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Session 1 [P1-07]
Gravimetry and Gravity Networks

Evaluation of significance of the different atmospheric correction approach in Polish national gravity network

Introduction

In this work we present differences in atmospheric gravity correction using two different approaches. First one utilizes site specific pressure along with single admittance factor (herein $-3\,\mathrm{nm\,s^{-2}}$). The second take an advantage of availability of numerical weather models. The results of convolution of Atmospheric Gravity Green's Function (AGGF) with pressure field is presented. The impact of neglecting temperature distribution and topography is also investigated.

Green's function used

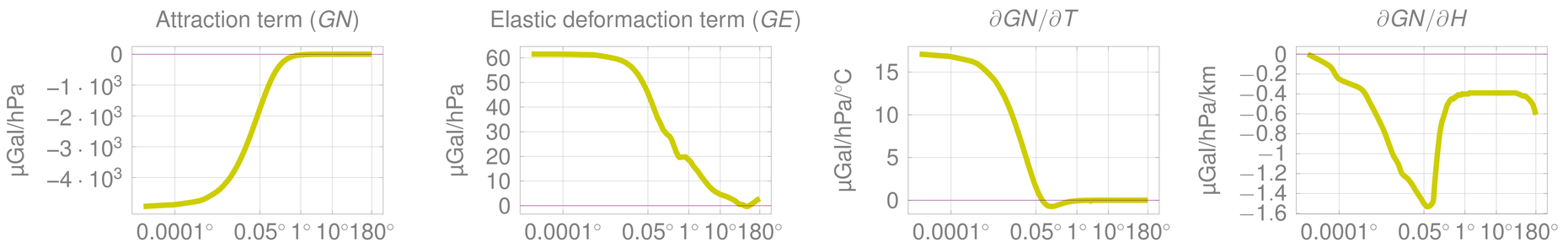

Figure. Atmospheric load gravity Green's function

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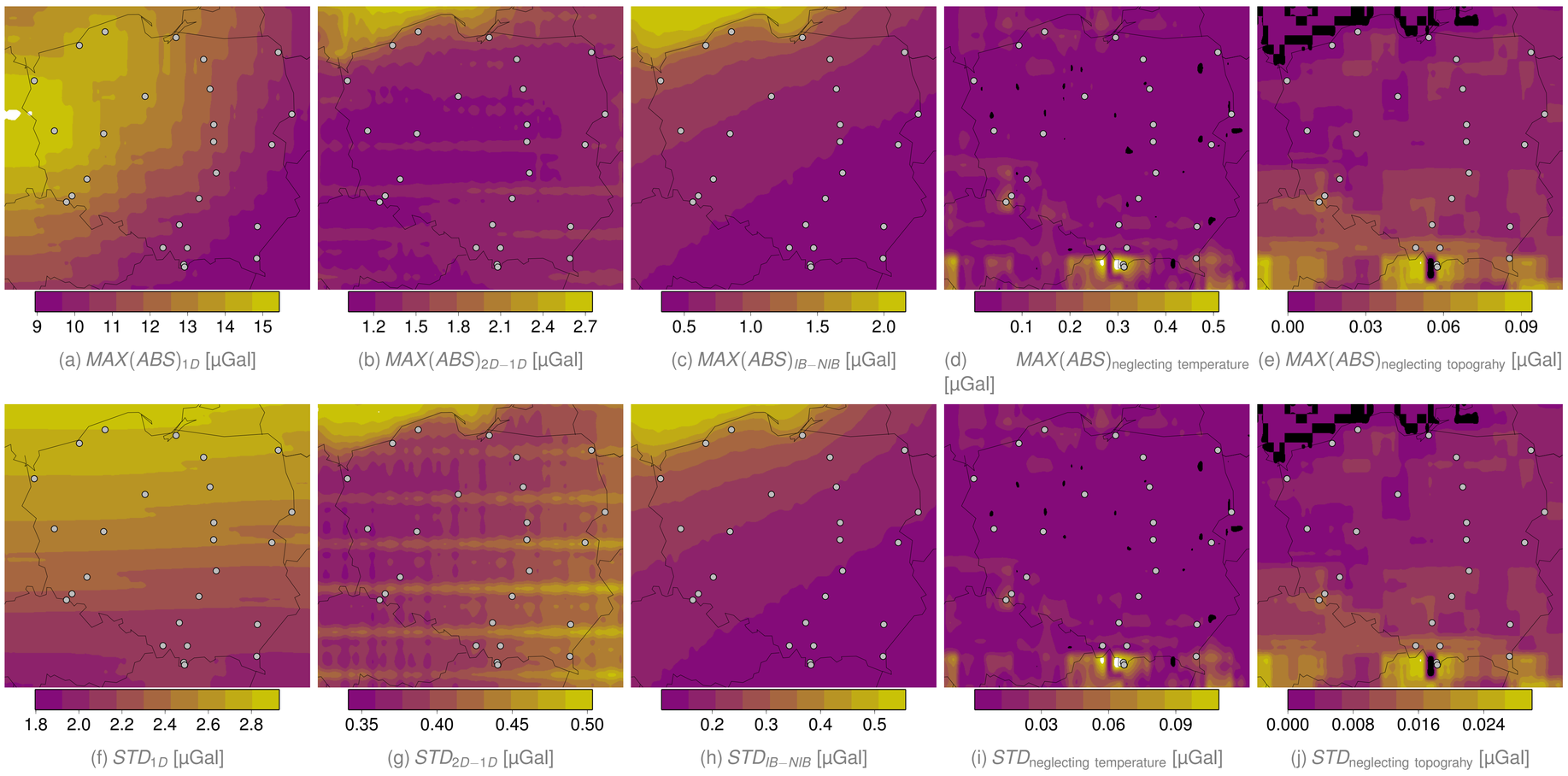
We used the Atmosphere Gravity Green Functions given by Merriam (1992). These comes from numerical integration of standard atmosphere. Elastic part comes from Farrell (1972).

