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New investigation on the choice of the tailored global geopotential model for Algeria

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The choice of the best geopotential model to reduce geodetic data is one of the critical steps in computing the geoid. Several studies have shown that the geopotential models tailored to regional or local gravity data are best suited for high precision geoid computations. Since 2000 different gravimetric local geoid models have been released and computed by Geodetic Laboratory of the National Centre of Space Techniques for the region of Algeria. During the same time several new Global Gravity Models from the recent satellite gravimetric missions CHAMP and GRACE were released. These models provide a homogeneous and near-complete global coverage of gravity field information and, by consequently, lead to significant improvements of our knowledge of the long wavelength part of the geoid. For the computation of a new gravimetric geoid model for Algeria we need a new investigation on the choice of the best GGM model for the combined solution with local gravimetric data. In this paper, an analysis was carried out to define the geopotential model, which fits best the gravity field in Algeria. In this comparison, five global geopotential models are used: The new GRACE satellite-only and combined models GGM02S, GGM02C, combined CHAMP and GRACE model EIGEN-CG01C, OSU91A and EGM96. The test of the fitting of these high order geopotential models to the gravity field in Algeria is based on the gravity data supplied by the B.G.I., and some of the precise GPS data collected from the international TYRGEONET (TYRhenian GEOdynamical NETwork), ALGEONET (ALGerian GEOdynamical NETwork) projects with baseline length ranging from about 1 to 800 km have been used. The comparisons were made at all gravity and GPS levelled points by calculation of the residual data (i. e. observed data minus model). The statistical parameters considered in this work are the mean, the standard

deviation and the smooth covariance function necessary for all estimation by the Fast collocation technique. The data used in this work and their distribution, the computation procedure, the different statistical tests, some conclusions and recommendations will be presented and widely discussed. Key words: Geopotential model, Fast Collocation technique, TYRGEONET projects, covariance function.