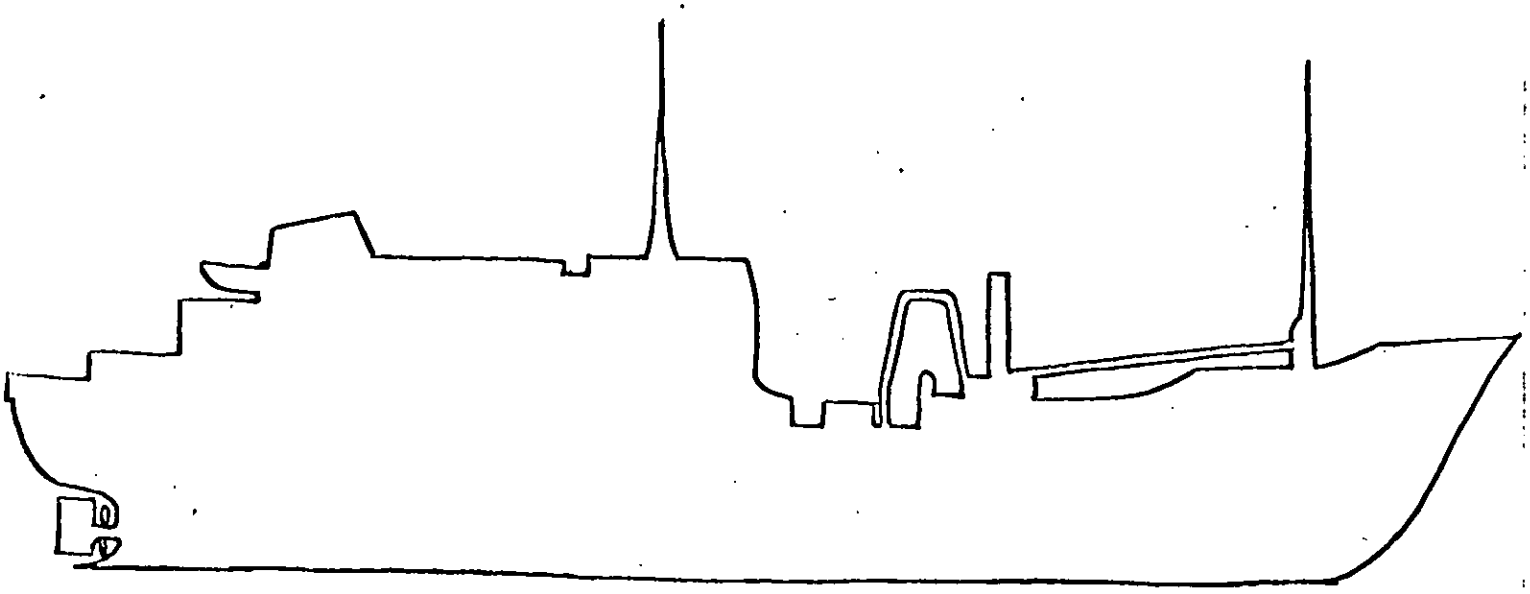
UNIVERSITY OF EDINBURGH

Department of Geology



Report on Cruise 3/79 of

RRS SHACKLETON

27 March - 11 April 1979

RRS SHACKLETON Cruise 3/79

Cruise objectives

These were to follow up the work carried out on RRS SHACKLETON cruises 5/76 and 4/77 to study in detail the crustal structure and geology of the continent-ocean boundary region west of Ireland. The boundary identified west of Goban Spur was to be traced northwards into the mouth of Rockall Trough.

