

LAMONT DATA REDUCTION CRUISE SUMMARY

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CRUISE: EW9203

START: 17 March 1992 [077] Gladstone, Australia

END: 24 April 1992 [115] Papeete, Tahiti

PURPOSE: Woodlark Basin Multichannel Seismic and geophysical survey

CHIEF SCIENTIST: John Mutter - Lamont-Doherty Geological Observatory

DATA REDUCTION: William J. Robinson

TIME:

Instrument: Kinometrics GPS Synchronized clock, Model GPS-DC

Logging: 60 second intervals

SPEED AND HEADING:

Instrument: Furuno CI-30 2-axis doppler speed log

Logging: 3 second intervals

Checking: visual check of plot of data

Smoothing: mean value of all good values within the same minute

Notes:

(1) day time comment

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077 0000-2359 gryo error: course corrected by adding 88.8 degrees

078 0000-2359 gryo error: course corrected by adding 88.8 degrees

079 0000-0359 gryo error: course corrected by adding 88.8 degrees

079 0400-1030 gryo error: used course and speed from GPS

TRANSIT SATELLITE FIXES:

Instrument: Magnavox MX-1107RS dual frequency Transit satellite receiver

Logging: all fixes from two receivers Transit #1 (lab) and Transit #2 (bridge)

GPS SATELLITE FIXES:

Instrument: Magnavox T-Set Global Positioning System 5 channel receiver

Logging: T-Set #1 at 2 second intervals, T-Set #2 at 20 second intervals.

Note: T-Set #1 is logged at 2 second intervals to provide realtime positioning for the Hydrosweep; this GPS data is decimated to 20 second intervals before use in the reduction.

Checking:

minimun number of sats: 3

dilution of precision maximum: north = 4.0, east = 4.0

carrier signal-noise ratio minimun:35.0

compared GPS speed and course with Furuno smooth speed and heading

compared positions with Transit-Furuno navigation

reject fixes producing Eotvos correction errors in gravity
Interpolation: interpolated positions at 00, 30 seconds of each minute
Smoothing: smoothed interpolated positions with 41 point running average
Notes:

- (1) The GPS data has a sinusoidal-like wave in it which is assumed to come from some degrading of the GPS quality for civilian users. This wave seems to vary in period and shape and is not a perfect sine curve. The periods are less than 20 minutes. The amplitudes and period will vary over 24 hours but always seem to be present in the data. This degrading produces a false ship's track for realtime navigation and introduces extreme errors, up to 10 mGals, in the Eotvos correction for the gravity. To handle this problem the following steps have been used to process the GPS:
 1. the smoothing has been increased from a 9 point (4 minute) running average of the interpolated positions to a 41 point (20 minute) running average.
 2. this smooth GPS data is deleted at turns because the heavy smoothing greatly "widens" the turns.
 3. the remaining smooth GPS data is decimated to 20 minute intervals

These GPS processing steps, together with using the smooth speed and heading data from the Furuno for DR'ing between the decimated GPS positions produces good navigation and gravity data.

(2) used GPS #1 as primary source

(3) day	time	comment
103	2100-2359	used GPS #2
104	0000-2359	used GPS #2
105	0000-0340	used GPS #2
113	2320-2359	used GPS #2
114	0110-0200	used GPS #2

NAVIGATION:

A "1 minute navigation" is produced from the GPS and Furuno sources. The smooth speed and heading data is used to fill the gaps between the processed GPS positions by computing 1 minute DR'ed positions corrected for set and drift. The DR'ed positions are produced at 00 seconds of each minute.

BATHYMETRY:

Instrument: Atlas Hydrosweep DS
Logging: every ping
Checking: visual check of plot of data. Bad data points removed with an interactive graphics editor.
Final data: interpolated depth value (meters) at 00 seconds of each minute
Notes:

- (1) these readings are the center beam of the swaths during the the actual survey using whatever sound velocity was in effect at the time.

(2) Hydrosweep was "hanging up" at times and thus there are data gaps

day	time	comment
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082	1314-2019	HS gap: filled with 5 minute data from the 3.5 PDR
085	0234-2359	HS gap: filled with 5 minute data from the 3.5 PDR
086	0000-0758	HS gap: filled with 5 minute data from the 3.5 PDR
088	2239-2359	HS gap: filled with 5 minute data from the 3.5 PDR
089	0000-0500	HS gap: filled with 5 minute data from the 3.5 PDR
091	1727-2301	HS gap: filled with 5 minute data from the 3.5 PDR
094	1633-2048	HS gap: filled with 5 minute data from the 3.5 PDR
095	2129-2319	HS gap: part filled with 5 minute data from the 3.5 PDR
099	0946-1209	HS gap: filled with 5 minute data from the 3.5 PDR
103	0242-0533	HS gap: filled with 5 minute data from the 3.5 PDR
104	1934-2155	HS gap: PDR not readable
105	0020-0102	HS gap: PDR not readable
106	2338-2359	HS gap: PDR not readable
107	0000-0010	HS gap: PDR not readable
108	0639-0748	HS gap: PDR not readable
109	0514-1000	HS gap: PDR not readable
110	0409-0546	HS gap: PDR not readable
110	0755-2359	HS gap: PDR not readable
111	0000-0130	HS gap: PDR not readable
111	0514-0731	HS gap: PDR not readable
112	0518-0538	HS gap: PDR not readable
112	0640-0715	HS gap: PDR not readable
112	0945-1102	HS gap: PDR not readable
112	1323-1646	HS gap: PDR not readable
112	2006-2023	HS gap: PDR not readable
113	2017-2359	HS gap: PDR not readable
114	0000-0015	HS gap: PDR not readable

MAGNETICS:

Instrument: Varian V75 magnetometer

Logging: 6 second intervals

Checking: visual check of plot of data. Bad data points removed with an interactive graphics editor.

Reference field: International Geomagnetic Reference Field 1990 (IGRF 1990) model of the main field at 1990.0 and a predictive model of the secular variation for adjusting to dates between 1990.0 and 1995.0

Final data: median values at 00 seconds of each minute calculated from the values +30 seconds of this time.

Notes:

(1) day	time	comment
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080	0001-0233	shallow water data deleted
080	2030-2329	magnetometer onboard; streamer work
081	0733-2359	magnetometer onboard; streamer work
082	0000-0259	magnetometer onboard; streamer work
102	2345-2359	magnetometer onboard; streamer work
103	0000-0310	magnetometer onboard; streamer work
103	2122-	magnetometer off for remainder of cruise

GRAVITY:

Instrument: Bodenseewerks KSS-30 Marine Gravity meter

Logging: mGal values at 6 second intervals

Smoothing: mean values at 00 seconds of each minute calculated from the logged values +30 seconds of this time. This stage also adjusts the times of the smoothed values for a 75 second delay due to the filtering of the gravity by the KSS-30.

Merge with navigation: calculate Eotvos correction and Free Air Anomaly. The velocities, from the navigation, used in the Eotvos correction are smoothed with a 5 point running average for all days

Checking: visual check of plot of data to determine satisfactory Eotvos corrections, delete spikes of data at turns

Dc shift: -980169.80 mGal

Drift rate: -0.013 mGal per day

Tie date: 03 March 1992 (day 063) at 0127 Z

Final data: Free Air Anomaly value at 00 seconds of each minute.

One data set is calculated with the 1980 theoretical gravity formula.

Another data set is calculated with the 1930 theoretical gravity formula.

The data with the 1930 formula is stored in the Lamont database.

Notes:

(1) day	time	comment
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104	0259-2359	bad data: gyro problem
105	0000-0928	bad data: gyro problem