
Integrating GRACE and GNET GPS in modeling the deglaciation of Greenland.

Per Knudsen, S. Abbas Khan and F. Bo Madsen, DTU Space,

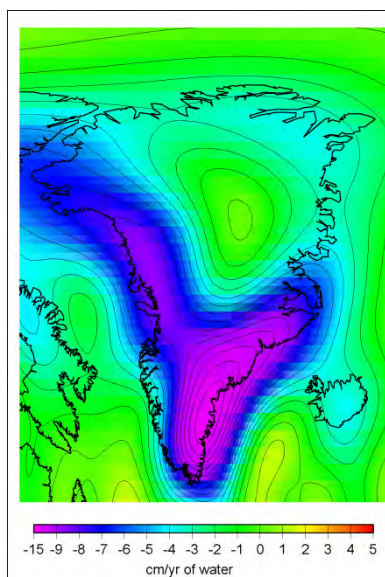
Mike Bevis, Ohio State University, and

Tonie van Dam, University of Luxembourg.

Motivation

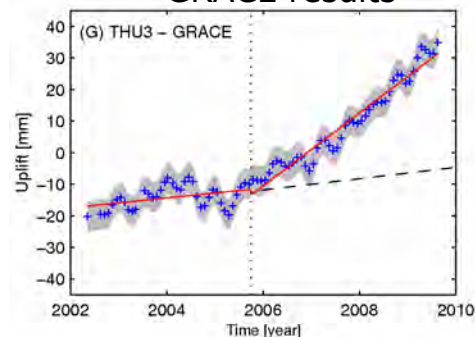
Two ways of weighting
surface mass changes

1. Direct attraction and
2. Earth's elastic response

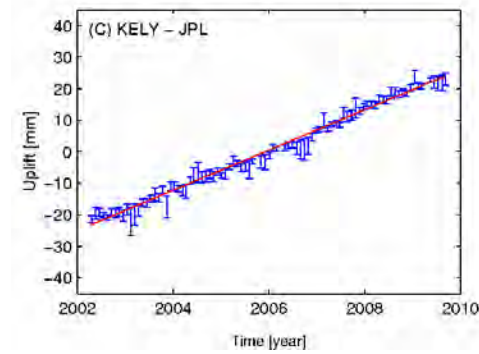
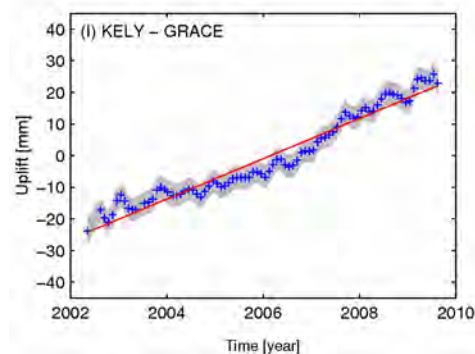
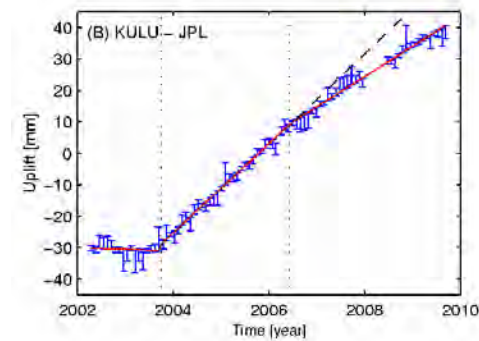
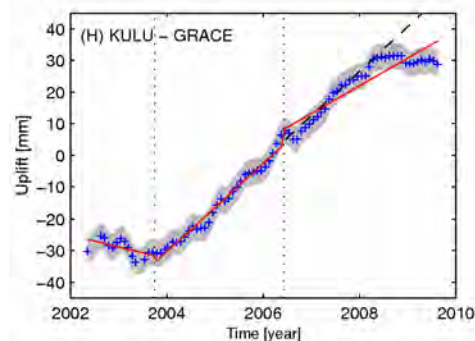
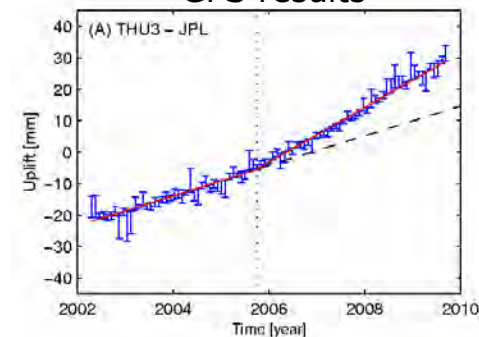


Khan, Wahr et al:

