FIG WORKING WEEK 2023
28 May - 1 June 2023 Orlando Florida USA
Protecting Our World, Conquering New Frontiers

The 2022 GNSS Survey for a New International Great Lakes Datum

Overcoming Challenges with International Planning and Digital Tools

Ryan HIPPENSTIEL, John MAY, and Jacob HECK, United States, Michael CRAYMER and Rachel VAN HERPT, Canada

Organized By NSPS FIG INTERNATIONAL FEDERATION OF SURVEYORS
Diamond Sponsors esri THE SCIENCE OF WHERE Trimble

International Cooperation

- Surveyors from the US and Canada collaborated in support of the International Great Lakes Datum (IGLD)
- The survey collected over 19,000 hours of GNSS over the span of 6 weeks each

Background

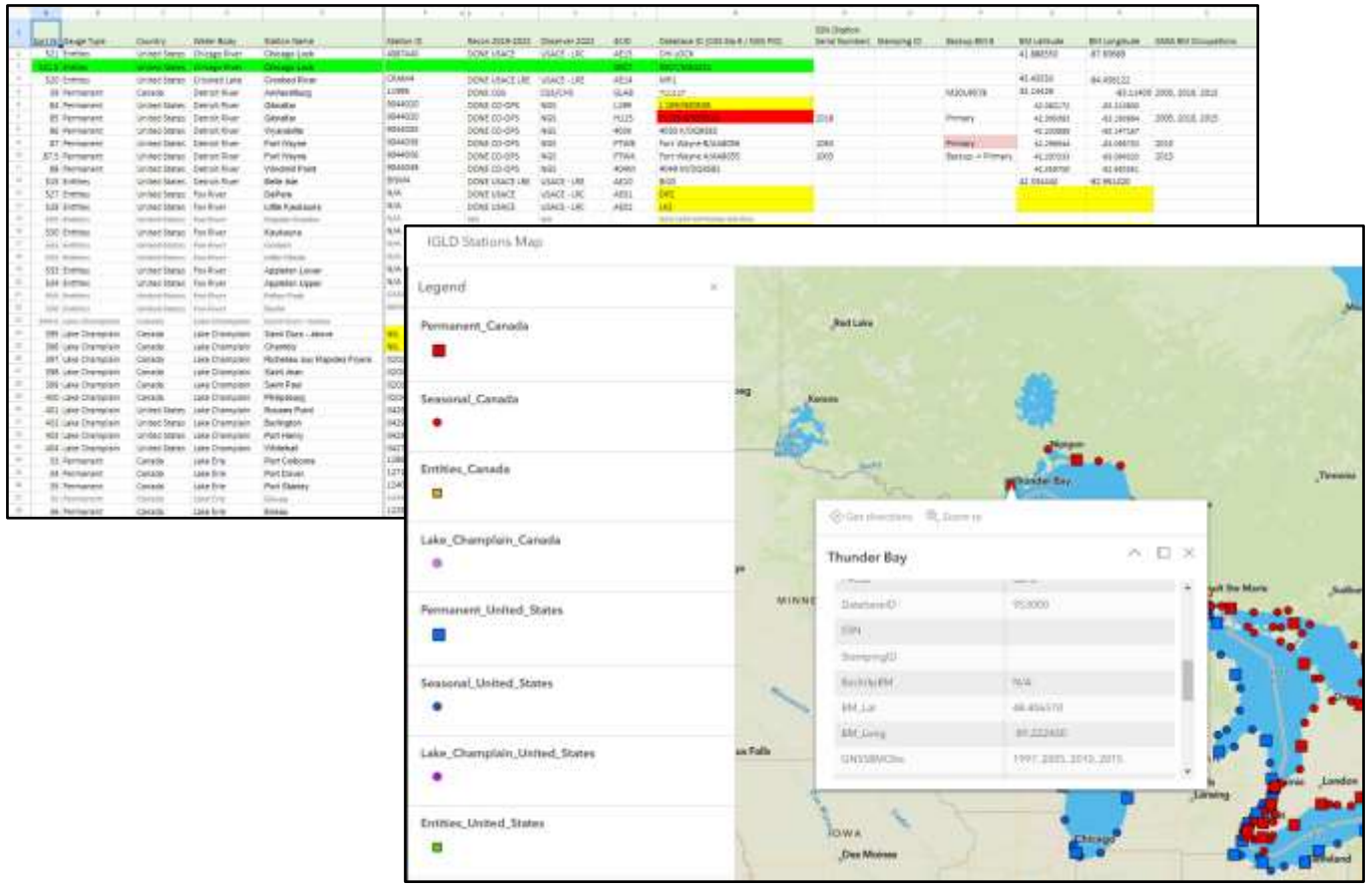
- The Great Lakes region is one of the largest freshwater resources on Earth
- It is affected by crustal motion largely due to glacial isostatic adjustment (GIA)
- The IGLD accounts for such changes to provide a consistent water level datum
- IGLD is updated every 25-30 years and a new update is currently underway

GNSS surveys

- GNSS data on ground marks is combined with geodetic leveling data to the water level stations to create datum products
- Previous GNSS surveys were completed in 1997, 2005, 2010, and 2015
- The 2022 survey was the largest, observing at permanent and seasonal water level stations - 365 bench marks

