**Brief summary of the proposed investigations**

1. **Title of the project:**

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|  | **Fine scale [VER]tical exchange in the upper ocean – [S]W[O]T** |

1. **List of investigators involved:**

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| --- | --- | --- | --- | --- |
| **Name** | **Institution** | **Department/Facility** | **E-mail** | **Role** |
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1. **General objectives and approach**

* **General objective:** Improve the monitoring and characterization of vertical motions associated with fine-scale ocean processes in the western Mediterranean Sea, through combining data from altimeter missions, multi-platform in-situ ocean observations with numerical models by using innovative computational techniques.
* **The ultimate goal:** Enhance our understanding of the impact of vertical motion associated with fine-scale (30-100 km) processes on the distribution of biogeochemical tracers.
* **Approach:**  **interdisciplinary** study (i.e. involving complex coupled physical-biogeochemical-ecosystem dynamical processes interacting over a vast range of scales in space and time) using a **multisensor** (e.g. gliders, moorings, drifters, CTDs, ADCPs, water samples, HF radar, satellite data) **and modelling simulations** approach.
  + - **Unique aspect:** combination of concurrent multi-scale ship-based, autonomous platform and satellite observations with adhoc modeling simulations.
    - **Innovative aspects:**

1. **Ambitious fieldwork** with 2 synoptic high-resolution multi-sensor experiments.
2. **Innovative analysis** of in-situ data, by using several reconstruction methods.
3. **Observing System Simulation Experiments -OSSEs-** to design multi-platform observations for future high-resolution satellite cal/val activities.
4. **Real 2D SSH SWOT** observations **cal/val activities** vs. in-situ data
5. Analysis of **temporal scales** of **HF radar** surface currents
6. Estimation of **vertical velocities**, using the semi-geostrophic approximation
7. **Expected results**

VERSO will contribute towards improving our understanding of the net effect of mesoscale variability on water mass formation and transport at the global scale, as well as on its impact on biogeochemical tracer redistribution and consequent marine ecosystem response.

* **The main outputs:**
  + - Observed SSH fields at various scales from multi-sensor approach.
    - Derived variables from both observations and models.
    - Better understanding of vertical transport at the fronts.

The proposed activities will help us to increase our knowledge of the relation between physical processes and biological responses in the upper ocean, crucial to understand and predict climate change impacts on marine systems.