SMART SURVEYORS FOR LAND AND WATER MANAGEMENT
CHALLENGES IN A NEW REALITY

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e WORKING WEEK 2021
20-25 JUNE

Jacob Heck (USA), **Michael Craymer** (Canada)

Updating the International Great Lakes Datum: Enabling the integration of water and land management in the Great Lakes region (11046)

Natural Resources Canada | Ressources naturelles Canada

COORDINATING COMMITTEE

ORGANISED BY FIG GIN Geo-Informatie Nederland kadaster ITC UNIVERSITY OF TWENTE.

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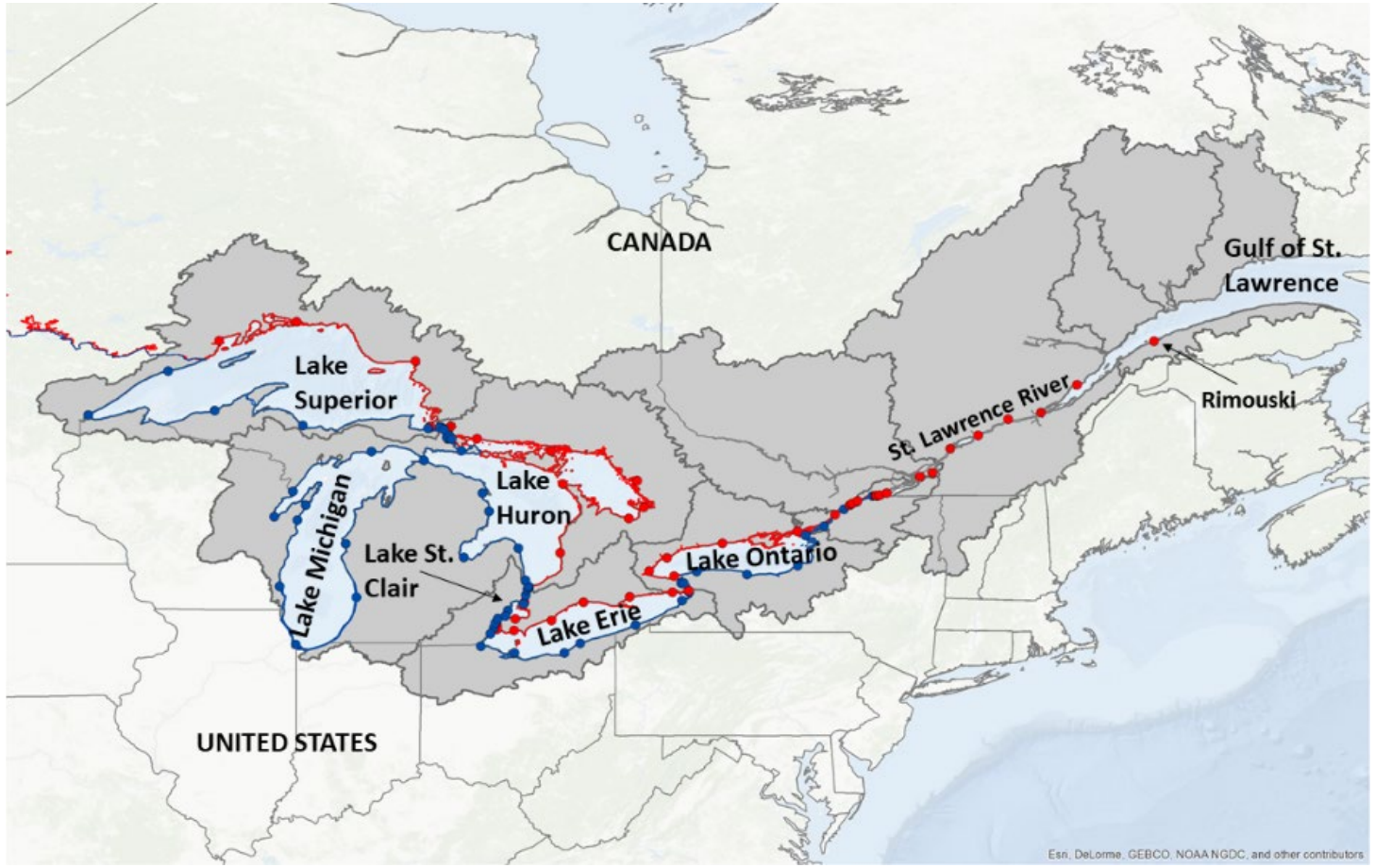
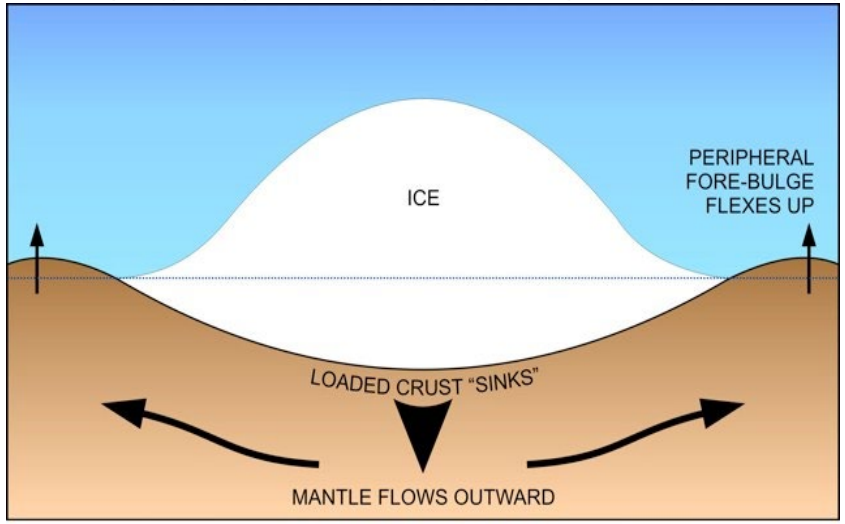
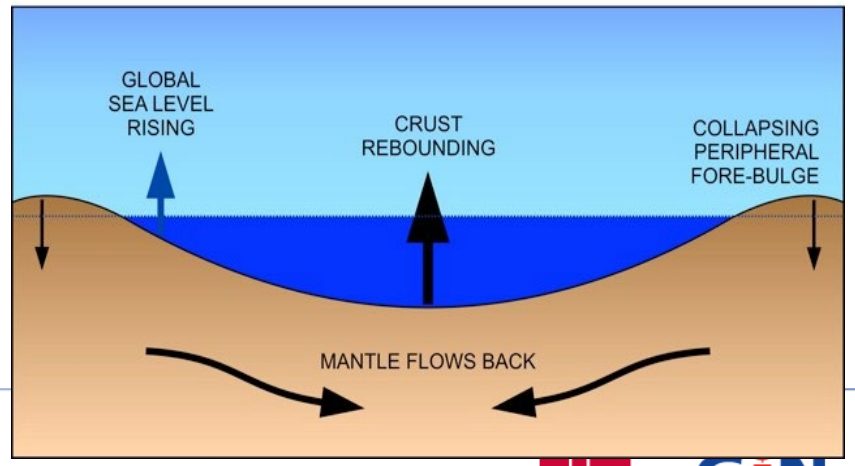
Outline

