# Average time-variable gravity from GPS orbits of recent geodetic satellites

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We have used our implementation of the acceleration approach to obtain low-degree monthly gravity field solutions from kinematic orbits of satellites GRACE A/B, CHAMP and GOCE. An important part of our procedure is based on time series methods, we use the sample partial autocorrelation function and the fitted autoregressive process to represent the correlation structure in the random component of the observations. Average seasonal variation have been obtained by fitting annual sinusoids to each geopotential coefficient. In the monthly solutions we include also the degree one geopotential coefficients, which are related to geocentre motion. Average time variation from GPS-based monthly solutions of GRACE A/B and CHAMP, covering the years 2003–2009, clearly show the global seasonal hydrology pattern on continents; estimates of geocentre motion from GRACE A/B orbits are comparable to those from other observation techniques. We also present our preliminary results on time-variable gravity from almost 3 years of GOCE kinematic orbits (2009–2012).