Results



(a) $MAX(ABS)_{1D}$ [μGal] (b) $MAX(ABS)_{2D-1D}$ [μGal] (c) $MAX(ABS)_{IB-NIB}$ [μGal] (d) $MAX(ABS)_{\text{neglecting temperature}}$ [μGal] (e) $MAX(ABS)_{\text{neglecting topograhy}}$ [μGal]

(f) STD_{1D} [μGal] (g) STD_{2D-1D} [μGal] (h) STD_{IB-NIB} [μGal] (i) $STD_{\text{neglecting temperature}}$ [μGal] (j) $STD_{\text{neglecting topograhy}}$ [μGal]

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We present here the stacked results from 2011 whole year (every 6 hours) using NCEP Reanalysis Pressure and Temperature fields. We also used ETOPO2 to compute topography effects. Below we show the example of site specific grid to compute atmospheric gravity correction.

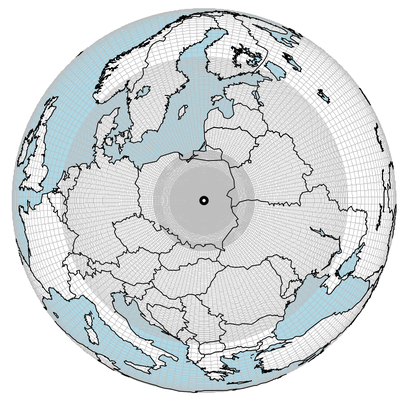

Figure. Grid for computation for one example point

Results (site example)

