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Comparison of the Gaussian and the DDK filter method for GRACE data

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To begin with, there is no one-to-one correspondence between Gaussian and anisotropic filter methods in smoothing GRACE gravity models.

The global gravity field products derived from the Gravity Recovery and Climate Experiment (GRACE) mission contain prominent striping errors. It is well known, that it is necessary to remove these striping artifacts before using the data, as the errors overlay most of the time variable gravity signal. The most common method for error reduction is the use of isotropic Gaussian filters with different filter radii. However, there are more advanced filter methods such as the anisotropic DDK filters. An often posed question is whether there is equivalence between some isotropic Gaussian filter and some DDK filter. Of course, one may compare the two filter methods using different criteria. But these comparisons not only depend on the chosen criterion, but also on the location on the Earth at which the filtered signal is evaluated.

We found different criteria useful for the comparison of the different GRACE filter methods based on user requirements. We evaluate how strongly a given signal is dampened through the filtering process, how much the filter spreads a localized signal over a larger region, and what minimum distance is needed between two signals to remain distinguishable after filtering. Furthermore, we define a measure for the striping reduction achieved by each filter. In this presentation we will compare DDK and Gaussian filters with respect to the above mentioned criteria for different geographical locations.