How CMEMS in situ TAC contributes to the monitoring of the ocean?

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This overview of the INSTAC contributions to the CMEMS Ocean State Report highlights the capacity of *in situ* observations to describe, analyse & understand the blue & green ocean state & variability from sea surface to deep ocean, from coastal to open sea waters at both short-term (event) & long-term temporal scales.

1 INSTAC multi-platform in situ observations

drifters, profiling floats, HF radar[(a)], moorings, gliders, vessels, ferrybox, saildrones[(b)], tide gauges, sea mammals

Global, Regional, Local, Boundary currents, Polar, Coastal

39000 platforms integrated
7000 platforms active in NRT

CMEMS INSTAC
Global & 6 Europeans seas
Near-Real Time & REProcessed
Quality Controlled, free, homogenised
Physical [(c)] & biogeochemical [(d)] data
Various (x,y,z,t) scales
Surface & deep ocean
Since 1950

marineinsitu.eu

2 INSTAC scientific applications

2.1 Support to operational oceanography providing data for
- Models (initialization/forcing/assimilation/validation)
- Blue & green ocean forecasting/analysis/reanalysis
- Satellite calibration
- Downstream services

2.2 Monitor the 4-D ocean at various space & time scales
- Essential information on ocean state-variability-changes
- Long-term variability analysis & detection of events
- Ocean health & climate monitoring

(a) Implemented in April 2019, (b) Since December 2019 (c) T,S, currents, wave, (d) Oxygen, chlorophyll, carbon, pH

3 Contributions to the ocean State Report

3.1 Ocean monitoring indicators
- Temperature & salinity
- Ocean heat content
- Water mass & heat exchange
- SL/SST/wave extreme event(α)

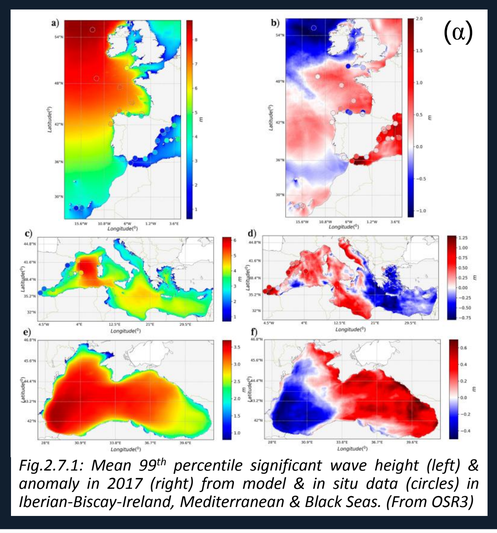


Fig.2.7.1: Mean 99th percentile significant wave height (left) & anomaly in 2017 (right) from model & in situ data (circles) in Iberian-Biscay-Ireland, Mediterranean & Black Seas. (From OSR3)

3.2 Ocean circulation variability
- Intensification of Iberian Poleward Current
- Cold-fresh anomaly in North Atlantic(β)
- Deep convection in Labrador Sea
- Anticyclonic eddy anomaly in Western Med
- Unusual salinity pattern in South Adriatic

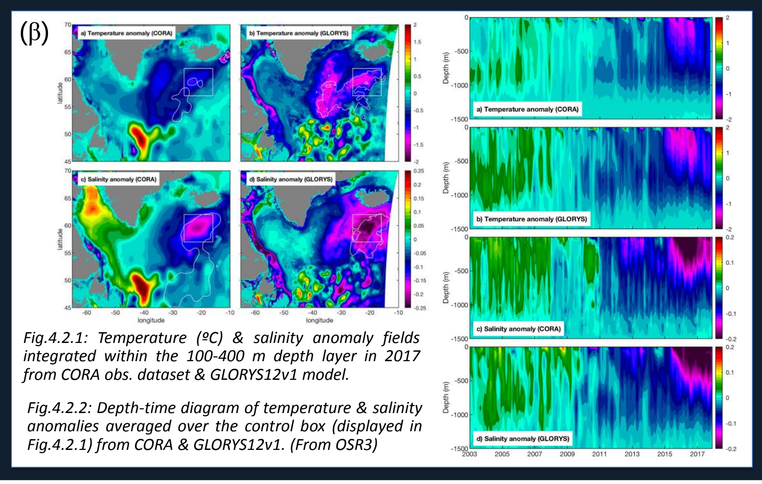
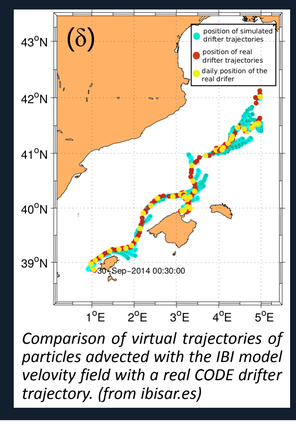


Fig.4.2.1: Temperature (ºC) & salinity anomaly fields integrated within the 100-400 m depth layer in 2017 from CORA obs. dataset & GLORYS12v1 model.

Fig.4.2.2: Depth-time diagram of temperature & salinity anomalies averaged over the control box (displayed in Fig.4.2.1) from CORA & GLORYS12v1. (From OSR3)

3.3 Climate change/warming
- Water mass change & impact on ecosystem
- Mediterranean water mass changes(γ)
- Tropical cyclones, "Medicanes"
- Decline of oxygen in Black Sea



Comparison of virtual trajectories of particles advected with the IBI model velocity field with a real CODE drifter trajectory. (from ibisar.es)

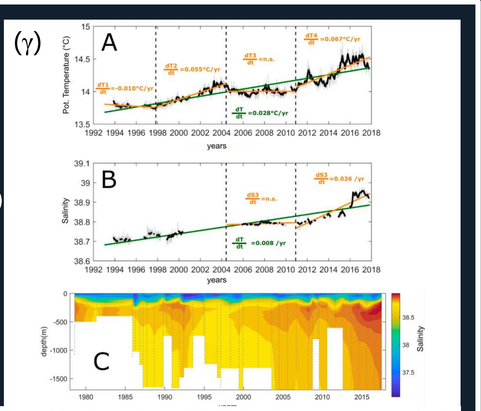


Fig.2.3.3: Daily & monthly time series (1993-2017) of (A) temperature & (B) salinity at 400m in Sicily Channel (mooring). (C) Hovmöller diagram of salinity in the central part of the channel from repeated CTD casts, 1978-2017. (From OSR3)

3.4 Operational applications & services
- Pollution risk (particle retention conditions)
- Marine emergency & search-and-rescue (IBISAR(δ))
- Storm/waves forecasts & associated alerts
- Extreme river discharges

References: Szekely, T. et al. (2019): the CORA dataset. Ocean Sci. // von Schuckmann, K. et al. (2016, 2018, 2019, 2020): Copernicus Marine Service Ocean State Report, Issues 1-4. J.Op. Oceanogr.

Partners: