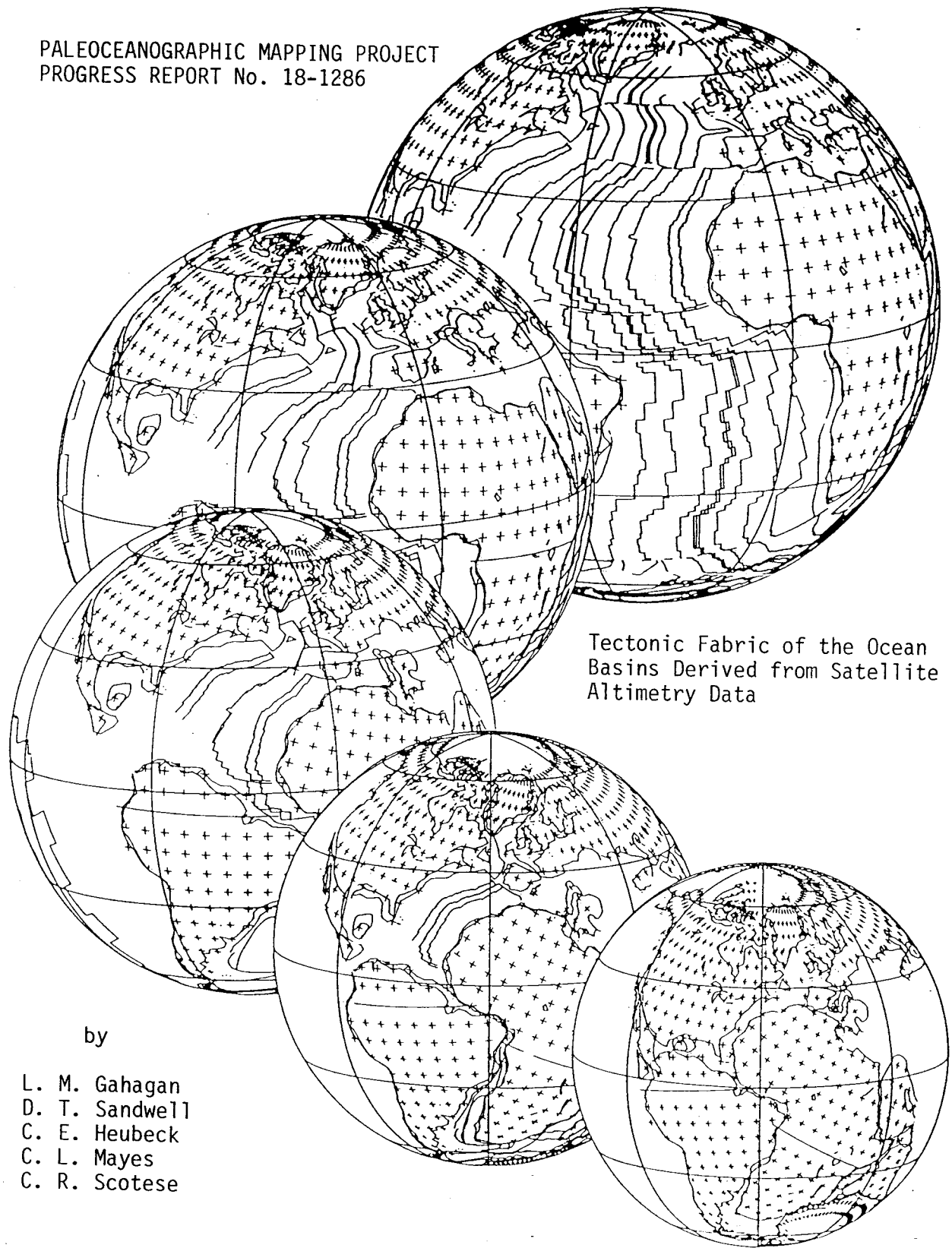


PALEOCEANOGRAPHIC MAPPING PROJECT
PROGRESS REPORT No. 18-1286



Tectonic Fabric of the Ocean Basins Derived from Satellite Altimetry Data

by

- L. M. Gahagan
- D. T. Sandwell
- C. E. Heubeck
- C. L. Mayes
- C. R. Scotese

Profiles of along-track deflection of the vertical obtained from Seasat altimetry data show the changes in the slope of the surface of the sea. These changes in slope represent changes in the topography of the sea floor. The signatures of the waveforms in the profiles, while not unique, can be used to interpret the presence of ocean floor features such as seamounts (Sandwell, 1984). In this study, we have used the Seasat data, which we divided according to GEBCO windows (Fig. 1), to locate fracture zones which we will be incorporating into plate tectonic reconstructions.

In our first attempt at using the Seasat data to identify fracture zones, we digitized the light and dark lineations from Haxby's (1983) deflection of the vertical map (Fig. 2). We ascribed these lineations to the change in topography due to the change in ocean floor age across fracture zones, with the light lineations representing younger crust and the dark lineations representing older crust.

