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# Satellite altimetry over inland water: A new tool to detect geoid errors!

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Nowadays satellite altimetry is not only used over open ocean but also over inland waters. Some applications as, for example, investigations on inundation zones require to consider physical heights which tell you where water will flow. This implies to reduce geometric (elliptic) lake heights by an utmost precise geoid. Physical heights of a lake surface should exhibit a flat surface, as in general the water is in balance with gravity and the hydrodynamics of lakes can be neglected.

In this presentation we investigate physical heights over a few rather large lakes by using different geoid models. The ultra-high resolution EGM2008 model, available up to degree 2190, seems to be most convenient for this purpose. Physical lake heights, derived with EGM2008 are, however, not flat. The latest gravity field models from GOCE indicate significant errors of EGM2008 in particular over land areas. Therefore we generated hybrid models by extending the GOCO02S, EIGEN6C and GO_CONS_GCF_2_DIR_R3 models by the high frequency parts of EGM2008. These hybrid models improve the physical heights, but deviations from a flat surface remain. These deviations are too large to be explained as geostrophic currents. Thus the remaining variations of physical heights must be interpreted as residual geoid errors.