GOCE geopotential models (GOCE and GOCO01S) represent a new important contribution to medium and short wavelength components knowledge of the gravitational field. This fact has consequences for the computation of the respective wavelength components of the geoid. The models have been evaluated against GPS observations on Bench Marks of the spirit leveling network (GPS/BM). They have also been used as a reference field in the modified Stokes integral. The terrestrial gravity data in South America have been updated with the most recent measurements in Argentina, Brazil, Ecuador and Paraguay. The short wavelength component was estimated via FFT and direct numerical integration for comparison, in both cases using Featherstone modified kernel. The complete Bouguer and Helmert gravity anomalies have been derived through the Canadian package SHGEO. The geoid models have also been compared over GPS/BM. The height anomaly derived from EGM2008 (order and degree 2160) has also been checked out.