GRACE results



GPS results



About GNET

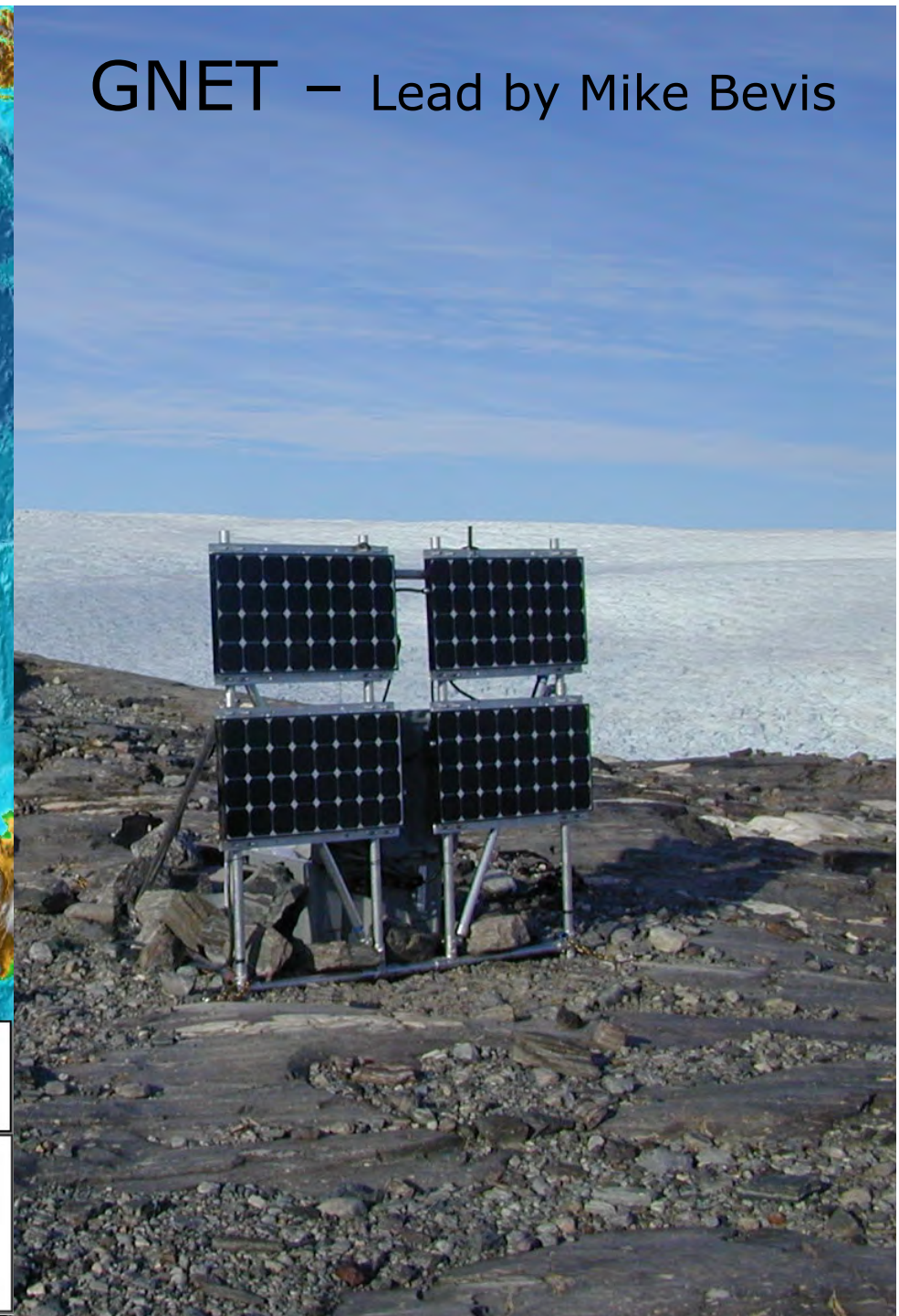
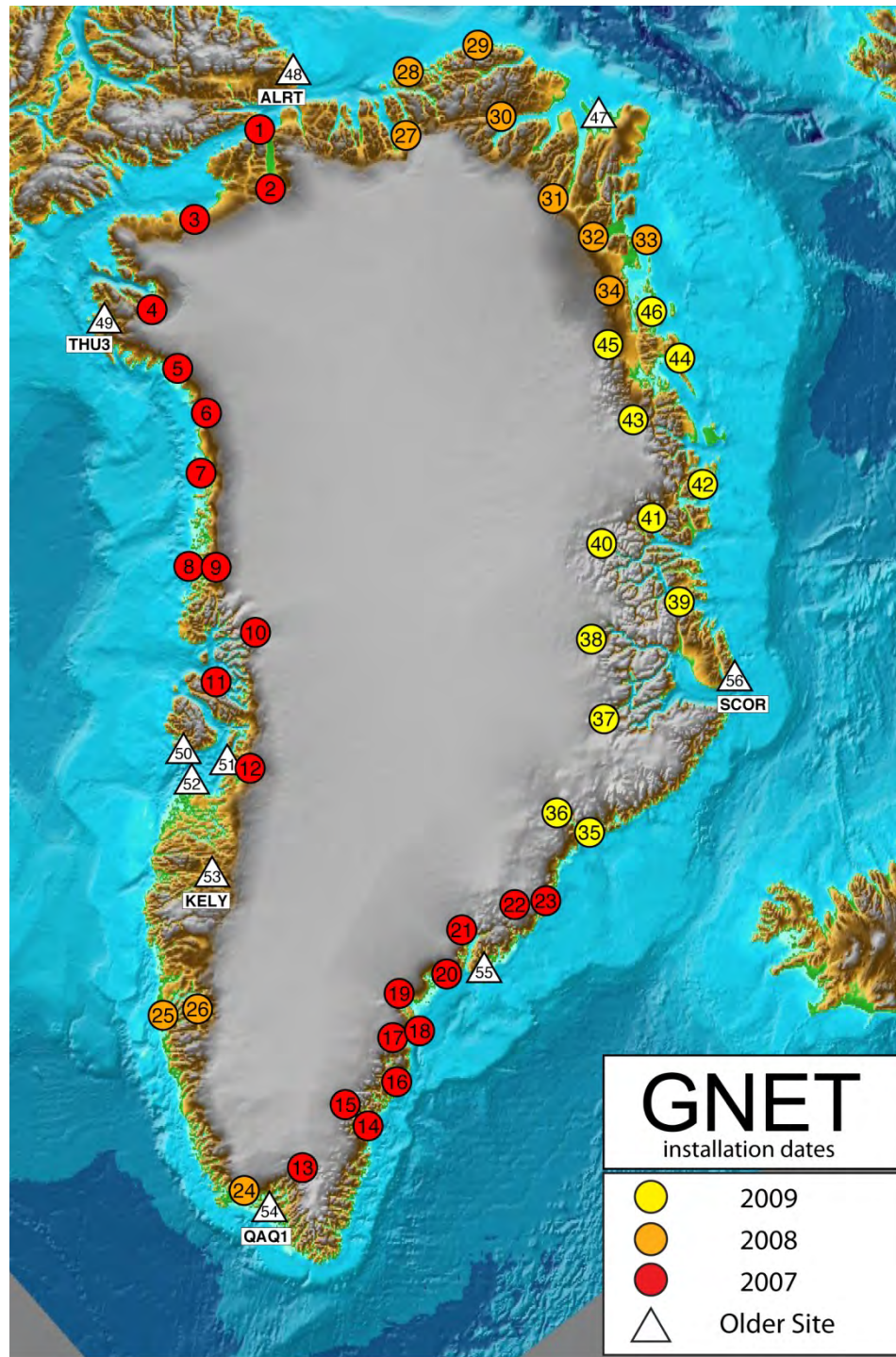
GNET is a collaboration of OSU, DTU Space, Colorado Uni, and U Lux.

GNET consists of 59 permanent GPS stations in Greenland (45 is owned by NSF (OSU, UNAVCO) and U Lux, 13 by DTU Space, 1 station by NR Can).

