



Gravity Field Retrieval of Next Generation Gravity Missions regarding Geophysical Services: Results of the ESA-ADDCON Project

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Next Generation Gravity Missions (NGGMs) expected to be launched in the midterm future have set high anticipations for an enhanced monitoring of mass transport in the Earth system, establishing their products applicable to new scientific fields and serving societal needs. The European Space Agency (ESA) has issued several studies on concepts of NGGMs, the latest being the “Additional Constellations & Scientific Analysis Studies of the Next Generation Gravity Mission” (ADDCON). The performed simulations make use of the gravity field processing approach where low-resolution gravity field solutions are co-parameterized in short-term periods (e.g. daily) together with the long-term solutions (e.g. 7-day solution). This method proved to be beneficial for NGGMs (ESA-SC4MGV project) since the enhanced spatio-temporal sampling enables a self-de-aliasing of high-frequency atmospheric and oceanic signals, which may now be a part of the retrieved signal. After a full numerical investigation of the impact of various orbit design parameters such as attitude profiles, length of retrieval period and sub-cycles, optimal constellations for NGGM’s were identified. Based on these orbit designs a long-term simulation is computed to assess the value of NGGM for geophysical applications and operational services. Additionally the potential of a near-real time (NRT) product with latencies of 1 to 3 days for hydrological purposes (e.g. detection of droughts and floods) is investigated and presented.