



## **The significance of GPS/leveling points for the high precision geoid computation**

N. Kühtreiber (1) and C. Pock (2)

(1) University of Technology Graz, Institute of Navigation, Graz, Austria (norbert.kuehtreiber@tugraz.at, +433168738888),

(2) University of Technology Graz, Institute of Theoretical Geodesy and Satellite Geodesy, Graz, Austria  
(christian.pock@tugraz.at)

The computation of a local geoid can be done by several methods. Collocation as one of the possible tools has the big advantage that observations representing different functionals of the disturbing potential can be combined. Therefore also GPS/leveling points can be used as observation values. The present work discusses the significance of GPS/leveling data in the collocation process as well as the overall importance of this kind of data in the field of the high precision geoid computation. Several basic principles are discussed. Is the combination of GPS/leveling data with the other gravity field observations in one step better than performing the widely used two step procedure? The two step procedure means combining gravity anomalies and deflections of the vertical in a first step, followed by the fitting of the geoidal surface to the GPS/leveling benchmarks by a transformation surface. The present work also focuses on the modeling of the transformation surface by radial base functions. An adapted version of the Greedy algorithm is used to find the minimum number of GPS/leveling points that are necessary to fix the transformation surface with a given accuracy. Finally the principle of a possible validation of the GPS/leveling points by a combined leave one out cross validation is discussed.