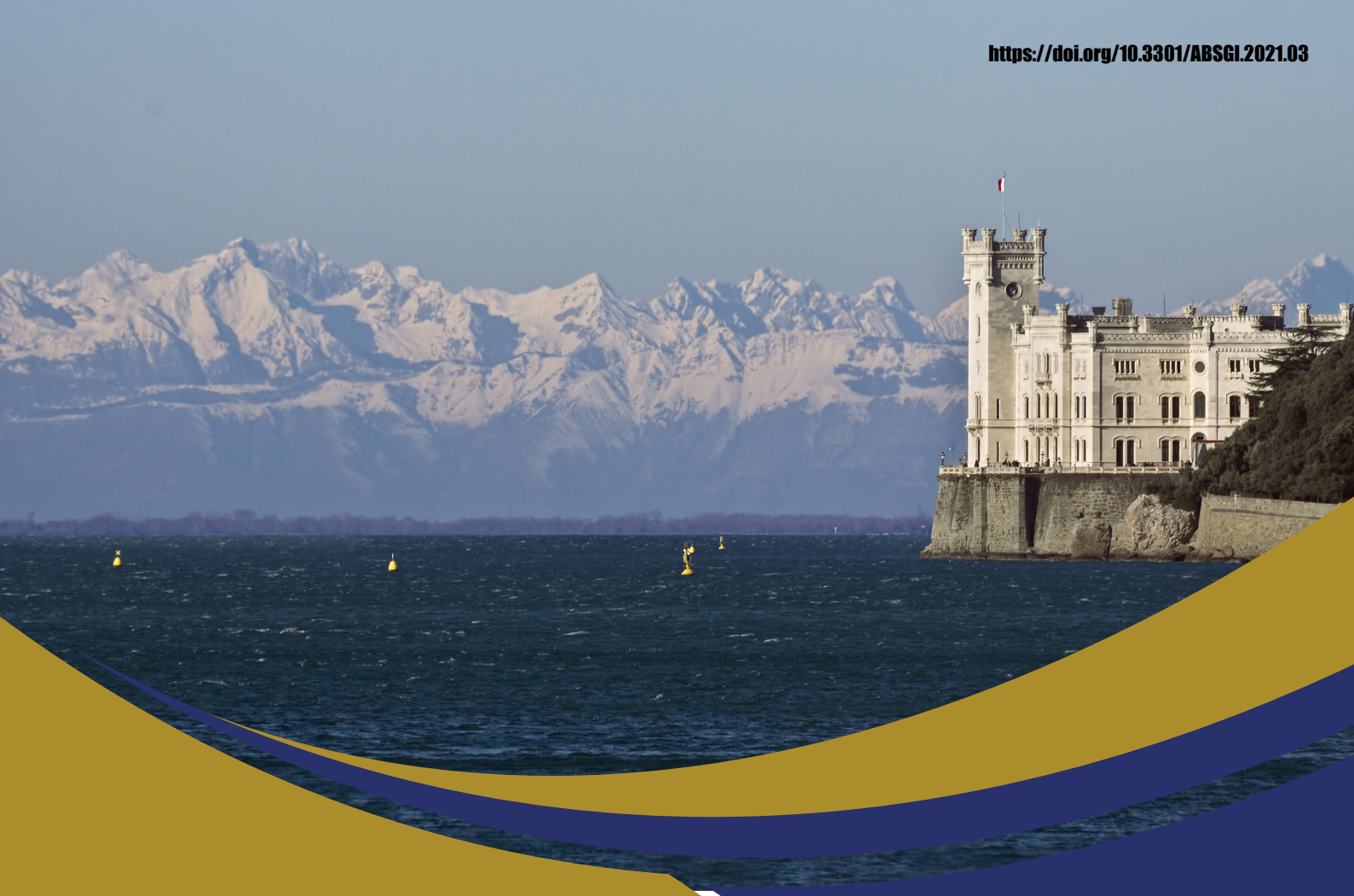
https://doi.org/10.3301/ABSGI.2021.03



Trieste 14-16 settembre 2021

ABSTRACT BOOK

a cura della Società Geologica Italiana

GEOLOGY WITHOUT BORDERS

90° Congresso della Società Geologica Italiana

dipartimento di matematica e geoscienze
UNIVERSITÀ DEGLI STUDI DI TRIESTE
OGS Istituto Nazionale di Oceanografia e di Geofisica Sperimentale
eni
SOCIETÀ GEOLOGICA ITALIANA 1881 MENTE ET MALLEO

COVER IMAGE:

Miramare Castle in Trieste (Italy) with mountains in background (Photo 7915319 © Jackallxxx | Dreamstime.com).

Gravity and magnetic data restoration with new processing and interpretation techniques

Zampa L.S. [1,2], Camerlenghi A.[2], Creati N.[2], Busetti M.[2], Lodolo E.[2] & Palmieri F.[2]

[1] University of Trieste, Geoscience, Trieste, Italy.
[2] National Institute of Oceanography and Applied Geophysics - OGS, Sgonico, Italy.

Corresponding author e-mail: luigisante.zampa@phd.units.it

Keywords: magnetic, gravity, processing.

During the past 60 years, the National Institute of Oceanography and Applied Geophysics (OGS) acquired a large number of gravity and magnetic data all over the Italian Peninsula and in the Mediterranean and Black seas. Thanks to the increasing computational power and the availability of many powerful software for data processing, it is today possible to extract new and more accurate information from the same datasets and merge them with the newest acquisitions. Data restoration is often a crucial factor for addressing new research projects and guide new scientific explorations. As a specific example, the hypothesis of the presence of several underwater volcanoes derived from the OGS gravity and magnetic acquisitions in the Sicilian Channel during the 70s have been substantially confirmed, and other volcanic edifices have been recently discovered a few tens of kilometres off the SW coast of Sicily during a geophysical cruise carried out by the R/V OGS Explora. This PhD project focused on restoring on-shore and off-shore gravity data from the OGS archives, addressing specific areas of interest: the Gulf of Manfredonia, the North Adriatic Sea, and the Friuli Venezia-Giulia region. The main target of these investigations is the identification of the subsurface fault networks lying below the Plio-Quaternary cover. Four different gravity datatypes were collected and merged to create the most detailed and homogeneous view of gravity anomalies in the study regions to date: (i) sea-bottom, (ii) sea surface, (iii) satellite altimeter, and (iv) land-based gravity. Processing all these different datatypes required a standard computational scheme to estimate topographic correction, draped-to-level upward continuation, and line levelling. In addition, the computation of topographic effects involved refining the available Digital Terrain Models (DTMs), covering both seafloors and continental areas. The analysis of the spectral content of the resulting gravity anomalies led to the interpretation of local density contrast, thorough the use of: (i) spectral and isostatic filtering for regional/local field separation, and (ii) combination of different potential field derivatives for data enhancement. In practice, the gravity data restoration and analysis helped to validate results of previous geophysical and/or geological interpretation and to gather new evidence of subsurface complexities in areas not yet covered by other geophysical and geological data.