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Interpolation of Superconducting Gravity Observations Using Least-Squares Collocation Method

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A pre-processing of the gravity data measured by superconducting gravimeter involves removing of spikes, offsets and gaps. Their presence in observations can limit the data analysis and degrades the quality of obtained results. Short data gaps are filling by theoretical signal in order to get continuous records of gravity. It requires the accurate tidal model and eventually atmospheric pressure at the observed site. The poster presents a design of algorithm for interpolation of gravity observations with a sampling rate of 1 min. Novel approach is based on least-squares collocation which combines adjustment of trend parameters, filtering of noise and prediction. It allows the interpolation of missing data up to a few hours without necessity of any other information. Appropriate parameters for covariance function are found using a Bayes' theorem by modified optimization process. Accuracy of method is improved by the rejection of outliers before interpolation. For filling of longer gaps the collocation model is combined with theoretical tidal signal for the rigid Earth. Finally, the proposed method was tested on the superconducting gravity observations at several selected stations of Global Geodynamics Project. Testing demonstrates its reliability and offers results comparable with the standard approach implemented in ETERNA software package without necessity of an accurate tidal model.