



A comparison of recent geopotential models with emphasis on their contribution in refining the gravity and geoid in continental or regional scale

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Since the computation of the EGM 96 model considerable improvements in the observation techniques resulted in the development of new models such as the models including CHAMP and GRACE data or the more recent EGM 2008 high resolution model. The use of the new models it is expected to contribute further in the improvement of the resolution and accuracy of the gravity and geoid modeling in continental and regional scale. To prove this numerically, three representative geopotential models are used for the reduction of several kinds of data related to the gravity field in different places of the earth. The results of the reduction are discussed regarding the corresponding covariance functions which might be used for modeling using the least squares collocation method. The contribution of the EIGEN-GL04C model in most cases is comparable to that of EGM96. However, the big difference is shown in the case of EGM2008, due not only to his quality but obviously to his high degree of expansion. Almost, in all cases the variance and the correlation length of the covariance functions of data reduced to this model are only a few percentages of corresponding quantities with data reduced to the other models. Furthermore, the standard deviation of the reduced gravity anomalies in extended areas of the Earth such as Australia, Arctic Ocean or the Canadian plains, varies between 5 and 10 mgal, reflecting the homogenization of the gravity field in regional scale. This is very important in using least squares collocation for regional applications. Finally, the first zero point of the empirical covariance functions is moved far away from the correlation length, so that finite covariance functions might be used in modeling using least squares collocation.