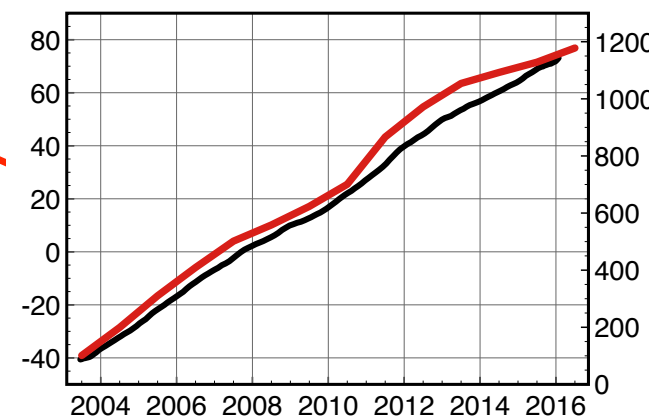
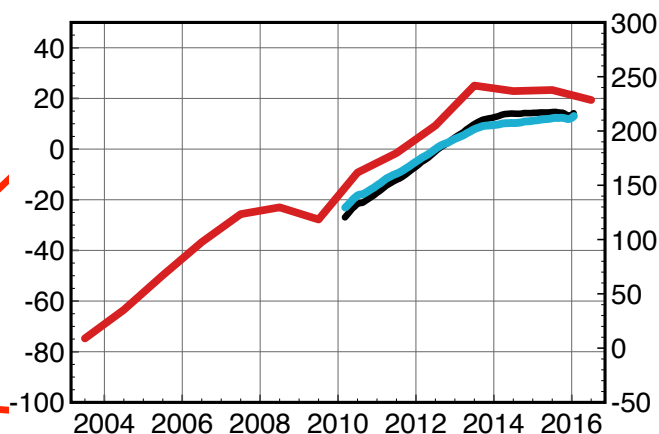
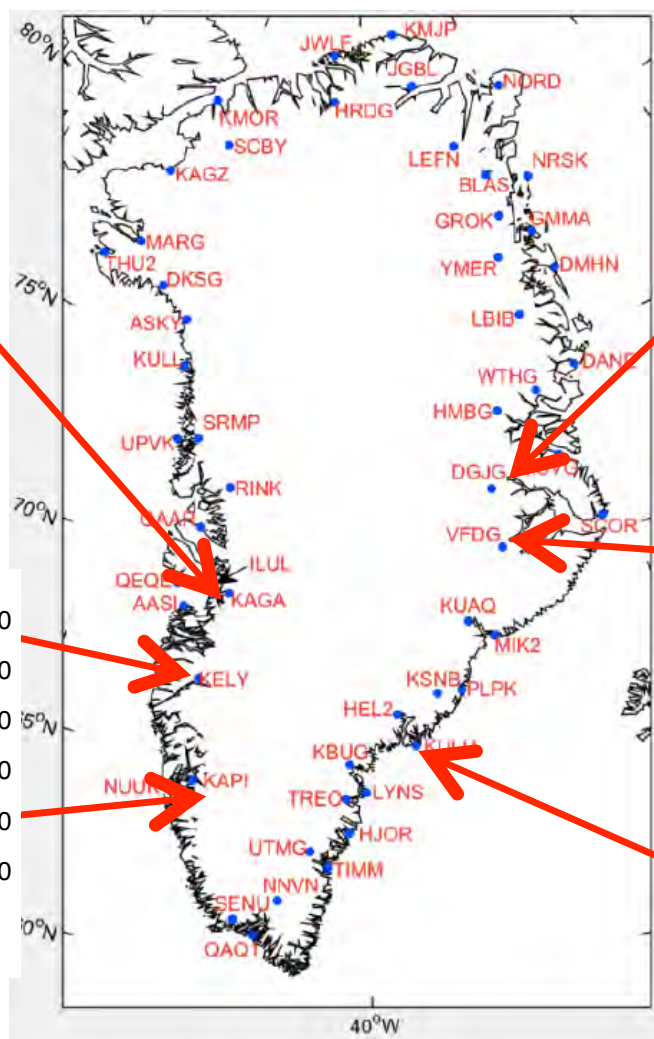
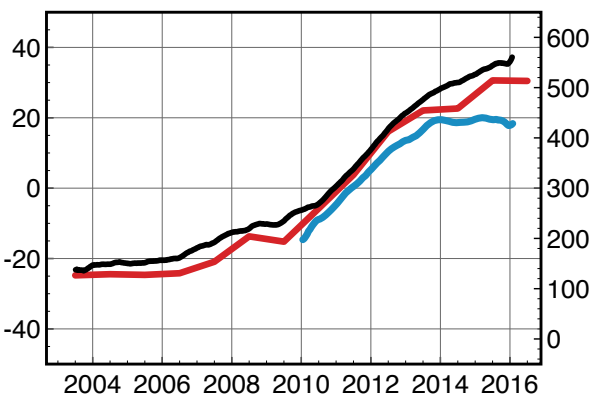
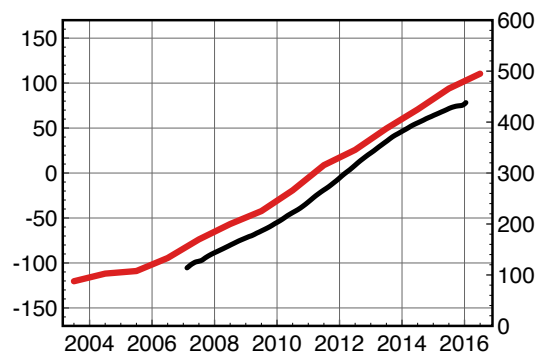
GNET is funded by NSF, DTU Space, and ULux.



