



## **Influence of the surface permeability on the GRACE water mass variations. Case of the Lake Chad basin.**

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Since its launch in 2002, the Gravity Recovery And Climate Experiment (GRACE) has been measuring the tiny variations of the gravity field due to redistributions of water mass in the surface envelopes of Earth. At a spatial resolution of 400 km, these satellite data offer a unique perspective to understand the evolution of continental water storage at regional and global scales, and therefore they enable the monitoring of the hydrological systems such as river basins. It is well known that seasonal cycle, droughts, vegetation and human extractions are the main contributors of the hydrology signals sensed by GRACE. However, the coupling between land surface and the atmosphere is important in semi-arid and arid regions, in particular in West Africa. We propose to quantify the surface water fluxes in the Lake Chad region by using the daily (and 10-day) water mass solutions of the GRACE mission in the context of the regular West African monsoon. Alternation of the evaporation/condensation cycles during the recent period are interpreted in terms of surface vertical permeability changes that control the thermal evolution in this region [2]. GRACE solutions reveal an interannual increase of surface water mass during dry seasons, especially in 2005 and 2007. We propose that this gain of surface water mass is caused by a seasonal cycle of clay fracturing.

[1] Koster et al. (2004). *Science*, 305, 1138-1140. [2] Lopez et al. (2016). *Surv. Geophys.*, 37 (2), 471-502.