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Investigation of wavenumber correlation filtering on airborne gravity

Jeong Hee Kim (1), Yan Ming Wang (2), Daniel Roman (2), Monica Youngman (2), Theresa Damiani (2), Kevin Ahlgren (2), and Xiaopeng Li (3)

(1) Visiting Scientist, NGS,1315 East-West HWY, Silver Spring, MD, United States (), (2) NGS,1315 East-West HWY, Silver Spring, MD, United States (), (3) DST, 1315 East-West HWY, Silver Spring, MD, United State

Wavenumber correlation filtering (WCF) is investigated using the GRAV-D airborne gravity data over Iowa, USA, designated as Block CN02. WCF is a method for resolving the full spectrum of correlations between co-registered data sets. In airborne gravity measurements, the errors of different flights are generally uncorrelated. Meanwhile, mass variations due to the topography and deeper sources of density variations produce correlated signals over the adjacent and repeated tracks. The application of WCF to neighboring tracks can extract correlated signals from gravity measurements while removing/reducing the uncorrelated errors.
NGS airborne gravity data are usually collected along adjacent tracks that are 10 km apart at an altitude of about 6 km. To demonstrate the potential of the method, we apply it to repeated airborne gravity tracks. Block CN02 tracks include 28 repeated/overlapped track-segments with average length of about 100 km for the overlaps and up to 400 km for the repeated tracks.
We start with data that are corrected for aircraft's aerodynamics. The xGeoid17A reference field is subtracted to get residual gravity for more sensible analysis. Then, Gaussian weighted filtering is applied to smooth the data and reduce random data errors, creating the intermediary data. After co-registering the data of neighboring tracks, WCF is applied. The characteristics or patterns of uncorrelated signals are examined and threshold criteria to enhance gravity signals are suggested. This analysis also evaluates the potential of WCF for enhancing the signal-to-noise properties in the NGS aerogravity observations.