GNET – Lead by Mike Bevis



KAPI, KELY, KAGA, DGJG, VFDG, KULU & GRACE



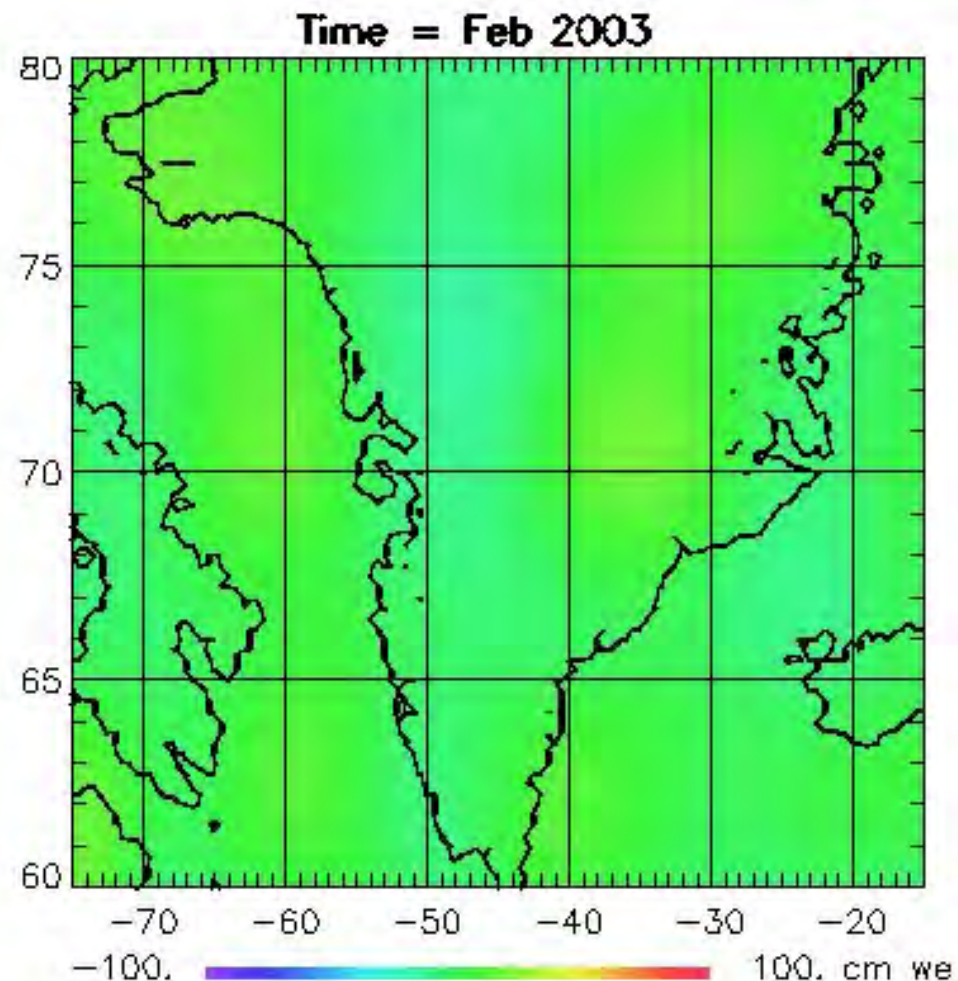
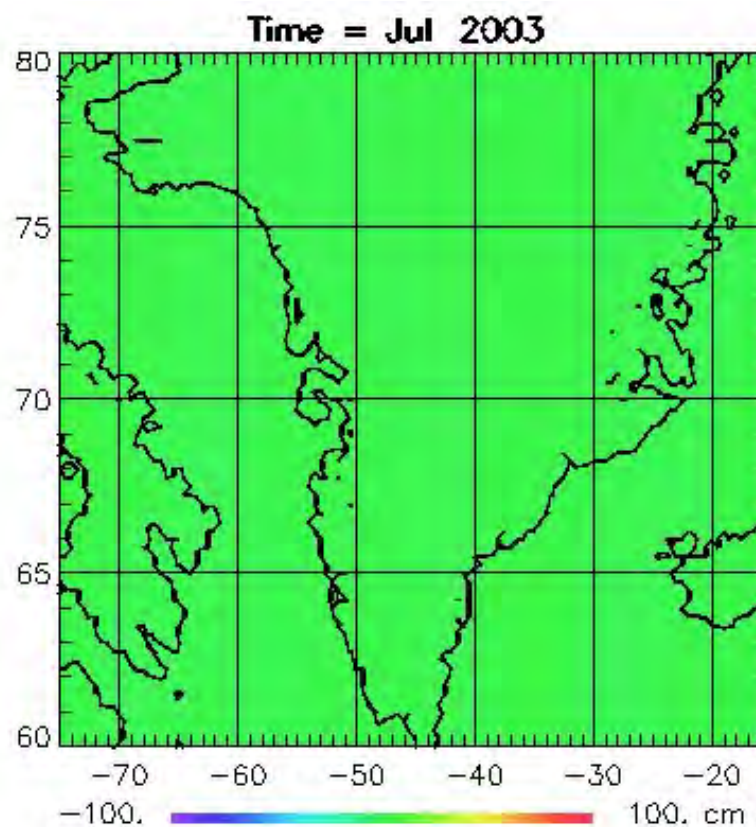
This Study

A first attempt to integrate GRACE and GNET GPS:

- Keep it simple.!
- EOFs of GRACE monthly fields – a few
- Long time series at THU2, KELY, and KULU
- Linear regression
- Reconstruction

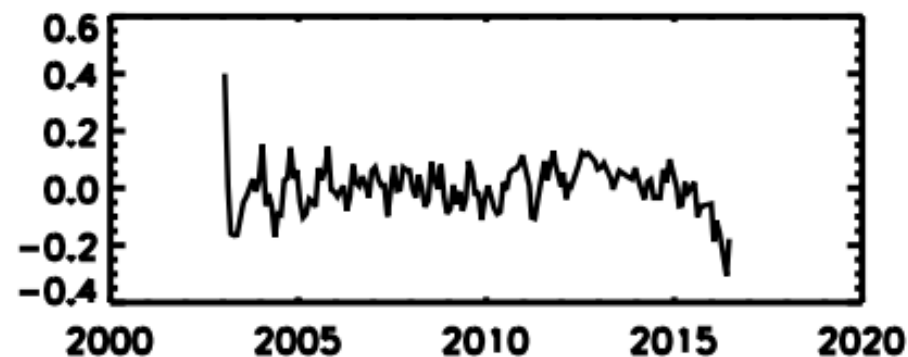
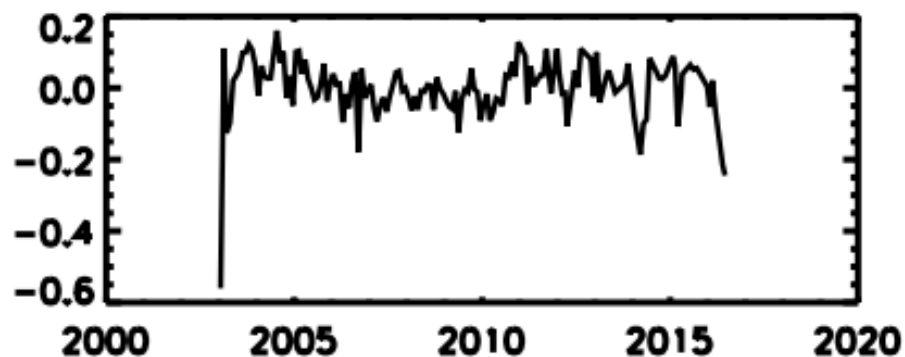
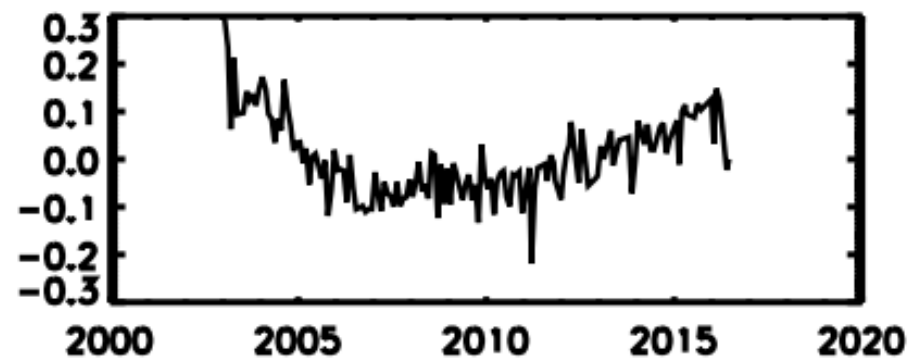
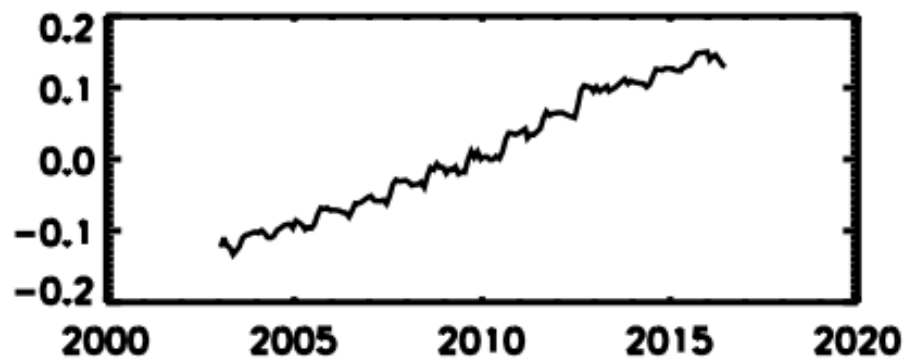
GRACE data