Scientific Personnel

R.A. Scrutton	(Edinburgh University) Senior Scientist
Miss J. Megson	(Edinburgh University)
Miss A. Slevin	(Geological Survey of Ireland)
Mrs P. Edwards	(Institute of Oceanographic Sciences, Wormley)
Miss D. Jones	(Research Vessel Services, Barry)
I. Chivers	(Research Vessel Services, Barry)
P. Hillary	(Research Vessel Services, Barry)
C. Paulson	(Research Vessel Services, Barry)
P. Walters	(Research Vessel Services, Barry)
R.V. Dingle	(Cape Town University)
R.T. Haworth	(Bedford Institute of Oceanography, Halifax, Nova Scotia)

Narrative

SHACKLETON departed No 1 Dock, Barry at 0930, 27 March, but then anchored outside the harbour entrance until 1300 to allow late scientific and ship's personnel to join by pilot cutter. Technical problems with the Geomechanique array used on the preceding cruise required the whole array to be replaced with a brand new, untested Geomechanique model in order that sailing could take place on time. Quick repairs had been carried out on the PES fish and it was known at the time of sailing that there were hardware and software faults in the IBM 1130 shipborne computer.

Heavy seas and strong winds from the west, together with a reduced ship speed because of a heavily fouled hull prevented work starting until 30 March. Deploying equipment over the side and stern commenced at 0900. After overcoming the usual minor problems that manifest themselves on starting work, full underway geophysics using PES, gravimeter, magnetometer and seismic reflection profiler began at 1600 in the mouth of Porcupine Seabight. A fault in the cable to the PES fish necessitated the use of the hull-mounted tranducer for the first 24 hours.

For the next five days recording continued unbroken. The data were of good quality despite very bad weather. Of special note was the excellent performance of the new Geomechanique hydrophone array, which proved to have low noise characteristics in heavy seas. Frequencies as low as 1 or 2 Hz were cleanly recorded. At this stage, and at intervals later in the cruise, the only factor that reduced the quality of the geophysical data was temporary loss of satellite reception arising from an intermittent fault in the Magnavox receiver. Fair quality LORAN C fixes were obtained during these periods.

An improvement in weather on 3 April prompted a start to the planned short sampling programme. The ship returned to the southern end of the survey area and at 1600 on 4 April all equipment over the stern was recovered to start sampling. Two corer stations and two dredge stations were occupied and sucessfully completed at the southern end of Porcupine Ridge.

At 0030 on 6 April geophysical surveying was restarted to continue the survey northwards and northwestwards using all systems. Good quality data were collected until it was time to recover equipment over the stern and set course for Barry. At 2020 on 7 April the equipment was recovered at the most northwestern point of the survey. A corer station was successfully completed on the Feni Ridge at this point.

SHACKLETON turned for Barry at 2200 on 7 April. Water depth, gravity and magnetic measurement were made at full speed on route as far as Porcupine Ridge. As the ship was making good time, the traverse was broken to occupy a free-fall corer station at 1430 on 8 April just west of Porcupine Ridge. Unfortunately, as is common with free-fall corers, the floats and core were not recovered. Geophysical watches were discontinued at 0000 on 9 April, and the PES fish and magnetometer were recovered at 1300 on 9 April.

SHACKLETON berthed at No 1 Dock, Barry at 0730 on 11 April.