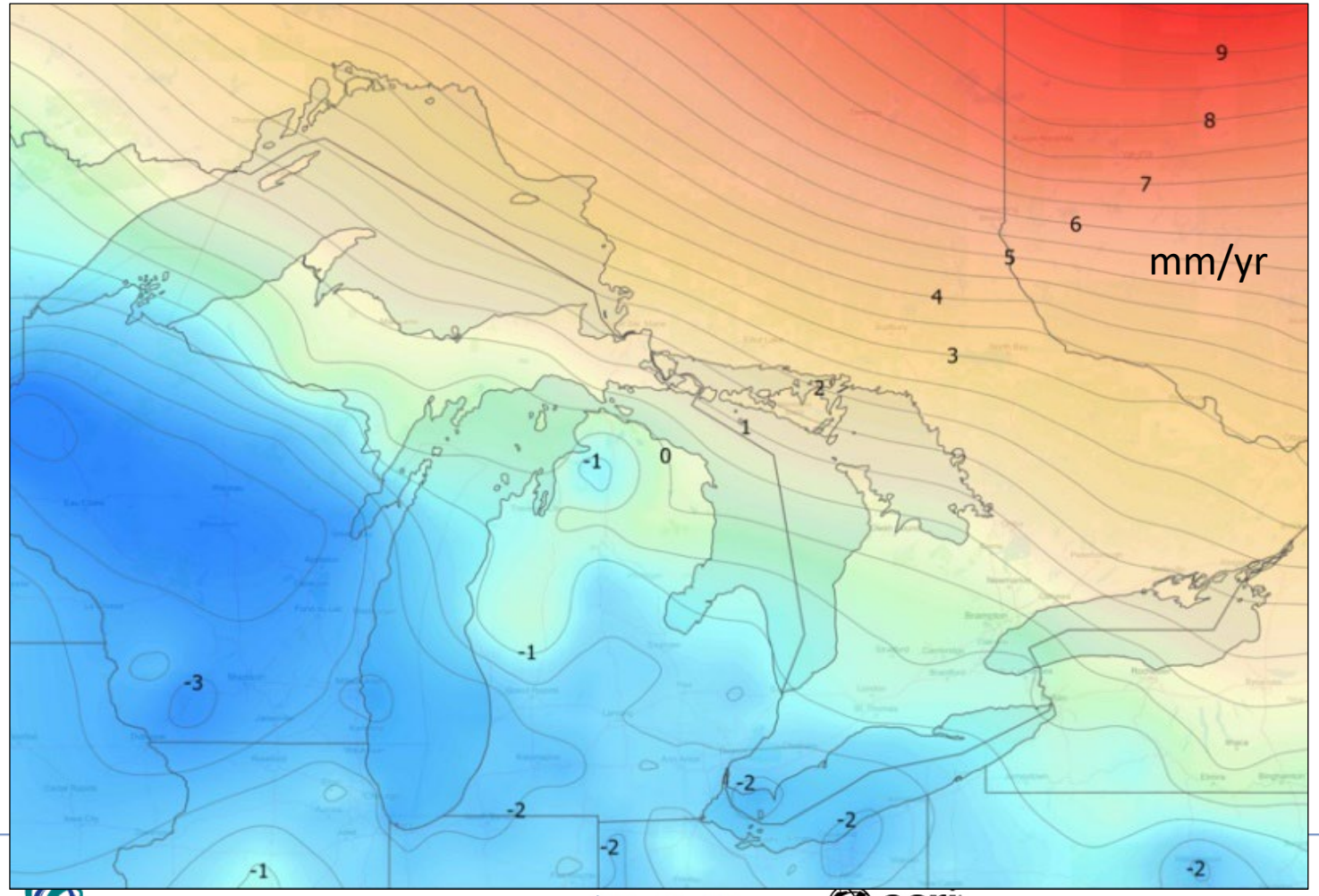
- International Great Lakes Datum (IGLD) is a joint effort between the United States and Canada
- Maintained by the Coordinating Committee on Great Lakes Basic Hydraulic and Hydrologic Data
- Due primarily to Glacial Isostatic Adjustment, IGLD is updated every 25-35 years
- The next update will be IGLD (2020)