- Use CSR05, 2003.0 – 2003.1
- Filtering applied – empirical

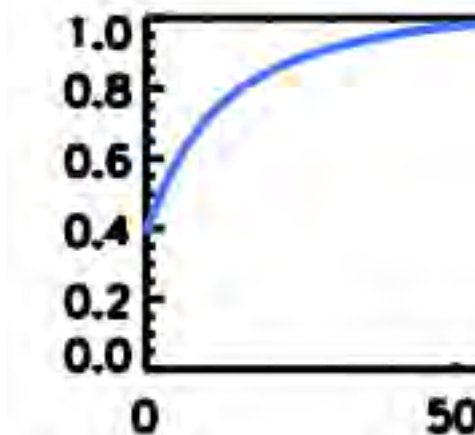
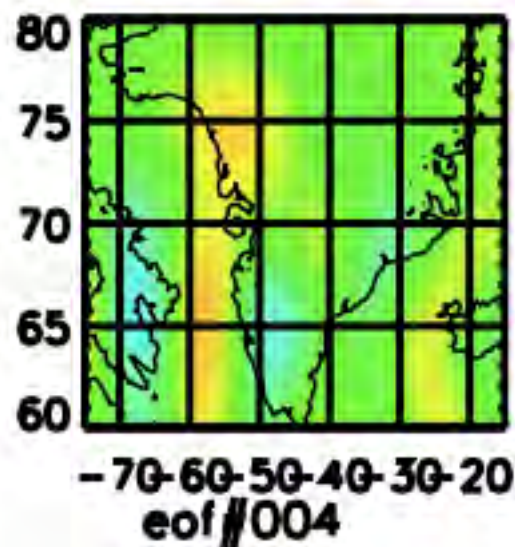
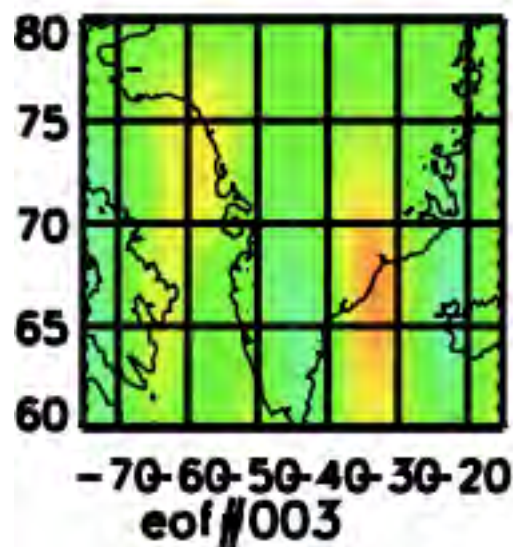
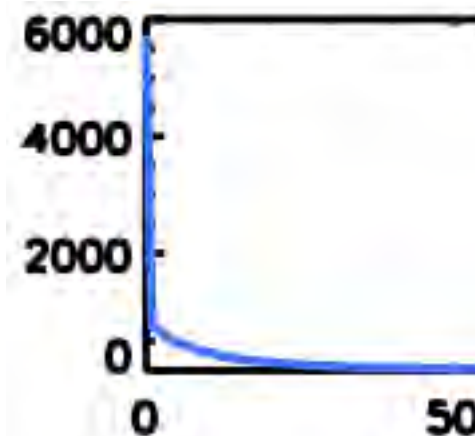
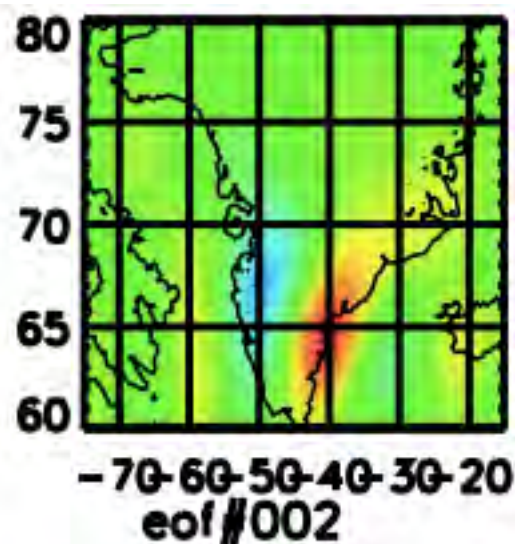
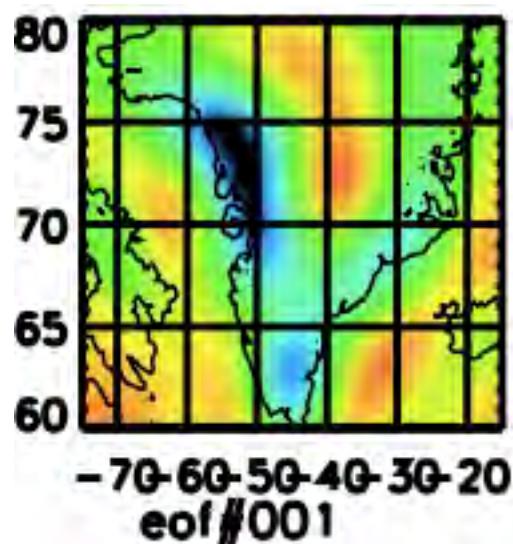


