Time Series Analysis of Vertical Positions of High-Precision GNSS Stations in Eastern Canada: a Case Study

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SUMMARY

Reference benchmarks are important in surveying all over the world. They form the basis for mapping, navigation, remote sensing, mineral exploration, and more. In order for these benchmarks to be reliable, they must remain stable. In the region of eastern Canada, specifically in the province of Quebec, previous studies have shown that the earth's crust has been rising due to the effects of post-glacial rebound (also known as isostatic rebound).   Reference benchmarks in Quebec are displaced due to these effects, which impact their accuracy and reliability. Knowing the rates of post-glacial rebound is important in order to explain and correct for the vertical movement of reference benchmarks in the region.

This paper looks at the uses of GNSS data in understanding the current rates of post-glacial rebound in Quebec. The Quebec region is chosen for this study since it has many permament GNSS stations that are constantly collecting GNSS data. These GNSS datasets, which are available to the public, are published as far back as the Spring of 2015. This study processes the four year time series of the GNSS datasets using precise point positioning, and network modes. The goal of the time series analysis of the results is to show the rate of movement at each of the GNSS control stations in Quebec.

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