Dynamic Heights for the International Great Lakes Datum of 2020

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SUMMARY

The Great Lakes in North America serve as a valuable resource of freshwater, hydropower and a means of navigation from interior North America to international markets. As such, maintaining a consistent reference system has been essential to both Canada and the United States. The border between the two countries is roughly 8900 km and extends through the middle of many of the Lakes. Treaties also emphasize equal access to the waters in the Lakes. Hence, adoption of a common reference system is essential. The International Great Lakes Datum of 1985 (IGLD 85) has served for this for over 30 years. Due to changes in from Global Isostatic Adjustment and improvements in positioning technology, IGLD 85 must be updated. The International Great Lakes Datum of 2020 (IGLD 2020) will replace IGLD 85 in about 2025. IGLD 2020 will use the same geopotential model as the North American Pacific Geopotential Datum of 2022 (NAPGD2022). NAPGD2022 is being realized as both a geoid height model and a gravity field model at one arcminute. These models will be combined with GNSS observations of mean water surfaces throughout the Great Lakes to determine dynamic heights. Comparisons will be made on each Lake to estimate the potential for a permanent water topography that would indicate the need for hydraulic correctors (HCs). In IGLD 85, there was a need for HCs to account for over 30 cm of residual tilt across the Lakes that were believed to be due to a datum defect in NAVD 88. The expectation is for little or no need for HC in IGLD 2020, but that must be borne out by investigations of the dynamic heights. Both leveling and GNSS were collected in 2022, and these data have provided the basis for evaluating the need for HCs in IGLD 2020.
