



## **A new high-resolution gravimetric geoid model for Algeria based on GRACE-derived Geopotential Model and SRTM data**

S. A. Benahmed Dahou (1) and D. J. FAIRHEAD (2)

(1) National Centre of Spatial Techniques, Geodetic Laboratory, Arzew, Algeria (d\_benahmed@hotmail.com, 00213-4147-3665), (2) GETECH-University of Leeds – Department of Earth Sciences – Leeds–LS2 9JT –United Kingdom

In Algeria, since the publication of most recent geoid model computed from the GETECH gravity data, several new Global Geopotential models from the recent satellite missions CHAMP and GRACE were released and a new high-resolution digital terrain model (SRTM 90m obtained from the Shuttle Radar Topography Mission), has been developed for the whole earth. Logically, these new data represent improvements that must be included in a new geoid for Algeria. For this reason, a new gravimetric geoid determination has been carried out including these new data. This solution is based on the Pre-processed 5' x 5' grid of the free air anomalies supplied by GETECH (Geophysical Exploration Technology Ltd), DEM based SRTM for topographic correction and the optimal gravity field model EIGEN-GL04C complete to degree and order 360 in terms of spherical harmonic coefficients. The method used in the computation of the geoid has been the Stokes integral in convolution form. The terrain correction has been applied to the gridded gravity anomalies, to obtain the corresponding reduced anomalies. The indirect effect has been also taken to account. This new gravimetric geoid and previous geoids existing for this study area, are compared to the geoid undulations corresponding to 62 GPS/levelling points located in northern part of Algeria. Four and seven parametric models have been tested in order to select in the experimental area the possible an improved transformation model that can describe more effectively the general trend of the discrepancies between the GPS/levelling and the gravimetric geoid using the empirical approach and the cross-validation. The study shows that the new gravimetric geoid model agrees considerably better with GPS/levelling data than any other local geoid models. Its standard deviations fit with GPS/levelling data are 29.2cm and 20.2cm before and after fitting using the four-parameters model as corrector surface in minimizing the long-wavelength geoid errors and the datum inconsistencies between our height data and GPS. The available and accuracy of the land gravity data remains insufficient to agree with GPS/levelling at the sub-centimeter level. This new geoid model will be used in low accuracy scientific applications and in low-order levelling network densification with regard to the national levelling network coverage considered as good in the north and becomes poor in the south and West of the country.

Keywords: Geoid, SRTM data, GRACE-derived Geopotential model, GPS/levelling.