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Gravity variations from precise LEO orbits of GRACE and GOCE

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The derivation of gravity variations in time by using precise orbit data from Low Earth Orbiters is a challenging task. Different methods aim at improvements in terms of gravity field processing or post-processing/filtering of the time series. However, the main component which determines the achievable accuracy is the quality of the input data, namely the orbit positions. Hence, we concentrate our investigations on improvements in terms of orbit accuracy. We apply a processing scheme based on raw GNSS measurements without the use of observation combinations.
In this contribution we will show results for the satellite missions GRACE and GOCE. These results demonstrate the ability to see time variations without post-processing of the time series. We show results for different areas like the Amazon river basin or Greenland.
Furthermore we will address several issues in the processing of GNSS observations and their influence on the derived gravity field estimation. As for example different weighting schemes for the observations. Special attention will be drawn to the reduction of the well known effect along the geomagnetic equator which is present in GOCE solutions. This systematic effect is induced by the ionosphere and its influence on GNSS measurements. It can be reduced by applying ionospheric corrections of higher order and including a correction for the atmospheric bending of electromagnetic signals. We will present different gravity field solutions to show the impact of these corrections.