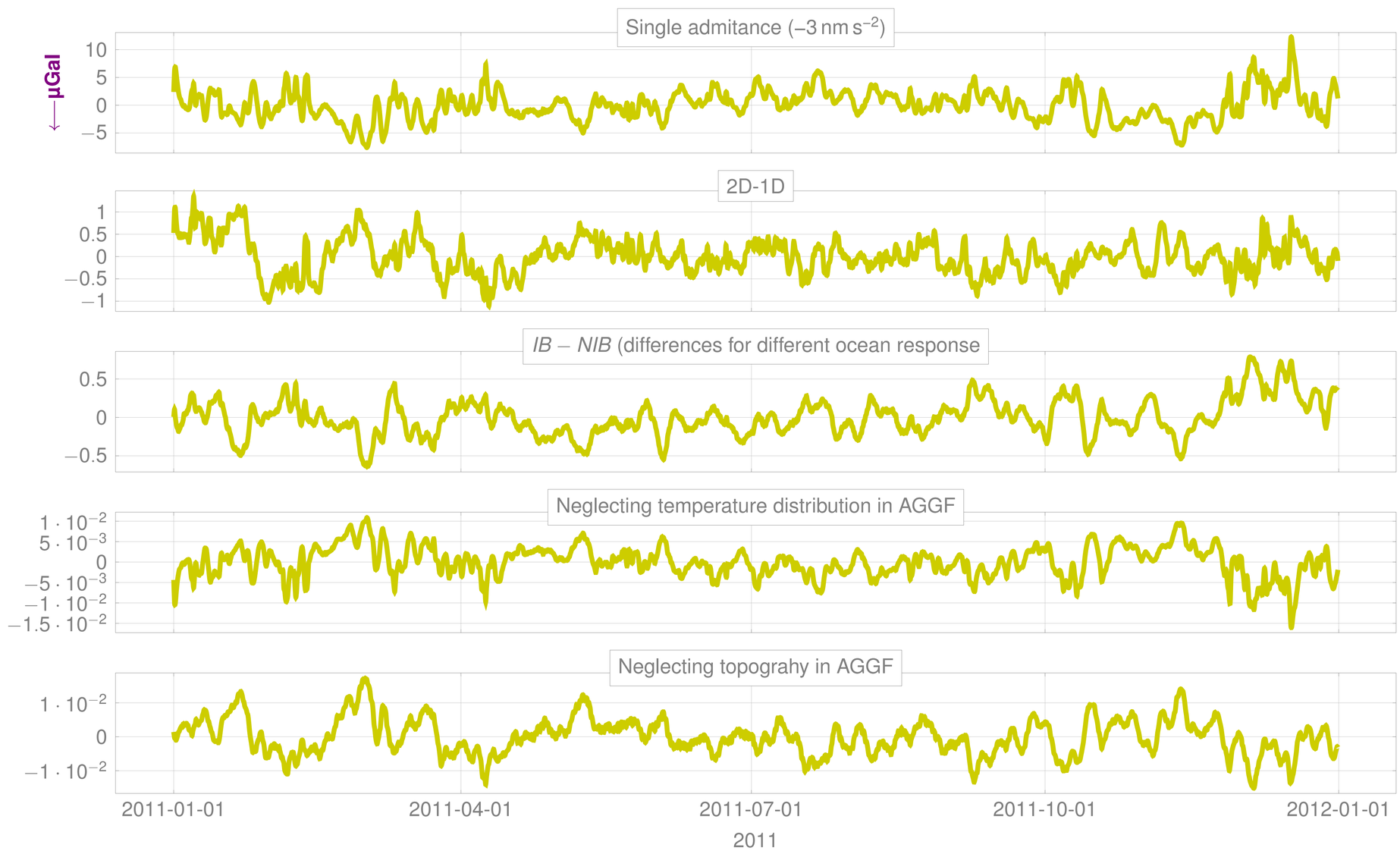

Figure. Time series of gravity correction and differences using different computation scheme for Lamkówko (North-east Poland)

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There is already a project to establish new 0 order reference gravity points in Poland (shown on maps above) in the following years. We present the example time series for planned location (Lamkówko).

References and Acknowledgments

- Merriam, J.B., *Atmospheric pressure and gravity*, Geophys. J. Int. 109, 488-500, 1992.
- Farrell, W.E., *Deformation of the Earth by surface loads*, Reviews of Geophysics, 10(3), 761-797, 1972.

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