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A study of the drift function and relative scale factors based on two juxtaposed CG5 relative gravimeters.

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A time-wise drift of one standard relative gravimeter can be modelled by linking the measurements of a gravity survey to high accuracy gravity stations with known gravity values. Alternatively, the measurements can be performed in one station with not necessarily known, but a constant gravity value. In both cases, and prior to drift function estimation, the gravity measurements should be corrected for systematics caused by the tidal accelerations. Typically the time-wise drift is modelled by a linear function. For Scintrex CG5 this linear drift is particularly strong and significant.

We have performed long time series measurements (weeks and months) using two juxtaposed CG5 instruments on our new absolute gravity station at the Technical University of Denmark. The instruments are only few decimetres apart, so it is reasonable to assume that the true tidal acceleration on both gravimeters is the same.
However, the signature of the tidal components is in principle scaled by a scaling factor for each gravimeter relating the differences in the counter reading values to the gravity differences in mGals. For Scintrex CG5 this scaling factor is close to one.

Knowing the position of our gravimeters the available tidal model yields a time-wise signature of the tidal accelerations on both gravimeters. The above setup can be used to decompose the gravity measurements into the following constituencies:

• The tidal signal
• The relative scale factor between the two gravimeters
• The individual drift function for each gravimeter
• The noise

Concerning the individual drift function for each gravimeter it is only for short time windows that it can be regarded linear. For wider time windows there is a significant 2nd order component of the drift function. In our poster we will discuss the above decomposition and study the appropriate drift model for different widths of the time-window and its stability in time.