On Downward Continuing Airborne Gravity Data for Local Geoid Modeling

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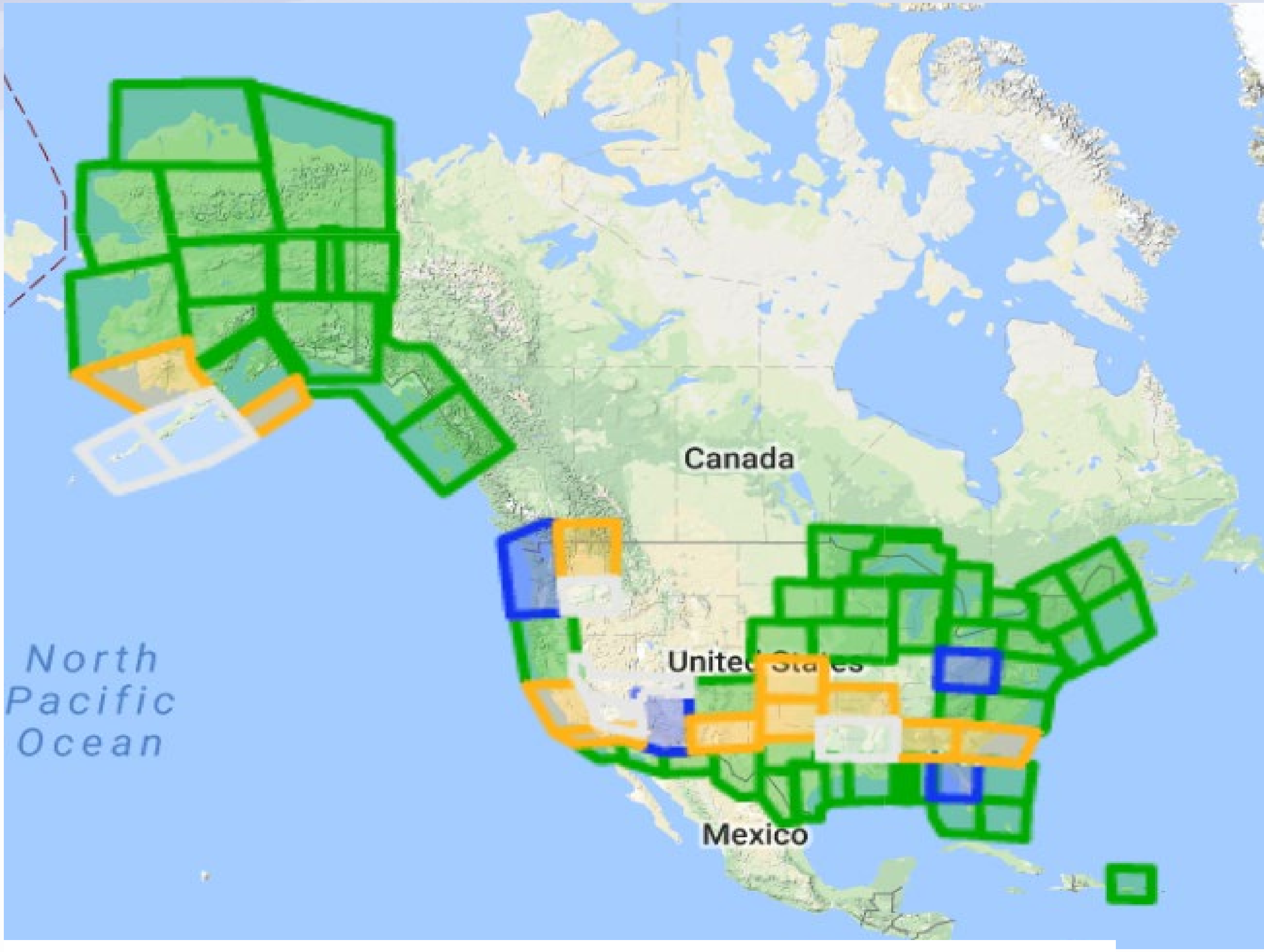
Motivation

- **Vast amount of GRAV-D airborne gravity data**
- **Theoretical completeness**
- **Cooperation between USA and Canada**
- **Special requests**



Smith and Roman (2010) How NOAA's GRAV-D Project Impacts and Contributes to NOAA Science.
Damiani et al (2017) GRAV-D General Airborne Data User Manual.

