Optimally combined regional geoid models for the realization of height systems in developing countries

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Motivation
Revolutionized knowledge of the Earth’s gravity field, especially since
- GOCE
- ERS
- GRACE
- Jason
- ALOS
- Envisat
- TerraSAR-X

Formulation of a general scientific concept how to
- optimally combine global models & terrestrial regional gravity information
- how to compute a national height system & link it to a global reference system
- e.g. constraints, limitations and specific boundary conditions of developing & newly industrializing countries

Scientific concept
- how to optimally combine global models & terrestrial regional gravity information
- how to compute a national height system & link it to a global reference system
- e.g. constraints, limitations and specific boundary conditions of developing & newly industrializing countries
- how to establish a national height system & link it to a global reference system
- w.r.t. constraints, limitations and specific boundary conditions of developing & newly industrializing countries

Gravity measurements & spirit levelling
- + countries with good geodetic infrastructure: cm-accuracy
- laborious, expensive
- + spatially limited
- + globally available
- + “inexpensive”
- not affordable for developing countries
- local (abnormal +100 national height systems)
- different definitions of height systems

Connection & unification by GNSS, unification by GNSS, & spirit levelling
- connection & unification by GNSS, spirit levelling
- combination of regional models and terrestrial regional gravity information

Aim
- Formulation of a general scientific concept how to
- (1) optimally combine all available data sets,
- (2) estimate realistic errors, and
- (3) establish and unify physical height systems based on resulting regional gravity models.

Scientific challenges
- missing reliable and high-quality terrestrial gravity data, data gaps
- stochastic & systematic errors, omission errors
- varying topography
- missing data in coastal regions
- unknown standards and reference frames

Guideline for further use in science and administration
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Related publications
- Schmidt et al. (2007): On the combination of global and local data in collocation theory.
- Schmidt et al. (2016): Regional Gravity Modelling: Satellite gravimetry and combination of gravity data. "High resolution only in regions with terrestrial data basis"
- Schmidt et al. (2010): On the combination of regional gravity models and terrestrial regional gravity information.