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Can GPS geodesy discriminate between low and high mantle viscosities beneath areas in West Antarctica with small changes in ice load?

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West Antarctica (WA) has the second largest ice mass loss in the world, with the potential to trigger an important interaction with the solid Earth as observed in Amundsen Sea Embayment (ASE). There, the large mass loss is exciting a large and fast movement of the bedrock allowing us to geodynamically constrain a low viscosity in the mantle beneath. Seismic tomography and gravimetry find thermal anomalies underneath ASE and even hotter areas elsewhere below WA, and recent studies suggest a plume below Marie Byrd Land (MBL). It is therefore natural to wonder if other areas in WA are characterized by low viscosity. However hot mantle does not necessarily imply low viscosity. And the geodynamic response of the Earth requires a significantly large mass loss in order to produce measurable mantle and bedrock movement.
In WA, the mass loss outside ASE is relatively small, and the GPS velocities are also quite small with relatively large errors almost everywhere, and previous studies attributed those small velocities to the GIA caused by the Holocene deglaciation. In addition, the elastic velocity signal produced by the ice mass changes is comparable with the observed GPS signal, leaving small room for an additional signal coming from low viscosity mantle displacement triggered by recent ice changes.
Nonetheless, by using low viscosity Earth models we are able to assess whether the relatively small ice mass loss in other areas (e.g. MBL and Bellingshausen Sea coast) could trigger a visible GPS signal. To improve the accuracy of our analysis we use for the first time high resolution monthly ice mass changes to compute the time series of the Earth response to be analysed together with the GPS time series instead of the GPS velocity. In this way we can avoid the errors in the trend due to the variability in the time series.
We find that even small ice changes could trigger measurable low viscosity GIA signal, and based on this we show the modelled displacements assuming low viscosity mantle in regions nearby ASE and the comparison with the observed GPS time series. From this preliminary analysis it appears that the elastic time series has a good correlation with the observed GPS time series, with not much room for a viscoelastic signal in the areas under study except for ASE.