

Energy of relief as useful geomorphic index to record seabed tectonic activity: preliminary results from the Sardinia Basin (Tyrrhenian Sea).

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A morphostructural investigation in the seafloor of the Tyrrhenian sea has been carried on using the analysis of the energy of relief (Er).

On the dry land the energy of relief is calculated to detect the intensity of denudation processes on the landscape and it is used as useful geomorphic index in the morphotectonic and morphostructural investigations. In fact, when it is calculated for single cells of small size this parameter may reveal zones affected by tectonic movements that control the development of the relief, by measuring unit cells of equal areas and assuming that for such cells mass and gravity acceleration can be treated as constant values. The energy of relief quantitative parameter is thus expressed by the maximum difference in elevation between the highest point and the lowest point measured in a given area.

On the sea bottom this geomorphic index has not been well and intensively applied. In fact, the study of this quantitative index was applied only by few authors to the Adriatic seabed; however we believe that because the absent or low erosion of seabed, it can be even more useful and easier to be interpreted as a tectonic activity marker too. Further researches, however, are needed to better understand the sensitivity of this parameter in detecting neo-tectonic features in marine environment.

Our research focuses on the calculation and evaluation of energy of relief in the Sardinia Basin, the peri-Tyrrhenian Basin located in the western passive margin of the Tyrrhenian Sea, and bounded offshore to the north by the Baronie Seamounts and to the south by the Ichnusa Seamount.

The distribution of the energy of relief was obtained by subdividing the study area into square cells of 25 km², which were numbered by orthographic coordinates. Highest and lowest elevation for each cell was obtained from the bathymetric map "Tyrrhenian Sea Bathymetry", with 100 m contour lines. Within each cell, the value of the energy of relief was calculated, so obtaining a detailed map of this parameter for the entire study area. Moreover, a complementary method of calculation and representation of this parameter has been developed to increase the quantity and the quality of data.

Preliminary results seem to suggest that in the study area tectonic activity is prevalent in the northern rather than the southern part of the basin, probably related to a different evolutive stage of the margin. Moreover in the northern sector the tectonic activity generally increases toward north. In particular, observing the difference between the areas to the north and to the south of the Orosei canyon appear that the extensional rate is higher in the northern sector. In the northern boundary of the basin the Baronie Seamounts appears to be characterized both by an higher faults activity along the eastern part and a possible tilting toward ENE in the northern part.

Moreover, this study highlights the capability of energy relief to detect the effects of regional tectonic structures regardless of style and rate of deformation.