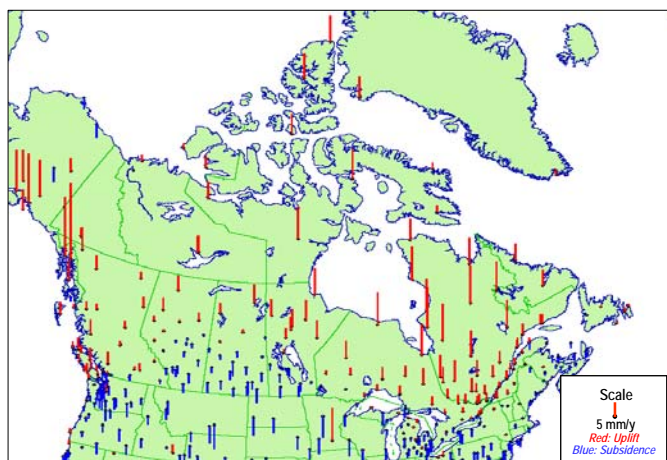


# Geodetic Observations for Earth Dynamics

**Did you know** that the earth's surface is rising or falling by up to 2 cm per year due to **glacial isostatic adjustment** (caused by the retreat of ancient glaciers 10,000 years ago)?

Lakes Superior, Michigan and Huron once formed a single lake, but rising land divided them only about 2000 years ago.

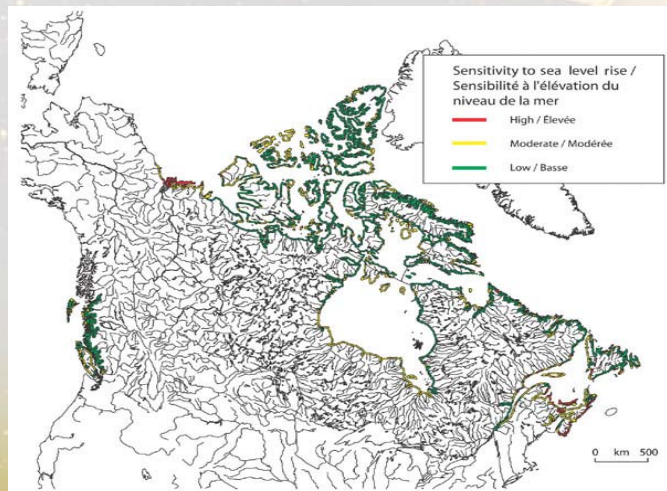
Today different rates of uplift cause southern shorelines of the lakes to have rising water levels while northern shorelines see falling levels. This has significant impact on water reservoirs, navigable waterways, and flood plain patterns.



**Did you know** that the height of the land in arctic Canada changes faster than sea-level rise?

GSC (Geological Survey of Canada) researchers have determined from geodetic data that over much of northern Canada the rate of uplift of the land from **post-glacial rebound** is **more rapid** than current **sea-level rise**. However there are particular regions, near communities, where land is **subsiding** due to a variety of factors.

Geodetic observations are used to evaluate sea-level trends in the context of climate warming to better understand and manage the potential impacts, including flooding hazards, on these communities.



**Did you know** that in some regions moderate changes in water levels can generate substantial **flooding** with significant economic impact?

Accurate height measurements are essential to good water management whether it be over small areas like a city or larger areas such as provinces.

Ellipsoidal heights provided directly by GPS do not account for gravitational effects and cannot be used for determining the direction of water flow. NRCan's new gravity-based geoid (mean-sea-level) height model produces height data that enables **proper water management**.



**Did you know** that we can measure less than 1cm of motion over thousands of kilometres using precise geodetic techniques?

Used precise GPS techniques GSC made an important discovery related to **earthquake hazards** near Vancouver and Vancouver Island: **Episodic Tremor and Slip (ETS)**

GSC has been using GPS stations for many years to measure and monitor the motion of the Juan de Fuca tectonic plate relative to the North America Plate. Advances in this GPS-based technique have enabled the discovery of minute **reversals of the motion** (in the order of 1cm) that occur with a surprising regularity (every 14 months).

Perhaps most surprising these motions occur at different locations on Vancouver Island at different times, beginning in the south and gradually working north over a period of a few days. Unusual **seismic tremors** were discovered to be associated with these events.

