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Long term tidal and instrumental stability in superconducting gravity records

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The first Superconducting Gravimeters (SG) were installed in the 80s. Since then, more and more instruments have been installed worldwide providing us with different long gravity records of excellent quality (high sensitivity and small instrumental drift).
In this study we will use some of the series belonging to the global network of SG, the Global Geodynamics Project (GGP), with at least 10 years of continuous records.

For each station we study the temporal variations of the tidal parameters (amplitude factor and phase differences) for the main tidal waves, as well as for the M2/O1 delta factor ratio (known to be independent of the instrument calibration) We perform for each data series an ETERNA tidal analysis on yearly segments shifted month by month.
The temporal evolution for these tidal parameters is observed in detail, and we compare the different evolutions found for several instruments. We also compare the observed parameters, with those theoretically estimated from the solid Earth tide models after ocean loading correction.

It is known that the long-term accuracy is also dependent of the stability of the scale factor of the SGs. This factor is usually derived from a direct comparison with repeated absolute gravity (AG) measurements. To have more insight on this effect, we focus on the long (1996-2012) series from the SG C026, installed in J9 station near Strasbourg (France), checking the stability of its instrumental sensitivity and studying if the calibration factor is stable in time using numerous calibration experiments carried out by co-located AG measurements. It turns out that the SG stability is much better than the one that can be achieved by SG/AG calibration repetitions.