Planning

- Geodetic and water level partners from both nations planned the work
- Stations and marks to survey were agreed upon
- Visualization through web mapping improved planning efforts



Planning

- Binational specifications were written to improve field protocols and account for equipment differences
- Details on duration, rate of collection, metadata, quality of equipment were established
- Desired accuracy was a minimum of 2 cm at each benchmark

Planning

- Two 24-hour static GNSS observations were to be collected on each mark
- US and Canada surveyors developed a schedule to maintain pace with each other
- Consistent conditions and "cross-lake" observations were important

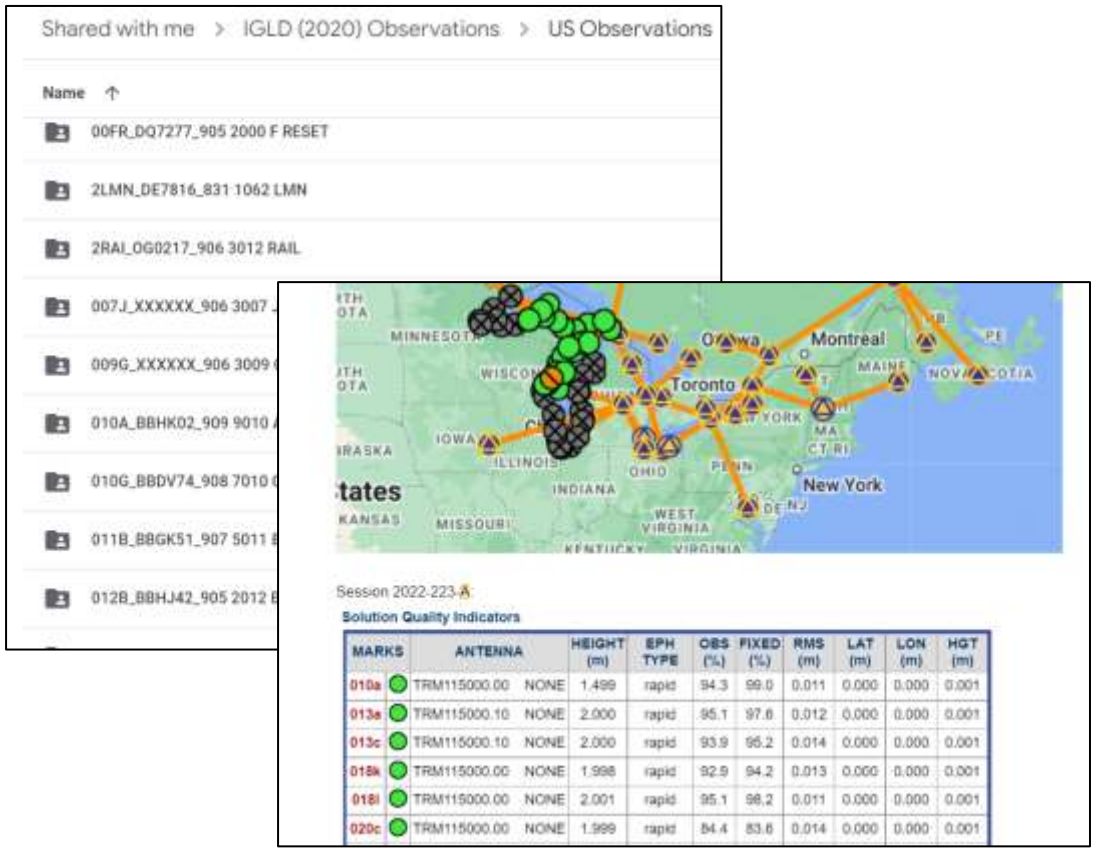
Execution

- Multiple partners assisted with mark reconnaissance and observation
- Survey was completed on schedule with limited disruptions
- Successful planning and preparations led to efficient adjustments

Canadian Partners	United States Partners
NRCan - Canadian Geodetic Survey (CGS)	NOAA – National Geodetic Survey (NGS)
DFO - Canadian Hydrographic Service (CHS)	NOAA – Center for Oceanic and Operation Products (CO-OPS)
ECCC - National Hydrological Service (NHS)	US Army Corp of Engineers (USACE)
Ontario Power Generation (OPG)	Michigan Department of Transportation (MDOT)
Saint Lawrence Seaway Management Corporation (SLSMC)	New York Power Authority (NYPA)
Hydro Québec (HQ)	Great Lakes St. Lawrence Seaway Development Corporation (SLSDC)
	Wisconsin Department of Transportation (WisDOT)
	Darin J. Henkel, PLS

Execution

- Both US and Canada implemented protocols for communication and data storage
- Established start/stop times worked well for traversing between points and transferring data
- Early QA/QC was performed to ensure data quality



Results

- Over 19,000 hours of static GNSS data collected by ~25 observers
- Metadata including photos, equipment, mark information, weather, and obstructions delivered
- Sub-cm repeatability exceeded goals
- Full data processing and adjustment is underway

Thank you!

For more information about the IGLD update, visit:

https://GreatLakesCC.org