LAMONT DATA REDUCTION CRUISE SUMMARY

CRUISE: EW9401

START: 4 January 1994 [004] Montevideo, Uraguay

END: 13 February 1994 [044] Salvador, Brazil

PURPOSE: CITHER II Leg 1 Physical Oceanographic cruise
CTD and water chemistry stations

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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

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
(2) Transit fixes were not used.

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
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. the GPS data with the 41 point smoothing is deleted at turns because the heavy smoothing greatly "widens" the turns.
3. the remaining smooth GPS data is decimated to 20 minute intervals

This degraded GPS quality has been observed since January 1992.

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.

Notes:

(1) Territorial waters

Uraguay:

Left: 005 1600 pitlog at 224.55

Falklands:

Entered: 009 1030
Left: 010 2036 (estimated)

Brazil:

Entered: 022 0206 run in to coast
Left: 023 1442

Entered: 036 0054 islands
Left: 039 0545

Entered: 043 0756 run in to Salvador

BATHYMETRY:

Instrument: Atlas Hydrosweep DS
Logging: every ping
Checking: visual check of plot of data. Bad data points removed with
an interactive graphics editor.
Sound Veolcity: All days were computed using 1500 meters per second.
Final data: interpolated depth value (meters) at 00 seconds of each minute
Notes:
(1) there are gaps throughout the cruise due to abnormal behavior of the Hydrosweep. This often persisted for a number of hours at a time as there were no regular watch in the main lab.

(2)

day	comment
022	center beam data only (swath data deleted) Brazilian waters
036	center beam data only (swath data deleted) Brazilian waters
037	center beam data only (swath data deleted) Brazilian waters
038	center beam data only (swath data deleted) Brazilian waters
039	center beam data only (swath data deleted) Brazilian waters

MAGNETICS:

Logging: no data 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:
    Pier gravity value established on 29 Dec 93 (day 363) at 1150Z (Montevideo)
    Ship gravity values taken on 29 Dec 93 (day 363) at 1150Z (Montevideo)
Dc shift: -980161.48 mGal (29 December 93, 1150Z)
Drift rate: -0.0169 mGal per day (between Capetown and Montevideo)
Final Data: Free Air Anomaly value at 00 seconds of each minute.
Lamont Database: KSS-30 gravity; 1930 theoretical.
Notes:
    (1) The drift rate between Capetown and Montevideo from cruise
      ew9309 was used for the drift rate on ew9401. This was done
      because the gravity meters were shut down on day 024
      (to avoid any question of collecting data in Brazilian waters)
      and also because the next gravity tie would not be until Barbados
      in April.

    (2) This cruise was primarily station work and the gravity data
      during stations was deleted from the final data.

Instrument: Bell Aerospace BGM-3 marine gravity meter
Logging: 1 second counts
Filtering: an observed gravity value in mGal is calculated by filtering
    the 1 second counts with a 360 second Gaussian filter, scaling the result
    and adding a bias. A value in mGal is calculated at 00 seconds of
    each minute.
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:
    Pier gravity value established on 29 Dec 93 (day 363) at 1150Z (Montevideo)
    Ship gravity values taken on 29 Dec 93 (day 363) at 1150Z (Montevideo)
Dc shift: 7.7 mGal
Drift rate: 0.0089 mGal per day (between Capetown and Montevideo)
Final data: Free Air Anomaly value at 00 seconds of each minute. 1980
    theoretical gravity formula.
Notes:
    (1) The drift rate between Capetown and Montevideo from cruise
      ew9309 was used for the drift rate on ew9401. This was done
      because the gravity meters were shut down on day 024
      (to avoid any question of collecting data in Brazilian waters)
      and also because the next gravity tie would not be until Barbados

in April.

(2) This cruise was primarily station work and the gravity data during stations was deleted from the final data.

Station work:
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(1) Numerous stations were conducted using a CTD and water bottle rosette. This data remains with the chief scientists.