LAMONT DATA REDUCTION CRUISE SUMMARY

CRUISE: EW9201

START: 15 January 1992 [015] Lyttelton, New Zealand

END: 28 February 1992 [059] Lyttelton, New Zealand

PURPOSE: Survey of Fracture Zone XII of the Pacific-Antarctic Ridge

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DATA REDUCTION: William J. Robinson

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TIME:

Instrument: Kinemetrics 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
029	0815-1140	major power failure affecting logging; gyro problem

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)
Notes: The fixes from the Transit system are logged in case there is a significant gap in GPS coverage.

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)

day	time	comment
029	0815-0851	major power failure affecting logging

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)

day	time	comment
029	0815-0851	major power failure affecting logging
058	0739-1415	Hydrosweep off for system upgrade

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
015	-2359	maggie off (200 mile limit)
016	0000-2359	maggie off (200 mile limit)
017	0000-0220	maggie off (200 mile limit)
029	0815-0851	major power failure affecting logging
048	2303-2359	maggie off (dredge)
049	0000-0359	maggie off (dredge)
049	1942-2359	maggie off (dredge)
050	0000-0017	maggie off (dredge)
058	0505-2359	maggie off (200 mile limit)
059	0000-2359	maggie off (200 mile limit)

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: -980170.18 mGal
Drift rate: 0.0077 mGal per day
Tie date: 14 January 1992 (day 014) at 2138 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
029	0815-0851	major power failure affecting logging
030	2023-2110	local power failure to KSS-30

STATIONS:

There were two successful dredge stations.