New methods for linking science objectives to mission architectures: A case study comparing single and dual-pair satellite gravimetry mission architectures

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MOTIVATION

Assessment of satellite gravimetry mission architectures is typically performed in the spectral domain using degree RMS analysis (left). However, science objectives (top) are usually expressed in terms of desired spatial and temporal resolution along with a targeted accuracy. Here, we develop a new method call Space Time Accuracy Grids (STAG) for which to easily relate science objectives to the performance of any observing system architecture (right).

RESULTS

Here, we demonstrate the ability of STAG analysis for targeted studies, examining land hydrology signals with inclusion of state of the art post-processing methods. Once post-processing is taken into account, we see that the Bender architecture offers improvements ranging from 25% - 55% over both the single and dual-polar pair architectures. Additionally, we see that two polar pairs offers only modest improvements over a single polar pair, with error reductions peaking at 15% for the largest spatial scales (> 1000 km).

METHODS

STAG creation begins with numerical simulation output from degree RMS (Figure 1).