



Using Absolute Gravity Data to Measure Relative Gravity Differences for Instrument Comparisons

Derek van Westrum

NOAA-NGS, Boulder, United States (derek.vanwestrum@noaa.gov)

NOAA's National Geodetic Survey operates the Table Mountain Geophysical Observatory (TMGO), located north of Boulder, Colorado, USA. One important function of the observatory is the hosting of absolute gravimeter comparisons, which range from informal bilateral comparisons, to officially sanctioned events in which multiple participants observe on a number of piers, over several days (e.g. SIM.M.G-K1 of 2016, in which twelve instruments observed on six piers over eight days) .

For the past three years, weekly observations, distributed over the ten TMGO gravity piers, have been acquired with various FG5(X) absolute gravimeters (as well as the data from official, multilateral comparisons). A weighted least-squares analysis of these data, including a simple model of an annual hydrology signal, is performed to determine the relative gravity differences between each pier using only absolute data. The sub-microGal precision that is obtained far surpasses that available from any relative instrument, and has implications for both comparison design and analysis.

A description of the mathematical model, full results, and detailed discussion will be included.