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Comparison of Topographic Effects using Various Gravity Reduction Methods in Korea

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The topographic effect is a very important component in the solution of the geodetic boundary value problem (geodetic BVP) and should be considered exactly for the development of precise geoid model. Especially, in case of very mountainous regions such like Korea, it is so necessary to select a proper gravity reduction method in order to calculate the topographic effect precisely. The selection of the gravity reduction method in context of precise geoid determination depends on the magnitude of its indirect effect, the smoothness and magnitude of the reduced gravity anomalies, and their related geophysical interpretation. In this paper, we studied gravimetric geoid solutions using 3-types of gravity reduction methods (Helmert's second method of condensation, RTM method and Airy topographic-isostatic method) and evaluated the usefulness of each method. In Korea, the gravimetric geoid model was determined by restoring the gravity anomalies (included the terrain corrections) and the indirect effects was computed from 3-types of reduction methods on the EIGEN-CG03C reference field, and the results were compared to geoid undulations at 1,185 GPS/levelling points after LSC fitting. According to the results, the RTM method is the most suitable for calculating topographic effect for the determination of precise geoid model in Korea.