

LAMONT DATA REDUCTION CRUISE SUMMARY

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CRUISE: EW9305

START: 11 August 1993 [223] Bridgetown, Barbados

END: 16 September 1993 [259] Rio de Janeiro, Brazil

PURPOSE: Vema Fracture Zone survey

CHIEF SCIENTIST: Kim Kastens L-DEO

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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251	0000-0027	gap: reboot logging computer

TRANSIT SATELLITE FIXES:

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

Logging: all fixes from Transit #2 (bridge)

Notes:

(1) Transit #1 (lab) was down during the whole cruise

GPS SATELLITE FIXES:

Instrument: Magnavox MX-4200D Global Positioning System receiver

Logging: 10 second intervals

Checking:

minimum number of sats: 3

dilution of precision (DOPs) maximum: north = 4.0, east = 4.0

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

Smoothing: positions at 00 and 30 seconds of each minute were extracted

from the logged data and then smoothed with a 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 6 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.

This degraded GPS quality has been observed since January 1992.

(2) day	time	comment
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251	0000-0027	gap: reboot logging computer

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.
 Recalculation: For days 223-224, center beam depths were recalculated using a sound velocity of 1500 meters per second. All other days already were computed using 1500 meters per second.
 Final data: interpolated depth value (meters) at 00 seconds of each minute
 Notes:

- (1) there are a number of small gaps in Hydrosweep data due to periods of poor behavior of the instrument
- | (2) day | time | comment |
|---------|-----------|------------------------------|
| --- | ----- | ----- |
| 251 | 0000-0027 | gap: reboot logging computer |

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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223	0000 2359	no magnetics collected - 200 mile limit
224	0000 1857	no magnetics collected - 200 mile limit
229	1841-2359	station - magnetometer onboard
230	0000-0152	station - magnetometer onboard
230	1250-2359	station - magnetometer onboard
231	0000-0159	station - magnetometer onboard
231	1536-2359	station - magnetometer onboard
232	0000-2359	station - magnetometer onboard
233	0000-0757	station - magnetometer onboard
235	1725-2359	station - magnetometer onboard
236	0000-0138	station - magnetometer onboard
236	0913-2215	station - magnetometer onboard
239	1213-2359	station - magnetometer onboard
240	0000-2359	station - magnetometer onboard
241	0000-2011	station - magnetometer onboard
243	2035-2359	station - magnetometer onboard
244	0000-2359	station - magnetometer onboard
245	0000-0141	station - magnetometer onboard
248	1621-2359	no magnetics collected - begin transit to Rio
	249-259	no magnetics collected

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

Tie date: 10 August 1993 (day 222) at 1326 Z (Barbados)

Dc shift: -980166.71 mGal (Barbados tie of 10 August 93)

Drift rate: 0.013 mGal per day (between Barbados and Rio de Janeiro)

Note: the tie in Rio de Janeiro was done following cruise EW9306.

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

Notes:

(1) day	time	comment
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