
Ocean currents	Geostrophic velocity derived from sea level (GV) Total kinetic energy derived from GV (TKE)
Atmospheric conditions	Wind speed and direction (WIND)
INTEGRATED VARIABLES	
Ocean heat and salt contents (OHC/OSC)	Ocean heat /salt contents (OHC /OSC) integrated within [10-150m] Ocean heat /salt contents (OHC /OSC) integrated within [10-700m]
Mixed layer properties	Mixed layer depth (MLD) Mixed layer temperature /salinity (MLT /MLS)
Water mass transports	Geostrophic transports of water masses

2.2. Temporal scales

- Daily mean monitoring: ocean weather and extreme event detection
- Monthly/seasonal mean monitoring: monthly/seasonal variability
- Annual mean monitoring: interannual variability and trend

	Daily	Weekly	Monthly	Seasonal	Annual	Linear
SURFACE VARIABLES						
Ocean temperature	X		X	X	X	X
Ocean salinity		X	X		X	
Ocean color	X		X		X	
Sea level	X		X		X	X

Ocean currents	X		X		X	
Atmospheric conditions	X		X		X	
INTEGRATED VARIABLES						
Ocean heat and salt contents				X		
Mixed layer properties				X		
Water mass transports		X				

3. OCEAN DATASETS

Satellite - near real-time and reprocessed - products and in situ observations are used for the monitoring of surface variables and vertically integrated variables, respectively.

Variable	Area	Products	Period
SURFACE VARIABLES (source: Copernicus Marine Service)			
SST	**MED**	SST_MED_SST_L4_NRT_OBSERVATIONS_010_004 SST_MED_SST_L4_REP_OBSERVATIONS_010_021	1982-present
SSS	**GLO**	MULTIOBS_GLO_PHY_SURFACE_MYNRT_015_013	1993-present
CHL	**MED**	OCEANCOLOUR_MED_BGCL_L4_NRT 009_142 OCEANCOLOUR_MED_BGC_L4_MY_009_144	1998-present
SLA GV/TKE	**EUR**	SEALEVEL_EUR_PHY_L4_NRT_OBSERVATIONS_008_060 SEALEVEL_EUR_PHY_L4_MY_OBSERVATIONS_008_068	1993-present
WIND	**GLO**	WIND_GLO_PHY_L4_NRT_O_012_004 WIND_GLO_PHY_L4_MY_012_006	2008-present
INTEGRATED VARIABLES (sources: Met-Office, SOCIB)			
Temperature & salinity profiles	**MED**	EN4.2.2 dataset - L2 delayed-time product Gouretski & Reseghetti (2010) corrections	2011-present
	IC/MC	L1 delayed-time glider products	2011-present

MED= Mediterranean Sea; EUR = European Seas ; GLO = Global ocean; IC/MC=Ibiza/Mallorca Channels

4. GRAPHICAL FUNCTIONALITIES

- **Ocean variable**. The variable can be selected by clicking on the menu at the top of the page.
- **Temporal scale.** In the "selected variable" page, the figures are displayed for the different temporal scales.
- **Sub-regions**. For each variable and temporal scale, the time series are averaged over the different sub-regions. The time series for the whole Mediterranean are automatically displayed. The region can be selected by clicking on the menu on the right or below the figure.
- **High-resolution figures**. Every figure is available in high resolution quality, clicking on the figure to enlarge the picture.

DATA CREDITS

The sub-regional indicators are generated using satellite products from E.U. Copernicus Marine Service.

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- Juza, M., & Tintoré, J. (2020). Sub-regional Mediterranean Sea Indicators. [Web App]. Balearic Islands Coastal Observing and Forecasting System, SOCIB. https://apps.socib.es/subregmed-indicators
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