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Augmentation the Great Lakes Basin's Geoid by Harmonic Downward Continuing of Newly Acquired Scalar Airborne Gravity Data

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Roughly 10% U.S. population and more than 30% of the Canadian population are living around the Great Lakes Basin (Superior, Michigan, Huron, Erie and Ontario as well as the associated watersheds and connecting channels)[1]. The Great Lakes system contains 84% of the North America's surface fresh water and 21% world widely [2,3]. Only the polar ice caps contain more fresh water [1]. Thus, a high resolution accurate geoid will definitely help us to better understand the Great Lakes system and its influences to local and global environmental changes. Over the years, both U.S. and Canada had developed regional geoid models that cover the Great Lakes area. By incorporating the up-to-date satellite information from GRACE and GOCE, the long wavelength component of the geoid is better defined. The newly acquired scalar airborne gravity data in this area is used to augment the middle to short wavelength. A recent study [4] showed that when compared with EGM2008, the airborne data detects the same new features as the satellite model does, but with more detailed information. As a continuation of the previous study, the airborne data will be harmonicly downward continued onto the surface with some predefined bands. Various weighting schemes between surface data and the downward continued airborne data will be carried out to find the most accurate geoid in terms of directly fitting on surface observations from both GPS/Leveling benchmarks and tidal benchmarks on both the U.S. side and the Canadian side.

References:
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