



Sensor requirements for a Next Generation Gravity Mission

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In our work we define sensor requirements for a next generation gravity mission (NGGM). Starting with science requirements the aim is the definition of requirements for the key sensors of a low-low-SST mission to be able to observe the required signals.

The first step is the definition of the science requirements in terms of signal properties of gravity signals on the Earth which should be observed by the NGGM. By setting a nominal mission profile these science requirements then are translated into observation requirements for this profile in terms of maximum cumulative geoid errors.

The second step is the translation of the observation requirements into sensor requirements. Therefore reference models for the noise of the key sensors are defined in terms of power spectral densities. The two sensors are the accelerometer and the distance measurement sensor. The requirements for these two sensors then are determined iteratively by propagating the noise models onto the spherical harmonic spectrum using the semi-analytical approach. As this propagation depends mainly on the altitude and the distance between the two satellites several of these pairs are analysed separately. The sensor requirements for one profile are then defined as the reference noise model times the largest scale factor to meet the observation requirements.

Using this semi-analytical approach temporal aliasing can not be taken into account. In the last step a full closed-loop error simulation shall be analyzed. These analyses are affected by temporal aliasing produced by mass variation models from which the low-low-SST observations along the orbit are computed. These results are then compared with the semi-analytical results.