Geophysical Research Abstracts
Vol. 14, EGU2012-11356, 2012
EGU General Assembly 2012

Improved g-dot signature in Canada by terrestrial gravity inversion

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The long observational history of the Canadian Gravity Standardisation network–CGSN along with repeated high precision absolute gravity measurements have been considered carefully in anticipation to estimate the time rate of change of gravity (g-dot) in Canada that is dominated by the glacial isostatic adjustment–GIA. We presented the first results in 2003 but a decade later more absolute gravity observations have been taken that provide significant new information on g-dot and GIA. We have reconsidered the inversion of the old gravity measurements with the following new additions: a) reprocessed longer absolute gravity series to estimate more accurate g-dot at a reference epoch with respect to which all observations are inverted, b) addition of 2 new absolute gravity stations for a total of 8 that serve as weighted g-dot constraints to the data inversion, c) addition of 225 new relative gravity observations in the region W-NW of Hudson Bay, d) hydrological viscoelastic loading effect reduction driven by WGHM and GLDAS global models and e) regional constraints on g-dot that effectively filter out high spatial frequency variation of g-dot. The new and improved g-dot map of Canada compares very favourably with the h-dot signature that has been derived from vertical crustal movements and modern GPS observations. Comparisons are also made to the GIA signature determined from GRACE.