LAMONT DATA REDUCTION CRUISE SUMMARY

CRUISE: EW9304

START: 1 August 1993 [213] Woods Hole, U.S.

END: 9 August 1993 [221] Bridgetown, Barbados

PURPOSE: Transit

CHIEF SCIENTIST: Bruce Francis L-DEO

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
        --- --------- ----------
        214 1433-1452 gap: logging computer problem
      217 1030-2000 Furuno on bottom track; erroneous speeds
                      and headings; numerous records deleted.

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:
    minimun 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
214	1433-1452	gap: logging computer problem

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: center beam depths were recalculated using a sound velocity of 1500 meter per second.
Final data: interpolated depth value (meters) at 00 seconds of each minute
Notes:

(1) the Hydrosweep had a number of data gaps, some quite long, due to Hydrosweep problems that occured when the lab was unattended as there were no regular watches on a transit leg.

day	time	comment
213	2304	start
213	2348-2359	logging off while on continental shelf
214	0000-1017	logging off while on continental shelf

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        214  1433-1452  gap: logging computer problem
      216  0050-0109  gap
      216  2113-2359  gap
      217  0647-0952  gap
      217  1310-1348  gap
      217  1445-1546  gap
      217  1556-1618  gap
      217  1949-2027  gap
      218  0110-0302  gap
      218  0546-1042  gap
      218  2314-2345  gap
      220  0456-1122  gap
      221  1243       stop


MAGNETICS:
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Not collected


GRAVITY:
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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: -980164.17 mGal (from Woods Hole tie of 22 July 93)
Drift rate: -0.1336 mGal per day (between Woods Hole and Barbados)
Tie date: 22 July 1993 (day 203) at 1900 Z (Woods Hole)
Lamont Database: Free Air Anomaly value at 00 seconds of each minute.
    1930 theoretical gravity formula.
Notes:
    (1) day    time      comment
        ---  ---------  ----------
        214  1433-1452  gap: logging computer problem


Instrument: Bell Aerospace BGM-3 marine gravity meter
    No data collected - BGM-3 was taken off the ship in May 93 at Newark,
    N.J. for a survey on another vessel.
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