Glacial Isostatic Adjustment

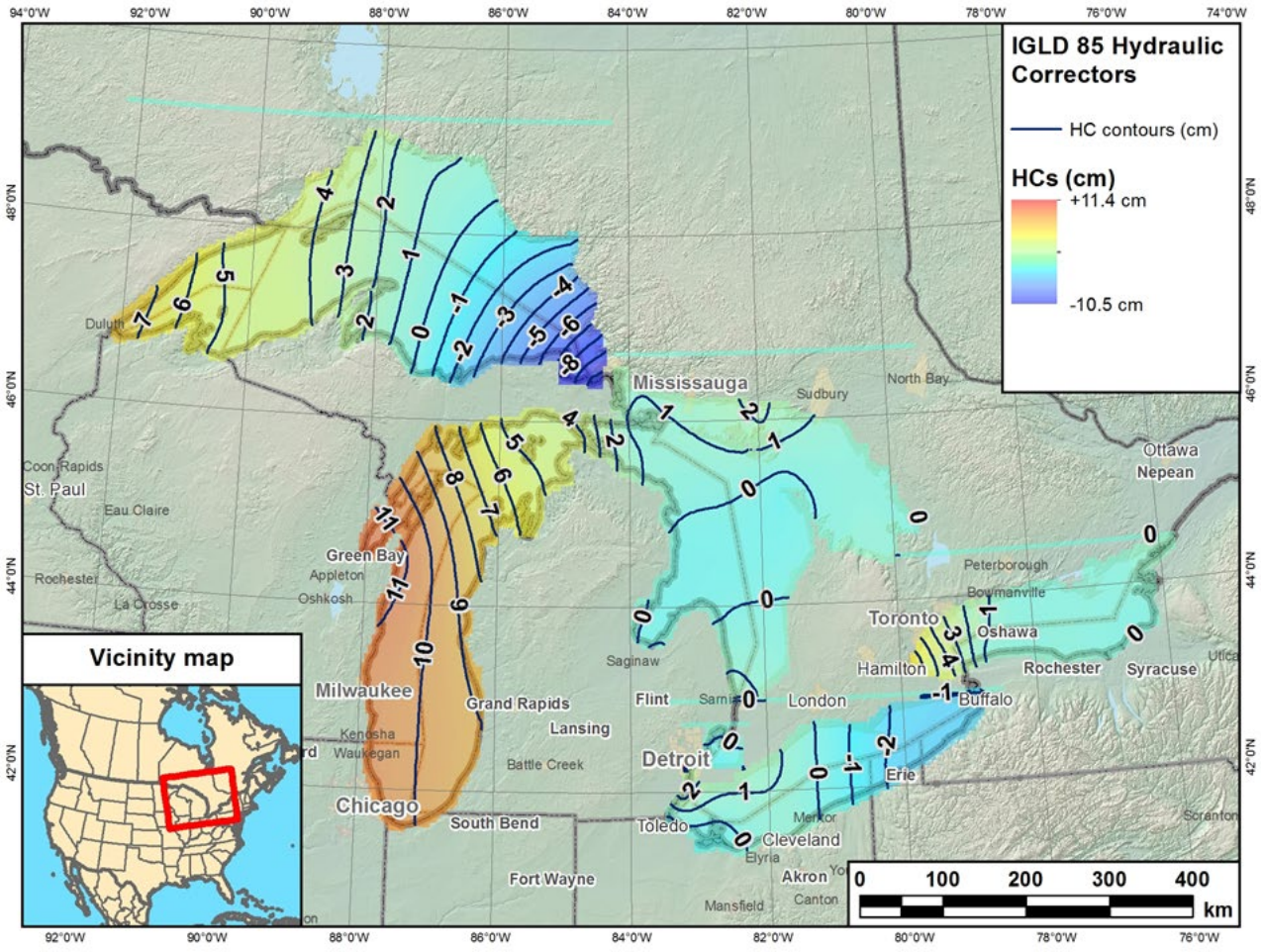






Current IGLD

- IGLD (1985) replaced IGLD (1955) in 1992
- Same reference zero as NAVD 88 (at Pointe au Père, Québec)
- Reference surface determined from leveling
- Dynamic heights
- Hydraulic correctors

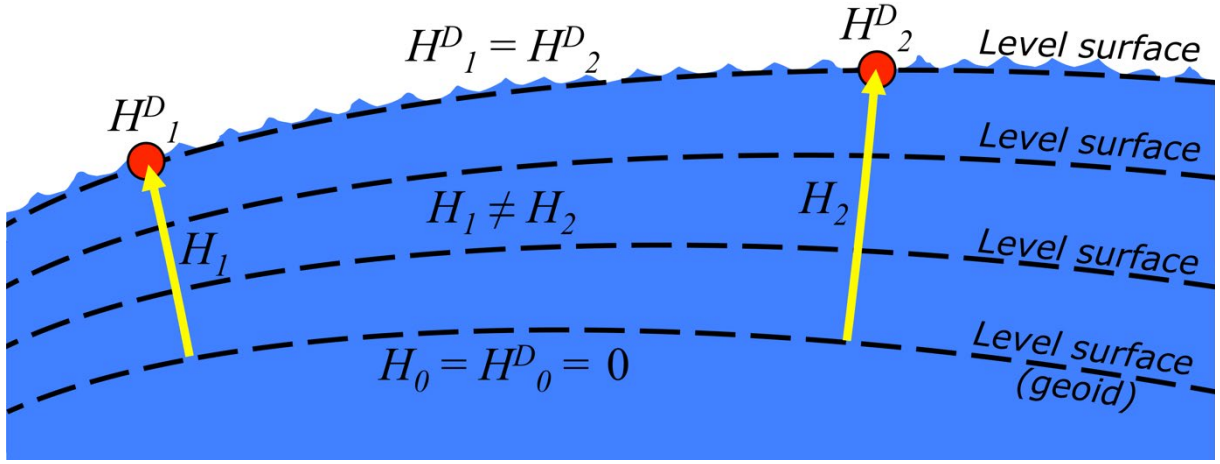


Definition of IGLD (2020)

- Reference Zero
  - W_0 = 62,636,856.00 m^2/s^2 that the U.S. and Canada have adopted for the new geoid-based North American-Pacific Geopotential Datum of 2022 (NAPGD2022)
- Realization of the Reference Surface
  - Geoid model that represents the reference zero everywhere over the Great Lakes – St. Lawrence River system and not only where leveling and bench marks exist
- Reference Epoch
  - 2020.0, the central epoch of the 7-year water level observation period of 2017–2023
- Dynamic Height
  - The dynamic height represents the difference in potential above the reference surface and is the same at all points on a level surface
  - IGLD (2020) will use dynamic heights derived from GNSS-determined ellipsoidal heights

Determining Heights in IGLD (2020)

- $H^D = \frac{\bar{g} * (h - N)}{\gamma_{45}}$
- h determined from GNSS
- $\bar{g}$ determined from surface gravity model and Helmert height reduction formula
- N determined from geoid model
- γ_{45} is normal gravity at 45 degrees (constant)



Dynamic heights, H^D, and orthometric heights, H.

Status

- GNSS field campaign originally scheduled for 2020 is now postponed until 2022 due to ongoing travel restrictions
- Seasonal gauging continues on a limited basis
- Working group set up to investigate the need for hydraulic correctors in IGLD (2020)
- IGLD (2020) is planned for release immediately after NAPGD2022 is released

Thank you

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http://www.greatlakescc.org