

The revised aeromagnetic anomaly map of Italy and its surrounding seas

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Between 1977 and 1979 the Italian oil company Agip performed a detailed aeromagnetic survey covering the national territory and the Tyrrhenian and Adriatic basins. These high-quality data were acquired by using an optically pumped caesium magnetometer and the acquisition was very dense all over the covered area, either for sampling step and for line-spacing. This original coverage was composed of 36 isolated micro-surveys that once merged together composed a global map of the aeromagnetic anomaly field of Italy. This map, that was realized for specific mining targets, shows some peculiarities in the data processing. These characteristics are partly due to the old techniques used at that time, but mostly depend on the selection of a specific geomagnetic reference model especially devoted to the study of mining problems. The subtraction of the main field in fact, was done using an interpolating surface composed by the envelope of local planes, obtained from horizontal gradient studies. The residual map, obtained after this procedure, shows the phenomenon of a linear trend aligned NNW-SSE, with an average slope of 0.5 nT/km and a global offset of about 2500 nT. This map was thus effective for industrial applications, showing some problems when it was used for structural-tectonic studies, because the trend effects can mask or even deteriorate the large-wavelength anomalies.

In a cooperation project with Eni Spa Exploration & Production Division, actually owner of the aeromagnetic data, we have updated the original Agip map, through the re-processing of the original data set. These data in fact show a very high potentiality, because of the care applied during their acquisition, their remarkable density and the homogeneous and uniform distribution over the covered areas. The occasion for this global revision, derived also from the needing to insert in the map some “patch” areas that were surveyed by Eni in 2001-2002, in order to fill some holes in the previous coverage. The integration was done by the application of procedures able to make comparable all available measurements. The different survey epochs and the different flight altitudes of each one of the separate 41 micro-surveys were integrated to converge into a systematic national coverage projected at the reference observation level of 2500 m and at the geomagnetic epoch 1979.0. The final map, where the old residual trend is now removed, shows remarkable progresses, either for the deep sources responsible of the large-wavelength field and for a better localization and definition

of the magnetic anomalies generated by the shallower sources. In this work we will describe the data organization and the processing methodology in detail. Particular attention will be used to explain the integration procedure that has a capital importance in merging the single micro-surveys, separate in space, time and altitudes that compose the global map.