GRACE data - EOFs

- PC loadings

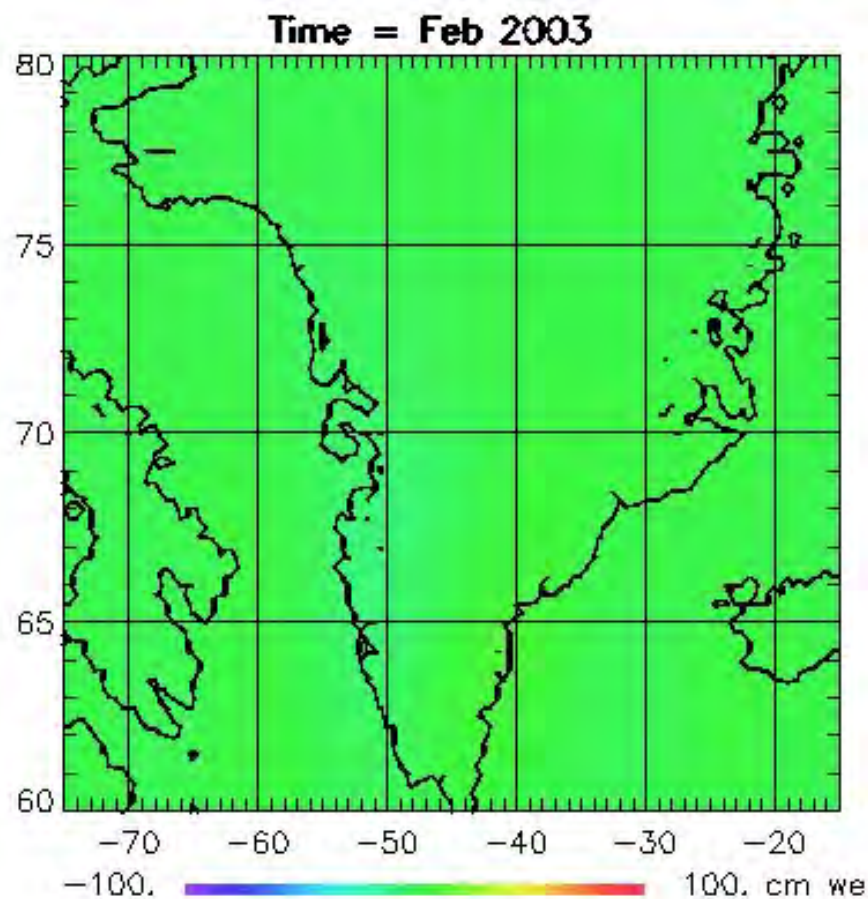


GRACE data - EOFs

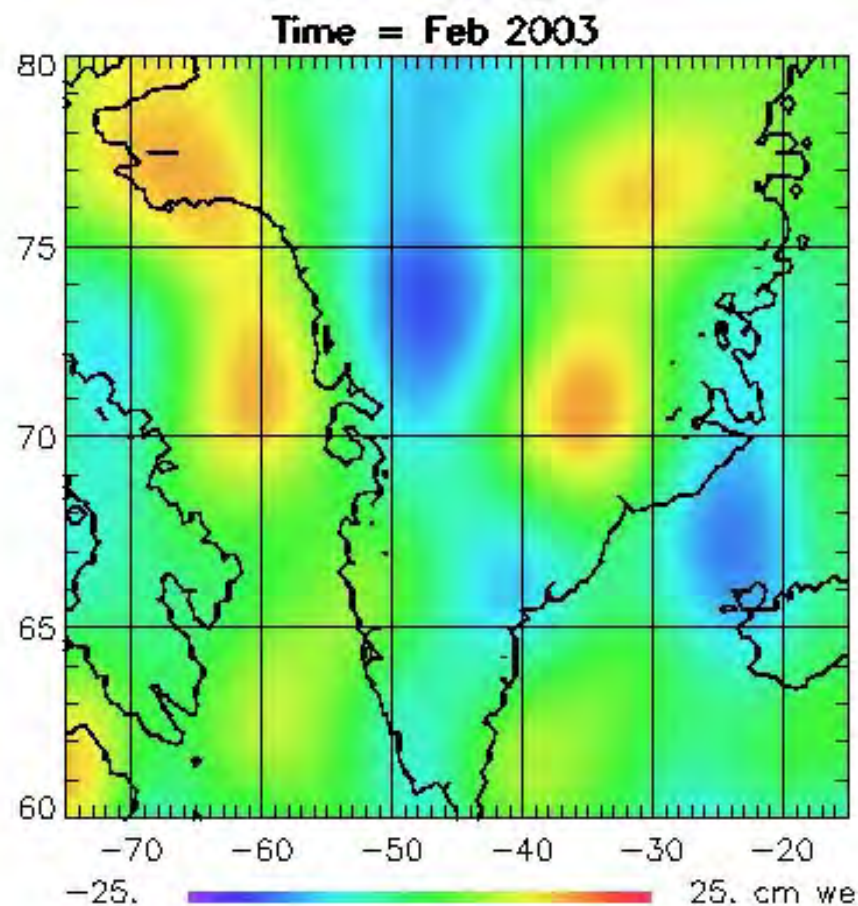


GRACE data - EOFs

- EOF 1+2:

