Combined gravimetric and VLBI free core nutation parameter Bayesian inversion

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The fluid core resonance phenomenon affects the amplitude of the tidal waves close to the diurnal period. Although this has been studied for a long time, the accuracy of most relevant resonance parameters (resonance frequency and quality factor) improves rather slowly. This is mainly due to the fact that ground-based experiments that can be used to retrieve these parameters (gravimeters, deformations as derived from VLBI measurements) undergo oceanic tidal loading that degrade the signal/noise ratio. We use here recent oceanic loading estimations and discuss their accuracy to correct raw gravimetric data. We also determine the most useful waves to be used in the inversion scheme by undertaking a sensitivity analysis. Then, we use a Bayesian inversion method to determine and combine superconducting gravimetric data from specific stations belonging to the Global Geodynamic Project with vertical displacement data as derived from the VLBI network (horizontal displacements having been found too noisy for that purpose). This actually permits to analyse and compare the respective informative contribution of each network, to fully quantify the level of certainty of the retrieved quantities, and finally to retrieve suitable uncertainty ranges for the FCN period and quality factor.