Theoretical overview

Methods:

- **LSC**
- **SHA**
- **RBF**
- **Poisson^{-1}**
- **RLSC**

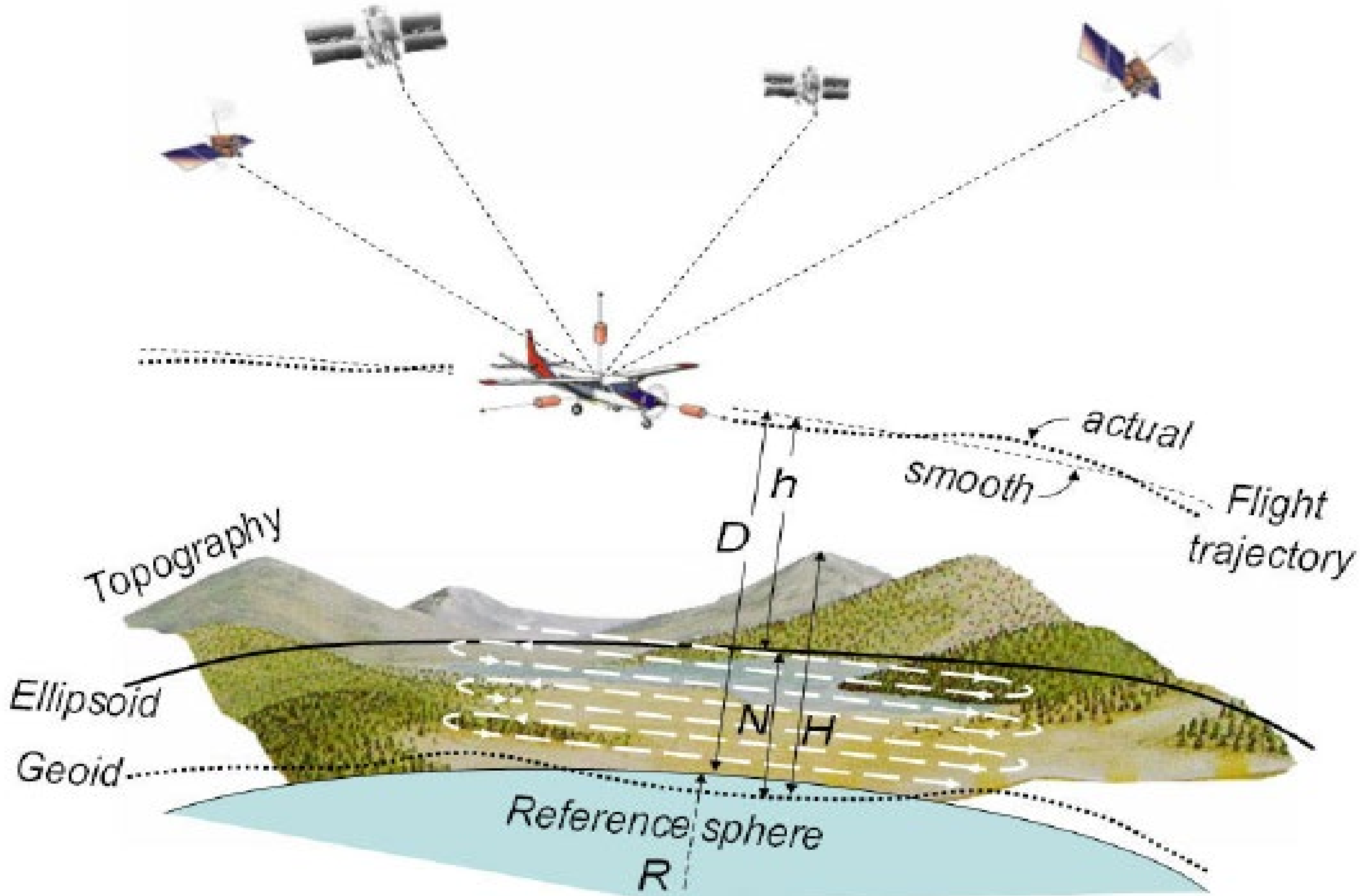
