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# Consistent combination of GOCE gravity gradiometry and terrestrial gravimetry in active plate margins

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The main focus of this project is the active continental margin of the subduction zone in South America, where a combined gravity field model from satellite and ground data shall provide a new constraint for lithospheric modelling. New gravity field data from GOCE provide new, high-accuracy and globally uniform information of the Earth's gravity field. Comparison of global GOCE gravity models with terrestrial gravity data reveals that there are large systematic differences in South America, which can be attributed to a low data quality of the terrestrial data. Consequently, most lithospheric models of the study region, which did not yet include GOCE, are affected with large-scale errors as well. Apart from the direct geophysical interpretation of GOCE gravity gradients, a major goal is to derive a consistent combined regional gravity field model from GOCE gradients, GRACE, and terrestrial data in the study region, by applying Least Squares Collocation (LSC). Such a combination task provides a number of methodological challenges, which shall be addressed in this contribution. In a first step, the ground data (gravity anomalies and associated heights) have to be validated thoroughly. In order to validate ground gravity satellite data, the high-frequency signal content (mainly contained in terrestrial data) has to be reduced consistently by a topographic-isostatic reduction. GOCE gravity gradient observations and terrestrial data (both consistently corrected for topographic-isostatic effects) are combined for a regional gravity field determination by LSC. Special attention is put on the realistic stochastic modeling of the error covariances of the GOCE gradients, which shall be introduced as direct gravity field observations into the LSC procedure.