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Using Kalman smoother to derive daily gravity field solutions from GRACE L1B data

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Different GRACE data analysis centers provide temporal variations of the Earth's gravity field as monthly, 10-daily or weekly mean fields. These solutions are derived independently for each time span, i.e. no correlation between the analyzed batches is considered. Following this procedure, an increase in temporal resolution is accompanied by a loss in accuracy. To avoid this problem, Kurtenbach et. al (2009) presented a new approach, which takes into account the temporal correlations of the gravity field variations thus enabling the enhancement of the temporal resolution up to daily snapshots. The GRACE Level-1B (L1B) instrument data processing is performed within the framework of a Kalman filter estimation procedure. In this contribution an improved approach is presented, which takes into account the full temporal and spacial correlation pattern of the expected gravity field signal. The required information in terms of an empirical auto-covariance function is derived in this approach from atmospheric, oceanic, and hydrological model data.