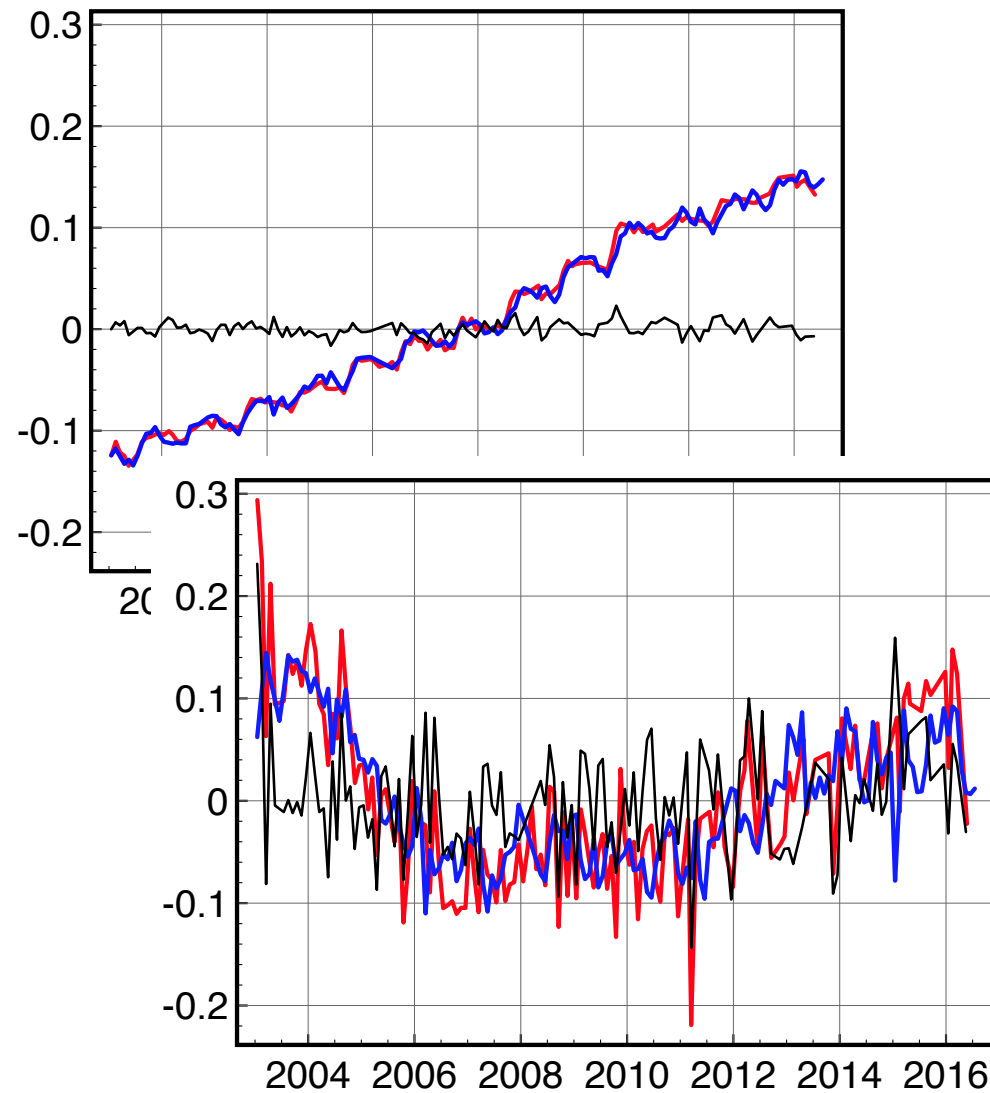
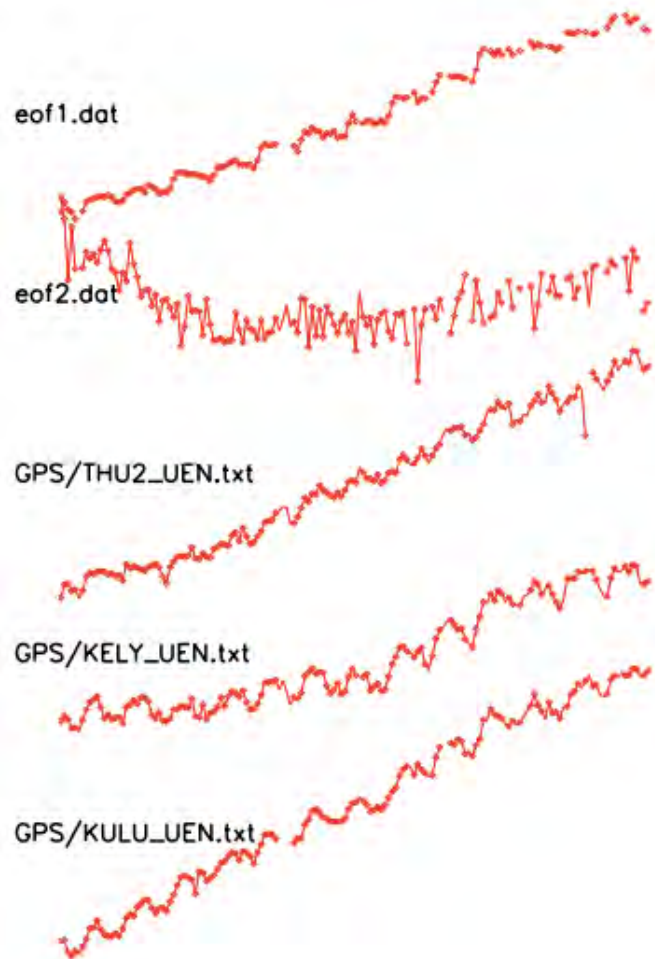


- EOFs 3+:



