

# GLIDER MEASUREMENTS AROUND THE VERCELLI SEAMOUNT (TYRRHENIAN SEA) IN MAY 2009

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## ABSTRACT

As part of this integrated study, the Istituto Nazionale di Oceanografia e Geofisica Sperimentale (OGS) operated a Slocum shallow battery-powered glider around the Vercelli seamount from the 23<sup>rd</sup> to the 30<sup>th</sup> of May 2009 to sample the physical and bio-chemical characteristics of the water column in its vicinity. The Vercelli Seamount is located in the Northern Tyrrhenian Sea, (41°05' N / 10°53' E), and its summit reaches 55 m below the sea surface.

The glider "Trieste-1" was programmed to cover an area of roughly 750 km<sup>2</sup>, above the seamount (see Figure 1). It was configured to provide oceanographic data during the ascending phase of the saw-tooth path, every 0.75 km. During the entire campaign 300 profiles between 4 and 200 m depth were acquired, providing temperature, salinity, oxygen, fluorescence, and turbidity data.

## 1. INTRODUCTION

The "Tyrrhenian Seamounts Ecosystems: an Integrated Study" (TySEc) experiment took place in the Tyrrhenian Sea in late Spring 2009 with the aim of studying the geomorphologic characteristics and the hydrodynamics of the area over and around a seamount. Seamounts are sites of high productivity with coexisting biocenosis in a relative limited space, moreover they represent 'stopping stations' in the benthonic dispersion processes. Their importance on the ecology of the marine environment and of their high level of vulnerability to the global climate change represents an interesting subject in different international projects. The Italian Ministry of University and Research (MUR), sensible to this topic, financed the experiment.

A seamount is a mountain rising from the ocean seafloor which does not reach the water surface. The seamount investigated is the Vercelli Seamount located in the middle of the Northern Tyrrhenian Sea off the Olbia coast at about 41°05' N and 10°53' E, with a main peak around 55 m below the surface.

A dedicated oceanographic cruise was organized in the period spanning from the 19th of May to the 3rd of June 2009 onboard the R/V Urania (CNR). As part of

the TySEc experiment, the OGS glider Trieste-1 was operated in an area over the seamount for a period of about 8 days (from the 23<sup>rd</sup> to the 31<sup>st</sup> of May). The glider "Trieste-1" covered an area of roughly 750 km<sup>2</sup> around the seamount. It provided oceanographic data during the ascending phase of the sawtooth path, with spatial resolution of 0.75 km. During the entire campaign 300 profiles between 4 and 180 m depth were acquired, providing temperature, salinity, oxygen, fluorescence, and turbidity data.

## 2. RESULTS

A shallow (5-10 m deep) mixed-layer with maximum temperature of 23 °C was present until the 27<sup>th</sup> of May, when the temperature at the surface abruptly decreased to 21°C and the mixed layer deepened to over 15 m. Satellite sea surface temperature images reveal that this change corresponds to the expansion/intrusion of a relatively cold near-surface plume originating from the Strait of Bonifacio (between Corsica and Sardinia). Due to the wind there is an increase of the double gyre structure. In particular, the southern anticyclonic gyre strengthen on the 27<sup>th</sup> of May advecting cold water which reaches the study area.

The salinity which was essentially minimal (around 37.7) near the surface before the 27<sup>th</sup> of May, increases to 38.0-38.1 in the surface mixed layer, while a layer with minimum salinity develops near the base of the mixed layer (10-20 m).

Contemporarily the dissolved oxygen maximum deepens from the surface to the base of the mixed layer (10-20 m).

In addition to the above evolution of the water mass properties, high frequency (with periods of 0.5 day or less) variations are ubiquitous and are mostly apparent near the base of the mixed layer. They correspond to mesoscale and sub-mesoscale structures crossed by the glider and to tidal/internal waves.

Below the mixed layer, the salinity and oxygen distributions show correlated structures (high salinity corresponding to low oxygen) all the way down to 180 m.

A sub-surface maximum in chlorophyll concentration and turbidity is also seen between 60 and 80 m.

Apparently the Vercelli Seamount has little effect on the water mass properties measured by the glider.

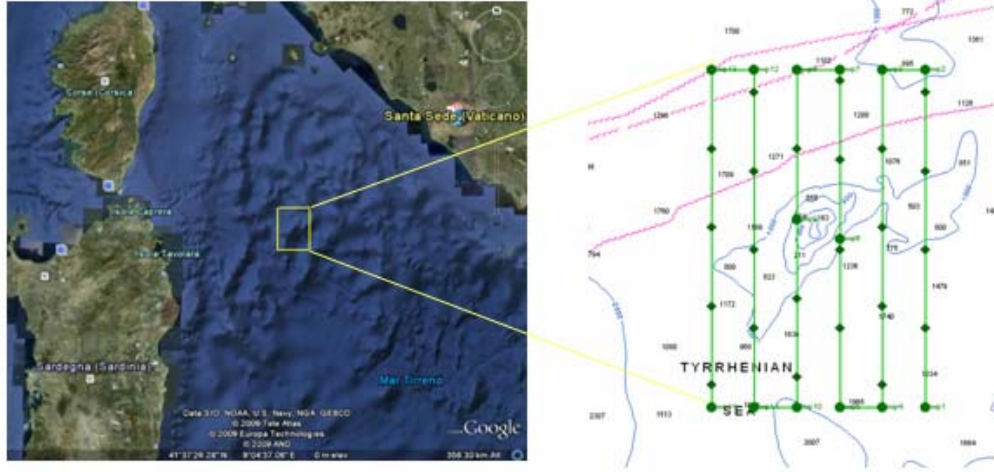


Figure 1. Tyrrhenian Sea sampling area (left). Details of the glider track overlaid on the bathymetry showing the Vercelli Sea mount (right).

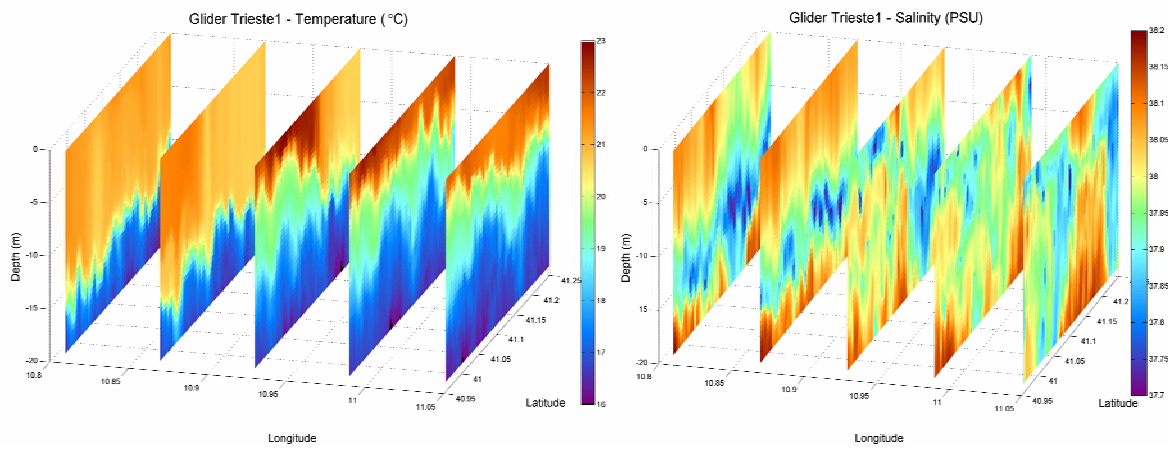


Figure 2. Color-coded contours of temperature(°C) and salinity along the drifter track.