Geophysical Research Abstracts
Vol. 20, EGU2018-10844, 2018
EGU General Assembly 2018

Comparison of scaling properties of topography and bathymetry: the case of the Sardinia versus the Tyrrhenian Sea, Western Mediterranean

Francois G. Schmitt, Virginie Gaullier, and Fabien Graveleau

CNRS, Univ. Lille, Univ. Littoral Côte d'Opale, UMR 8187, LOG, Laboratoire d'Océanologie et de Géosciences, Lille and Wimereux, France

Topography presents, as many geophysical fields, important fluctuations over a large range of scales. On the Earth, theses fluctuations are controlled by various geological processes over which, tectonics (and isostasy) is a first order one. Indeed, it generates surfaces which are scale invariant over many scales.

Here we are interested in a multi-scale comparison between the submarine bathymetry of the Tyrrhenian sea and the emerged topography of the adjacent Sardinia island. Our goal is to analyse the statistical properties of both topography domains to document if variations of these properties can be related to geological processes like tectonics and surface processes (erosion, sedimentation).

To achieve this objective, we used 1) a 90m resolved NASA-SRTM dataset for topography and 2) a 100m resolved CIESM-IFREMER dataset for bathymetry that we analyzed with a 2D structure functions tool coming from the field of turbulence and oceanography. It aims at considering the statistical moments of the fluctuations $\Delta_L H = ||H(M) - H(N)||$ versus $L = d(M,N)$, where H is the height, M and N two points of the considered region, $d(M,N)$ the distance between these two points. There are scaling relations of the form $< (\Delta_L H)^q >= C \times L^{S(q}$, where $S(q)$ is a scaling exponent. The comparison of $S^+(q)$ for the Sardinia zone, and $S^-(q)$ for the Tyrrhenian Sea is performed here.