



Validation of the land water storage simulated by ORCHIDEE with the GRACE data

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Launched in mid-March 2002, the GRACE mission provides time variable geoid observations, which, over continental areas, are closely related to changes in vertically integrated terrestrial water storage. Recent studies have demonstrated the ability of GRACE to monitor water storage variability on continental areas with a resolution of ~ 500 km and a precision of a few cm in water thickness. In this paper, we compare the land water storage simulated by ORCHIDEE LSM developed at the Institute Pierre Simon Laplace, France with GRACE observations. We focus on large tropical river basins where land water storage predicted by models is not coherent with observed values. We show that a transfer scheme which takes into account the storage of drained water flowing towards oceans, improves the agreement between water storage variation estimates from ORCHIDEE and GRACE observations. When run without the transfer scheme, the model predicts significantly smaller amplitudes of water storage than the observed GRACE data over large tropical rivers basins. When run with the transfer scheme, the predicted land water storage values are comparable to observations, taking into account water stored in the river systems and aquifers during its transfer to the oceans. Water stored in aquifers contributes about half of the seasonal variation of water storage over some large basins such as the Amazon, Congo, Yangtze, Ganges, Brahmaputra, and Mekong.