



Calibration of GNSS derived inertial accelerations for the SAGS4 airborne gravimeter system

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In airborne gravimetry, gravimeter readings need to be reduced by inertial accelerations caused by the motion of the carrier aircraft. Inertial acceleration evaluation is even more demanding than observing the total acceleration by a gravimeter, particularly for higher frequencies in view of higher spatial resolution required for mineral exploration. Usually, it is derived from the GNSS observations. Having achieved high sampling rates and precision for SAGS4, we focused on high sampling rate precision kinematic GPS positioning. For further analysis, we have constructed a mechanical lift with incremental resolution of < 0.001 mm and a GPS time tagging better than 1 μ s at lift height sampling rates of several hundred / s. The construction of the lift permits motions up to 0.7 m simulating the motions of the aircraft we are using for our Strapdown Airborne Gravimeter System prototype SAGS4. With the GPS antenna mounted on the lift, we saw several cm deviation in kinematic 50 /s GPS heighting, depending on the receiver parameter settings. Analysing the GPS heights against lift height ground truth, we are able to determine the calibration function not only for the kinematic GPS positioning in an operational setting, but also for the inertial accelerations derived. Moreover, we have developed numerical reconstruction filters.