



## **A detailed investigation of a 25 year duration (1987-2012) superconducting gravimeter record in Strasbourg, France**

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Since 1987, two different Superconducting Gravimeters (SGs) have been recording in consecutive periods at the Gravimetric Observatory J9, located near Strasbourg (France). As a result, one of the longest gravity records obtained by this kind of gravimeters (1987-2012) is now available reaching more than 25 year duration.

The quality improvements in the superconducting gravimeters (drift and sensitivity) allows us to launch more precise studies of the Earth's response to various excitations sources over a wide spectral range (from quart-diurnal tides to the Chandler component of Earth's rotation).

Our long duration of 25 years will help the detailed investigation of the content of the gravity record in two ways: first to exhibit very low frequency terms (e.g. long period tides) and second to separate contributions of near frequencies (e.g. the annual and the Chandlerian components induced by the Earth's rotation).

We use this long gravity series to present some updated analyses of SG data for the determination of the Earth's response to luni-solar tidal forces in terms of gravimetric factors (amplitude and phase lag) with special emphasis on the degree 3 and degree 4 terms, as well as on the long period tides.

We also investigate the Free Core Nutation (FCN) parameters both by studying the resonance effect on diurnal tides (eigenfrequency and quality factor) and by searching the amplitude of the excited rotational eigenmode itself. We use the time stability of the diurnal waves around the liquid core resonance in order to improve the investigation of the stability of the free core nutation (FCN) eigenperiod and damping. The knowledge of these parameters gives us useful information to constrain the physical process of coupling between the mantle and core.