Variants for the determination of atmospheric gravity field coefficients

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The determination of accurate atmospheric gravity field coefficients is indispensable for the gravity field satellite missions which are sensitive to the instantaneous distribution of all the masses of the Earth, including all solid, fluid, and atmospheric particles. Due to the fluctuation of those masses at various temporal and spatial scales a long observation time does not guarantee that all variations in the gravity field are cancelled out. Thus, in order to avoid aliasing effects the known part of the mass variations has to be modeled and corrected with respect to the mean state.

In this presentation we apply different methods for the determination of the atmospheric gravity field coefficients. We compare the coefficients that are derived with model level, pressure level, and surface pressure data from the European Centre for Medium-Range Weather Forecasts (ECMWF), and we apply different representations of the reference pressure which has to be considered. For example, we use modifications of a 5 x 5 min reference pressure field which has been determined for the ETOPO5 topography (Plag et al., 2007) or the Global Pressure and Temperature model (GPT, Böhm et al., 2007). Another part of the presentation is about the vertical distribution of the density compared to its simplified representation by surface pressure.