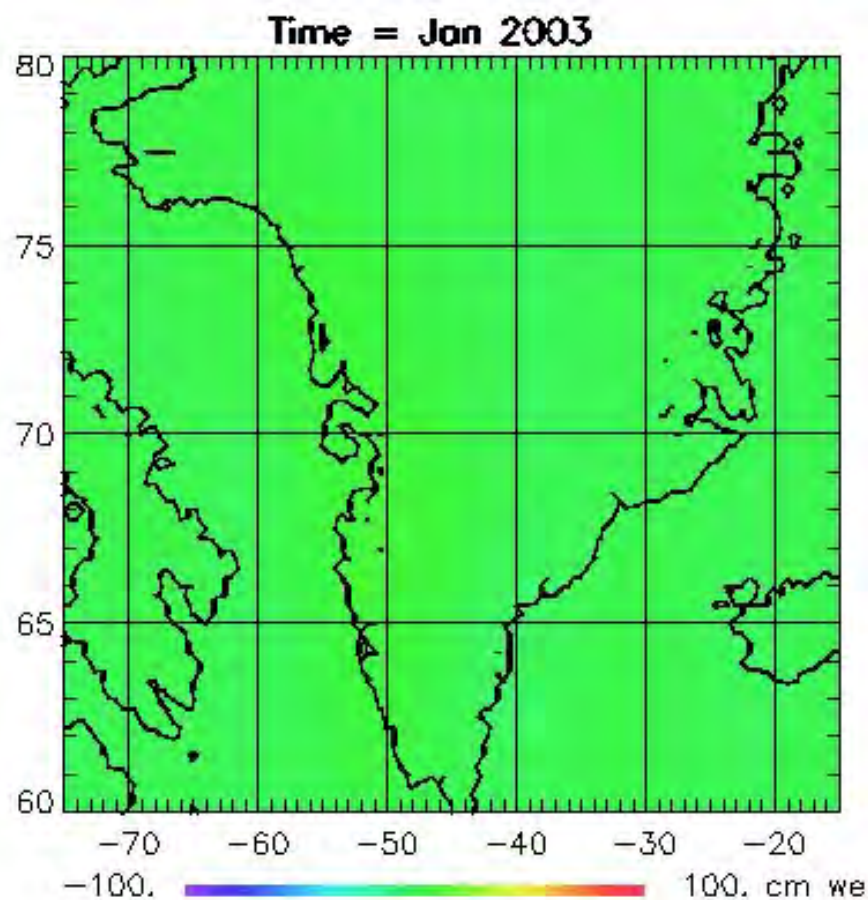
GRACE EOF/PC reconstruction

Linear regression

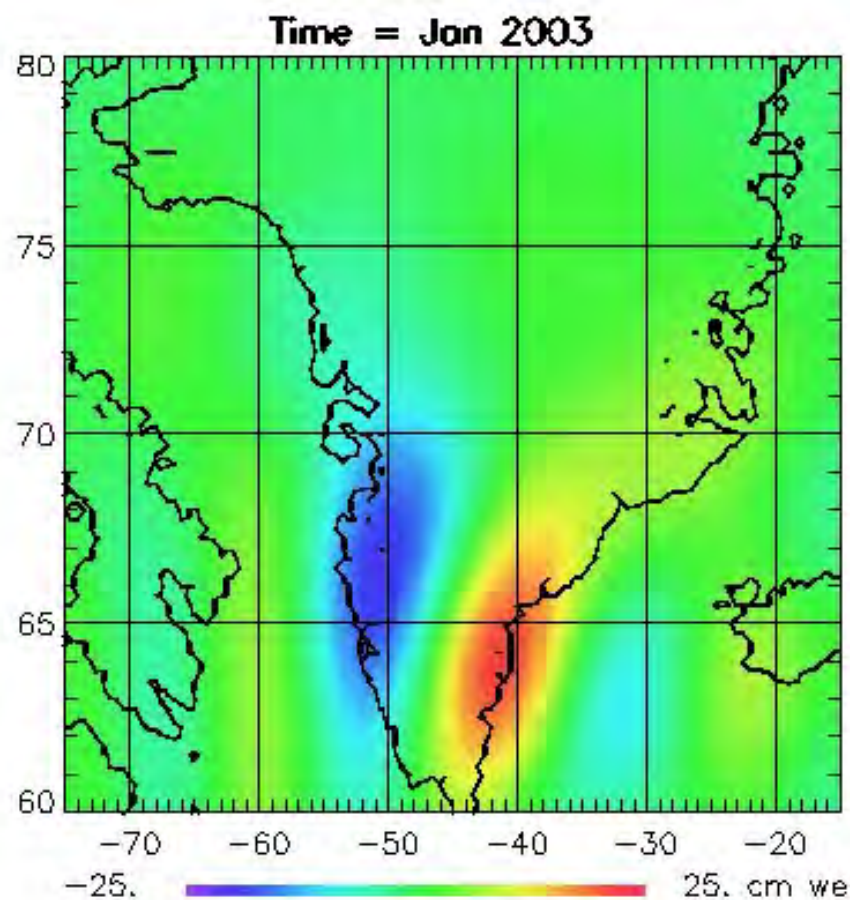


GRACE GPS reconstruction

GPS reconstruction:

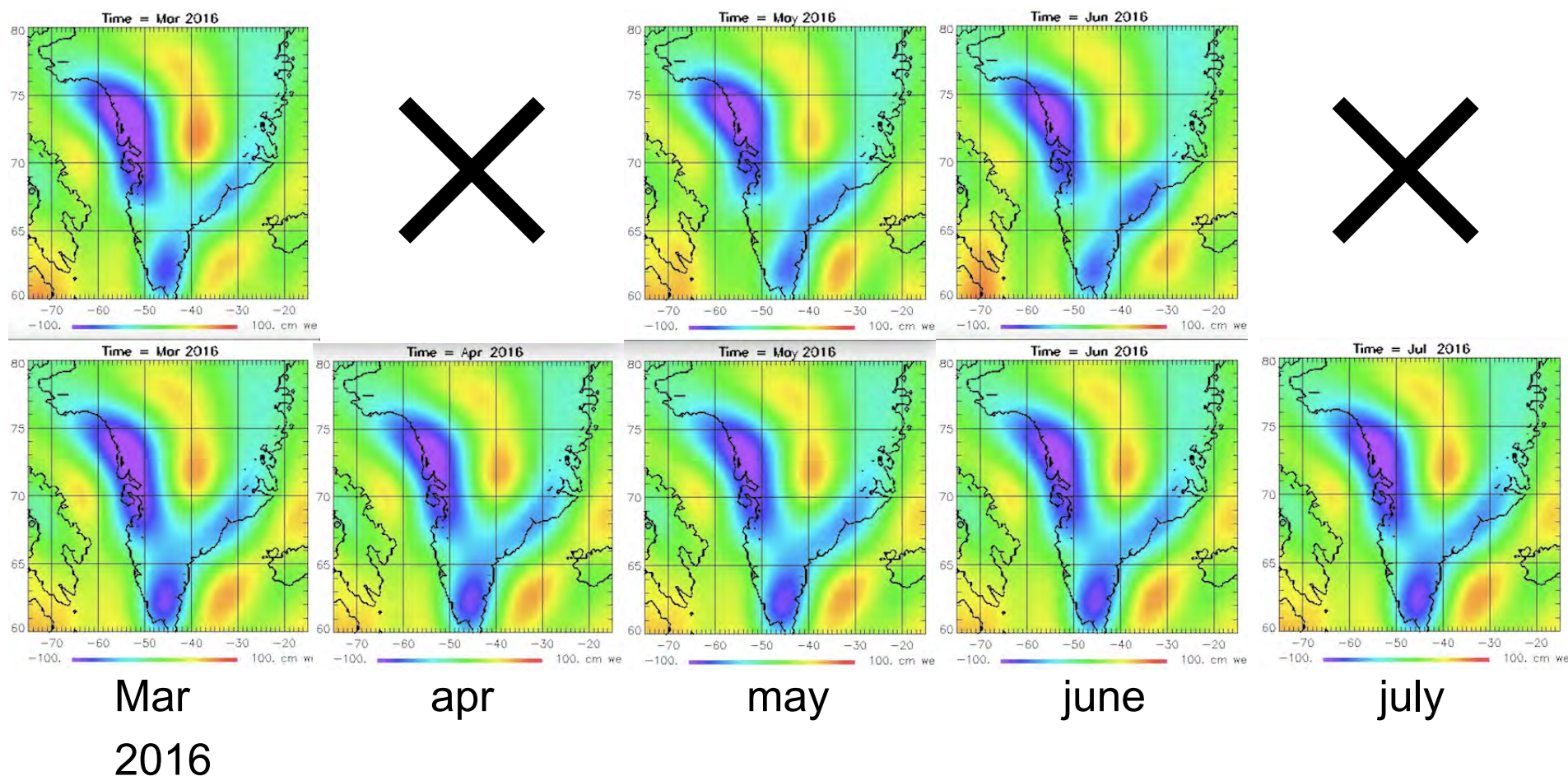


Differences to EOFs 1-2:



GRACE GPS reconstruction

GPS reconstruction for filling in and bridging:



Summary

We have found that:

- General patterns of the GRACE derived gravity changes may be recovered using the 3 GPS time series,
- GNET GPS data may be used for bridging GRACE and GFO.

Next:

- More details to extract – also 56 more GNET GPS stations,
- Convert gravity into mass changes,
- Robust estimation based on collocation / objective analysis,
- Rigorous calculation of uplift based on the mass anomalies.

Contribute to the Integrated Arctic Observation System – EU funded INTAROS project.

NSF welcomes proposals from US scientists on the use of GNET