



Robust estimation of error covariance functions in GRACE gravity field determination

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The accurate modelling of the stochastic behaviour of the GRACE mission observations is an important task in the time variable gravity field determination. After fitting a model in the least-squares sense, it is necessary to determine whether all the necessary model assumptions, i.e. independence, normality, and homoscedasticity of the residuals, are valid before performing inference.

Checking the model assumptions for the range rate residuals, it has been concluded that one of the major problems in the range rate observations is the outliers in the data. One way to deal with this problem is to implement a robust estimation procedure to dampen the effect of observations that would be highly influential if least squares were used. In addition to insensitivity to outliers, such a procedure tends to leave the residuals associated with outliers large, therefore making the identification of outliers much easier.

Implementation of this procedure using robust error covariance functions, comparison of different robust estimators, e.g., Huber's and Tukey's estimators, and assessing the detected outliers with respect to temporal and spatial patterns are discussed.