

## ***Interactive comment on* “The bias in GRACE estimates of continental water storage variations” by R. Klees et al.**

### **Anonymous Referee #2**

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General Comments: The paper addresses an important point in the interpretation of GRACE derived mass change, i.e. the error in the estimation introduced by the filtering procedure required for the suppression of high frequency and geographically correlated noise in the GRACE fields.

The paper is well structured and written. It expands previous works by the authors on this topic in a systematic investigation on influence factors like size of the area, model-errors and filter lengths. The bias in GRACE estimation due to filtering is presented in a nice form that allows to discerning easily between in area and out of area contributions, i.e. attenuation and leakage errors. The approach to uses external a-priori information on the water mass to calibrate the GRACE results. This is an improvement of global or

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other more crude approximations of this scale factor because it takes care of the size and shape of the area and of the geographical distribution of the mass variations within and around the area. It is also an alternative to the frequency domain scaling of the coefficients.

Also the hydrological part with the LEM model is well presented and described.

The results and interpretation are interesting and should be published. There are a few points where improvements could be helpful. Some are details, but in general more emphasis could be used to show that the method really works and that it is not an single case event for using the same model for bias correction and comparison to GRACE.

**Specific Comments:** The information on the GRACE data treatment is sparse and could be made more specific. what is the effect of the neglect of degree 1 and 2 coefficients (3570/10). What is the error of the GRACE fields, how is it affected by smoothing and does it relate to the monthly variations in the differences to the model, e.g. the orbit weakness discussed in (3571/20). It may be interesting to see the partial contributions of the damping error-bias inside the area and the leakage error-bias in an example. The comparison of results of LEM and CPC-LDAS should be more elaborate, because it can proof the validity of the improvements in GRACE by bias correction. A direct comparison of corrected GRACE to both LEM and CPS-LDAS in the amplitude and time series and in the resulting differences should be given. A statement on the comparison to (Chen,2006) results, where it is stated that GRACE estimates are consistently larger as the model values would be interesting.

**Technical Corrections:** The form of the paper and figures is ok, there are two typing erros in 3571/5:table and 3571/10:do.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 3, 3557, 2006.

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