

GRAV-D Anchorage AK08 Survey Project Report: Delivery to NGA

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1 Executive Summary

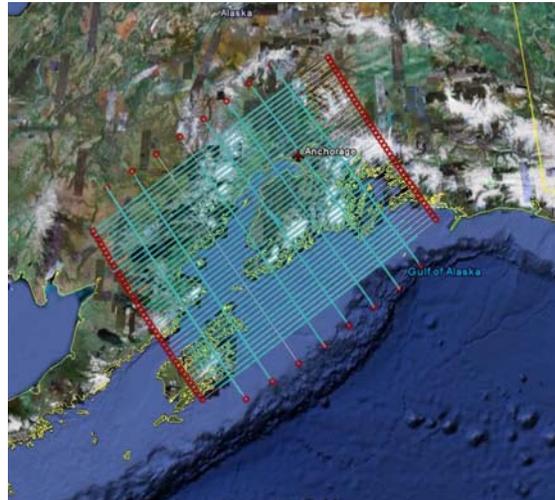
NOAA's National Geodetic Survey launched a program in FY07 called Gravity for the Redefinition of the American Vertical Datum (GRAV-D). This program is designed to replace the current national vertical datum (NAVD 88) with a datum based upon a gravimetric geoid by 2018. To produce the geoid at the needed accuracy, an airborne survey has been launched to measure the gravity field over all of the US and its holdings.

The GRAV-D team launched its first airborne gravity survey in July, 2009 in coastal Alaska. The aircraft was operated from Signature Flight Support, a Fixed Base Operator (FBO) located at the Ted Stevens International Airport in Anchorage.

The survey was conducted over a 400 x 500 km region that encompassed Kachemak Bay and Cook Inlet, covering about as much territory on land as over the water. About 100 flight hours in 24 flights aboard the NOAA Cessna Citation were required to execute the survey. The aircraft was equipped with an airborne gravimeter, GPS receiver, and a GPS/Inertial unit. A GPS base station was maintained during the survey for differential GPS positioning.

A terrestrial campaign was designed to support the TAGS operation. Both the FG5 absolute gravimeter and two relative meters were used to establish the gravity tie from an existing absolute station (re-measured for this survey) to the aircraft parking spot.

The cross tracks yielded a population of 250 intersections, or "crossovers", where the difference in the measurement of gravity along the two lines at the intersection can be evaluated as a measure of error in the survey. The RMS difference of the intersection errors is 4.29 mGal, and the error apportioned to an individual track is 3.02 mGal (RMS difference * $1/\sqrt{2}$). Details about the survey are included in the Survey Synopsis and Report.



2 Alaska AK09 Survey Synopsis

Survey Overview

Organization	NOAA/National Geodetic Survey
Project/Survey Name	GRAV-D/AK08
Airport Base of Operations	Ted Stevens International Airport, Anchorage, AK Signature Flight Support FBO
Geographic Location	Kachemak Bay/Cook Inlet region
Survey Size	400 km x 500 km
Dates of Airborne Operations	July 10-31, 2008
Team Lead/Contact Person	Dr. Vicki Childers, GRAV-D Proj. Mgr. vicki.childers@noaa.gov

Survey Design and Execution

Line Spacing	Data Lines: 10 km Cross Lines: 60 km
Nominal Survey Altitude	35,000 ft / 10,668 m
Nominal Aircraft Ground Speed	280 knots
Number of Lines Completed	Data Lines: 40 Cross Lines: 7
Number of Crossovers	250
Total Flight Hours	100

Instrumentation

Aircraft	NOAA Cessna Citation II (Tail: N52RF)
Gravity Instrumentation	Micro-g LaCoste (MGL) TAGS S-137 MGL FG5 -102 (absolute) MGL G-157 and D-43 (relative)
GPS Instrumentation	NovAtel DL-4 Plus Applanix POS AV 510 Ashtech Z-surveyor (ground survey)
Processing Software	MGL AeroGrav v1.1.8 Waypoint GrafNav v7.80.2315 MGL g7 NGS RELEN3 and RELG2D

Data Processing

Gravity Processing Filter Length	120 seconds
Nominal Spatial Resolution	17.3 km along track 20 km cross track
RMS Crossover Difference	4.27 mGal
RMS Crossover Error	3.02 mGal
Datums	WGS-84 (G1150) and ITRF00

Gravity Tie

Gravity at Absolute Station (mGal)	Anchorage AD: 981,931.765 +/- 0.002
Gravity at ANC Airport Excenter (mGal)	Anchorage AP: 981 905.981 ± 0.009
Gravity at Aircraft 125cm (mGal)	ANC TAGS: 981 905.647 ± 0.011