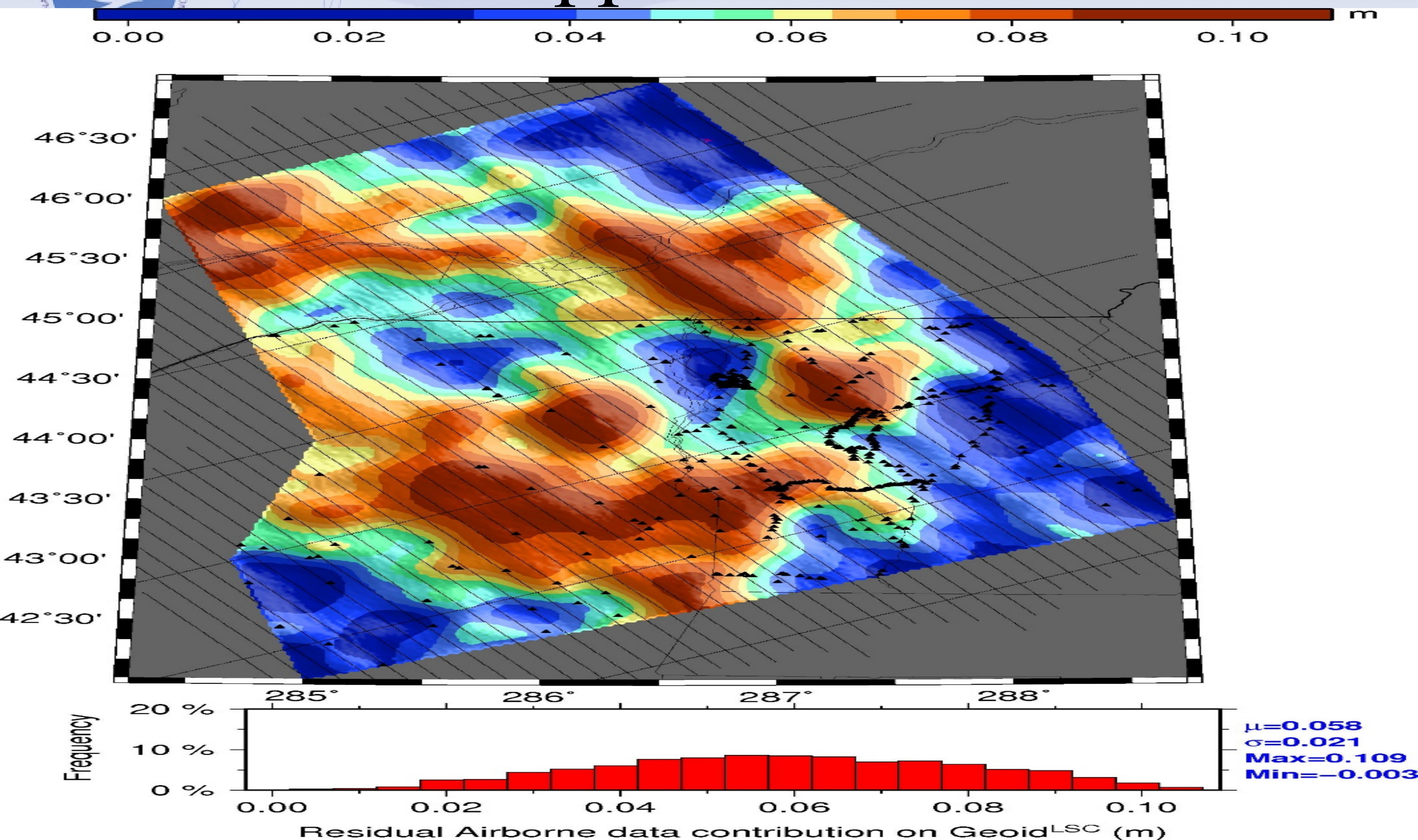
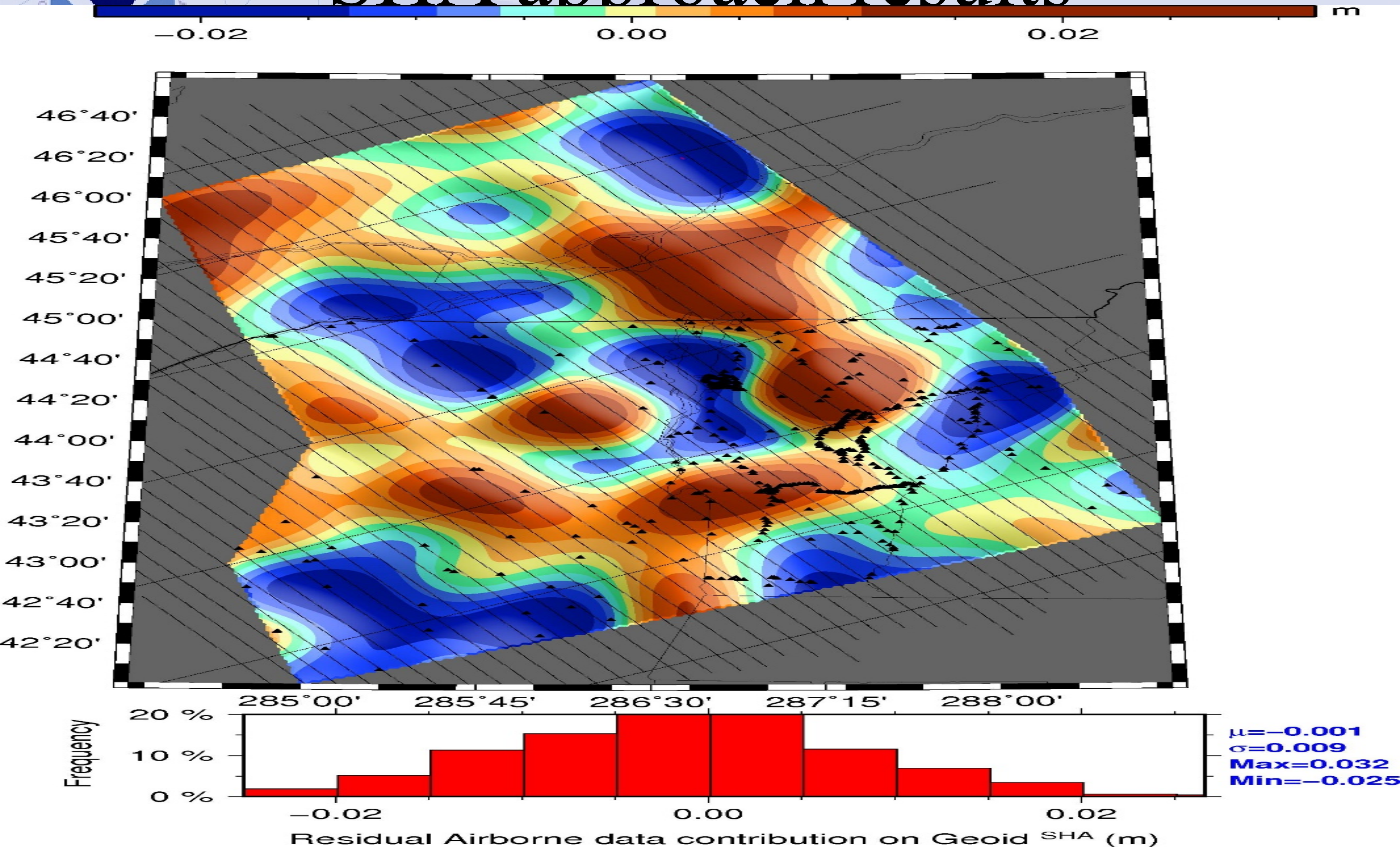


