Geoid solution for South America based on the new EIGEN-CG01C global gravity field model

D. Marchenko (1), P. Schwintzer(*) and F. Barthelmes(1)

(1)GeoForschungsZentrum Potsdam, Department 1: Geodesy and Remote Sensing, (*) Died 24.12.2004

This contribution intends to present the result of geoid computations based on the new combined EIGEN-CG01C global gravity field model (Reigber et al, 2004) using the remove-restore technique. Area of interest limited by 25° N to 60° S in latitude and 25° W to 100° W in longitude. The initial data sets are: (a) onshore gravimetry database from Polytechnic School in Sao Paulo, (b) ERS1, ERS2, and TOPEX/POSIDON altimetry data for the time-period ˜10yr. Due to a huge terrain in the Andean areas a topographic correction had to be applied to the 10'x10' free-air anomaly data resulting in Faye anomalies. For terrain correction, the ETOPO'2 digital terrain model was applied. Furthermore, the global EIGEN-CG01C gravity model (up to degree/order 360) was used in remove-restore procedure and sequential multipole analysis method as a tool for the geoid computation. Preliminary solution represents gravimetric only geoid model, which was obtained by the direct approximation of the residual gravity anomalies using radial multipoles of different degrees. In the final stage the preliminary model was readjusted on the basis of 5'x5' Faye gravity anomalies onshore and 10'x10' corrected sea surface height data offshore (using ERS1, ERS2, and TOPEX/POSIDON altimetry data) leading to the gravimetric/altimetric geoid model. To improve the gravimetric geoid model in offshore areas corrected sea surface heights were chosen instead of gravimetry data. The comparison of resulting model with the models based on EGM'96 global gravity model is discussed. The resulting gravimetric/altimetry geoid solution shows a good accordance with the available GPS/leveling data.

Reigber, Shmidt, Flechtner, Konig, Meyer, Neumayer, Shwintzer, Zhu (2005) Earth gravity model from Grace (Submitted to Journal of Geodesy)