

# Consistency Assessment of Geoid, Orthometric and Ellipsoidal Heights, Case Study, Metro Vancouver Area - Canada

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## SUMMARY

The ability to determine accurate elevations is an integral part of geomatics, however it has always presented a problem to surveyors when implementing heights in the field. Traditionally elevations were determined through precise spirit leveling providing published orthometric heights with the majority of control monuments being established this way. As technology has advanced GNSS leveling has become a viable option and there is a need to have an accurate geoidal separation to convert between orthometric and ellipsoidal heights. The geoid height accuracy degrades in mountainous area or in places like Western Canada where the mountainous terrain meets the ocean.

This paper analyzes the consistency among geoid, orthometric and ellipsoidal heights across Metro Vancouver Area by measuring ellipsoidal heights of several benchmarks for which their orthometric and geoidal heights are already published. Comparing these three heights in absolute and relative mode shows that the third component of the coordinates, i.e., elevation, is still a challenge. Metro Vancouver Area presents a unique case study as it is situated at the base of the coastal mountains on the edge of the Pacific Ocean, resulting in a large varying of elevation which in turn, creates a difficult situation to develop an accurate geoid model. With Metro Vancouver Area being Canada's third largest metropolitan area, there is vast ongoing development and a demand for accurate surveying.

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