Image: courtesy of **Hajkova, et al (2010)** Spectral decomposition and signal processing techniques of airborne gravity data for earth gravity field modelling-A case study for Taiwan.

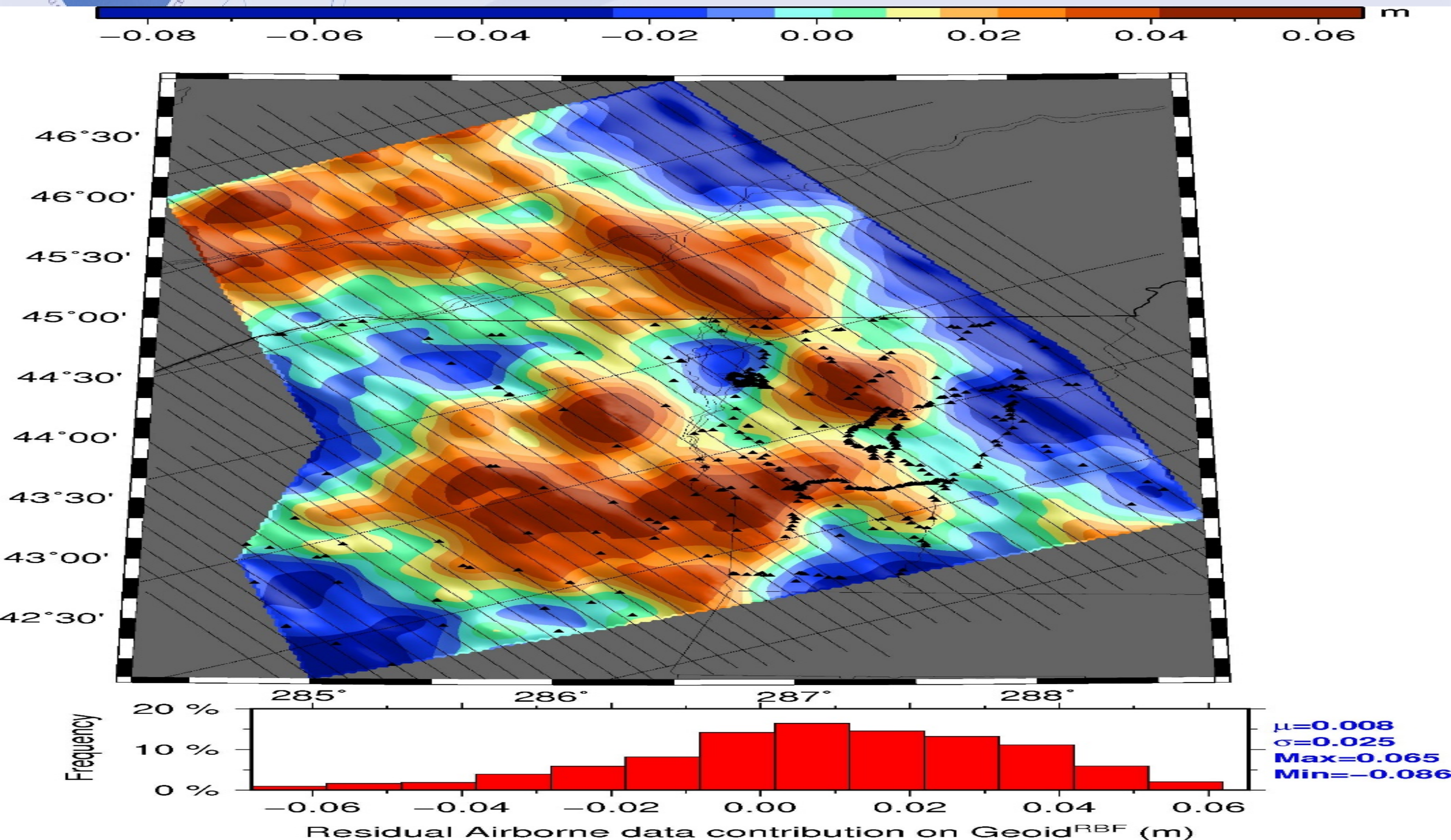
LSC approach results



SHA approach results



RBF approach results



Summary and discussion

- Both LSC and RBF can directly establish the relationship between the observables and predictors.
- LSC can deal with extremely unevenly distributed data, but it needs a covariance model and fairly accurate noise estimates.
- While RBF does not require a covariance model, it does need a network to establish the observation equations because it is essentially a two point function. Certain a-priori information of the band width can also improve the solution.
- Both SHA and Poisson methods need to use iterations to find the solution. In addition, all the masses between the reference sphere and the topography need to be removed when Poisson method is applied.
- RBF and SHA method can effectively depict the harmonic signal due to their particular mathematical form.
- Like LSC, RBF can also directly combine different types of observables at different heights.
- As expected, on the ground, all of these methods cannot obtain the signals that are beyond the resolution of airborne data. Dense surface data or accurate terrain models are still necessary for local high resolution gravity field modeling.
- Computation time

Welcome to Join IAG Study Group:

SG: 2.4 Downward Continuation of Airborne Gravity Data for Local Geoid Improvement

Please contact us if you want to join this group.

Thank you very much for your attention!

Questions/Comments → Xiaopeng.Li@noaa.gov