Geophysical and geological equipment

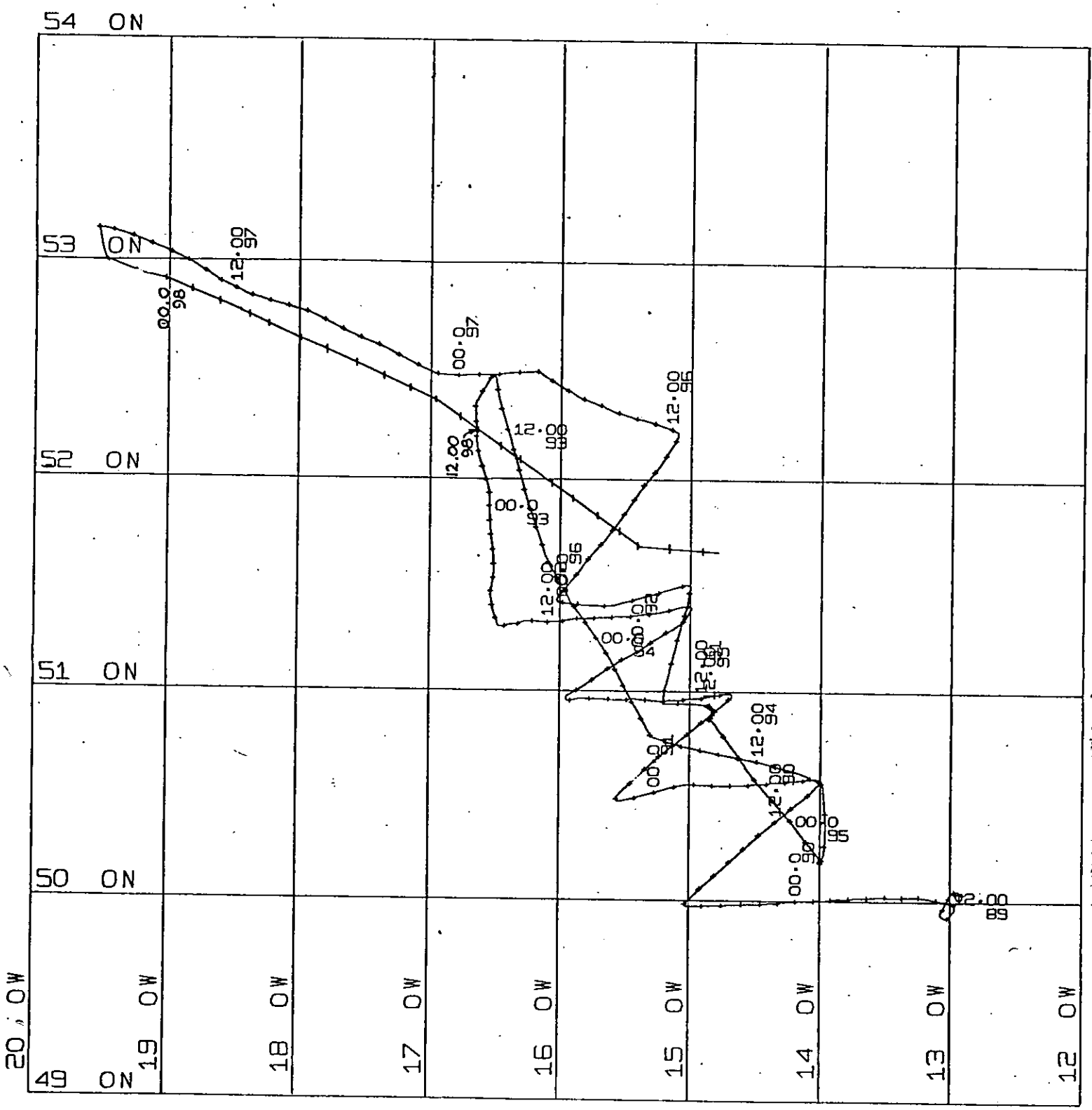
I.O.S. precision echo sounder
Varian proton precession magnetometer
LaCoste-Romberg S40 Gravimeter
Two channel Geomechanique hydrophone array

One Bolt PAR 1500 C air-gun with 300 in ^{3} chamber
2 EPC 4100 dry paper profile recorders
RACAL store 4D magnetic tape recorder
Dredge, I.O.S. piston corer, Moore free-fall corer and gravity corer

Data processing and results

The seismic reflection data were recorded not only on paper but in analogue form on magnetic tape for post-cruise replaying at different frequency band passes, gains and scales. 1620 km of good quality profiles were obtained.

Digital data logging of DR navigation sensors, PES, gravimeter and magnetometer outputs was made at 1 second intervals. On-board processing of the satellite, LORAN and DR navigation data was achieved, but both hardware and software problems in the IBM 1130 shipborne computer delayed processing of geophysical data until after the cruise. 1986 km of magnetic data and 2310 km of bathymetric and gravity data were obtained



G/G MERCATOR PROJECTION

SCALE 1 TO 2500000. (NATURAL SCALE AT LAT. 57)

INTERNATIONAL SPHEROID