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Space geodesy to understand the recent fall in the Lake Victoria

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The level of the Victoria Lake is analysed using space gravity and altimetry data, together with the output of the large-scale land LaD water model. The good agreement between the space gravity and altimetry proves the robustness of the results. Comparing these geodetic observations with the LaD land water model allows one to better estimate the relative contribution of the precipitation, evaporation and run-off. It favours a slight increase in the evaporation with respect to that predicted by the LaD model, which allows explaining most of the low frequency time variable Victoria Lake water level. Similarly, the runoff has to be lowered by a factor 5, which is explained by the storage effect of the lake. With these slight adaptations, this study evidences the consistence of the LaD model with the satellite geodetic observations for multiannual signals, and shows that the 2002-2005 decrease in the lake water level is due to an increased evaporation, accompanied by a repeated deficit in the rainfall.

This work, based on a case study, clearly shows the ability of space gravity and altimetry techniques to investigate multiannual processes in water basin at the regional scale. Moreover, for the first time, this also evidences the possibility to assimilate space geodesy data into land water models. This is paramount to improve global hydrology models, those resulting in one way or another from local and regional investigation