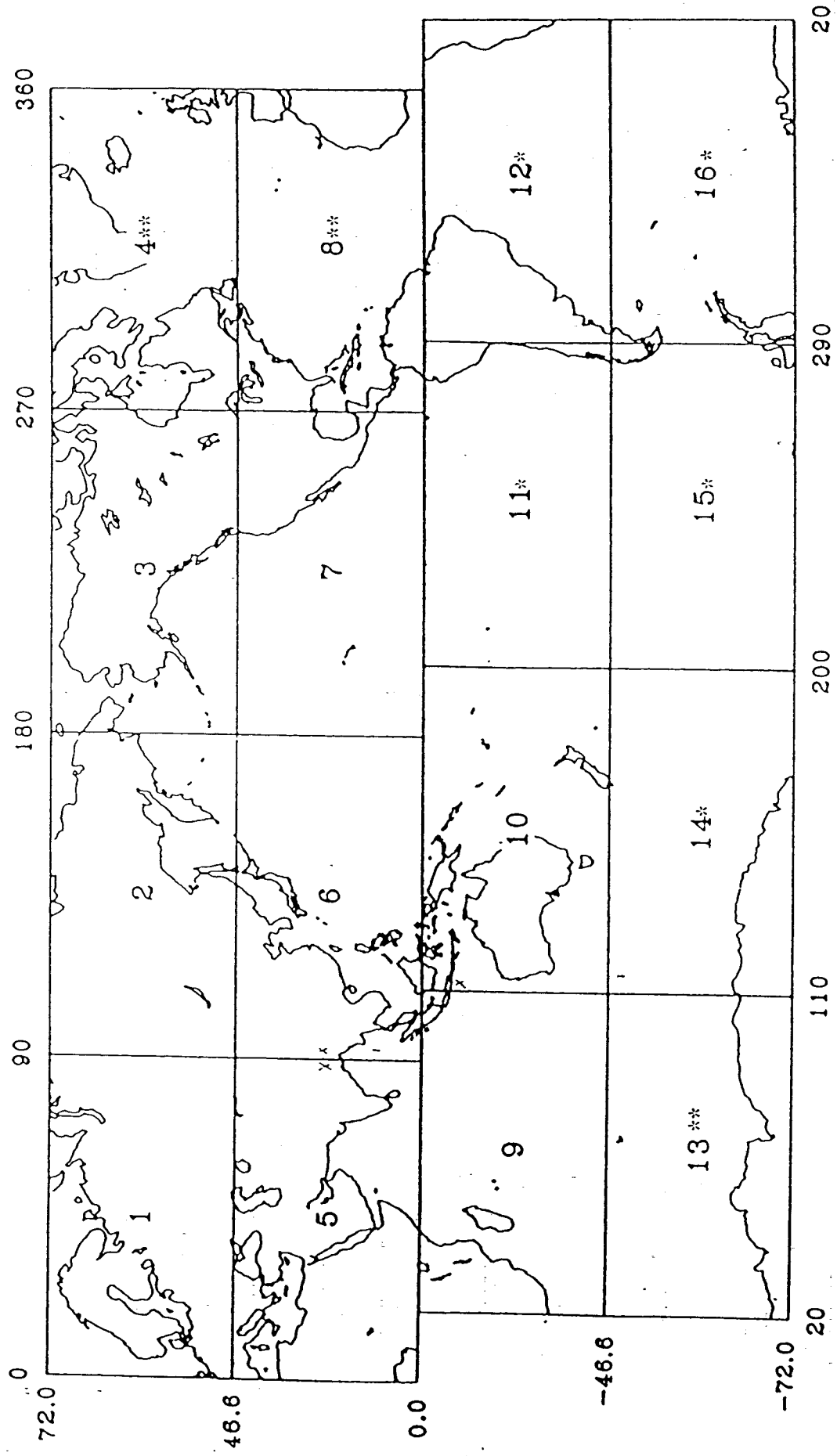
We next went back to the original Seasat altimetry data. We used a program to identify the peaks and troughs in the waveforms of the profiles. We plotted this information at GEBCO scale, representing the peaks in the waveforms as circular picks and the troughs as triangular picks (Fig. 3). We interpreted the peaks and troughs as showing the change in topography due to a change in sea floor age across the fracture zone (the peaks are on the younger side of the fracture zone). With the aid of the GEBCO maps and our earlier Seasat lineation work, we've been able to connect the picks and draw lineations to help locate fracture zones.

We've begun work in several areas (Fig. 1). We've completed the work in the North and Central Atlantic and are presently incorporating the lineations into revised plate reconstructions (Fig. 4 and 5). We've also used this technique to identify fracture zones and other features in the Indian Ocean (Fig. 6). We plan to examine the Seasat altimetry data in the other areas of the oceans and to use this information on ocean floor topography to improve and constrain our plate reconstructions.

References:

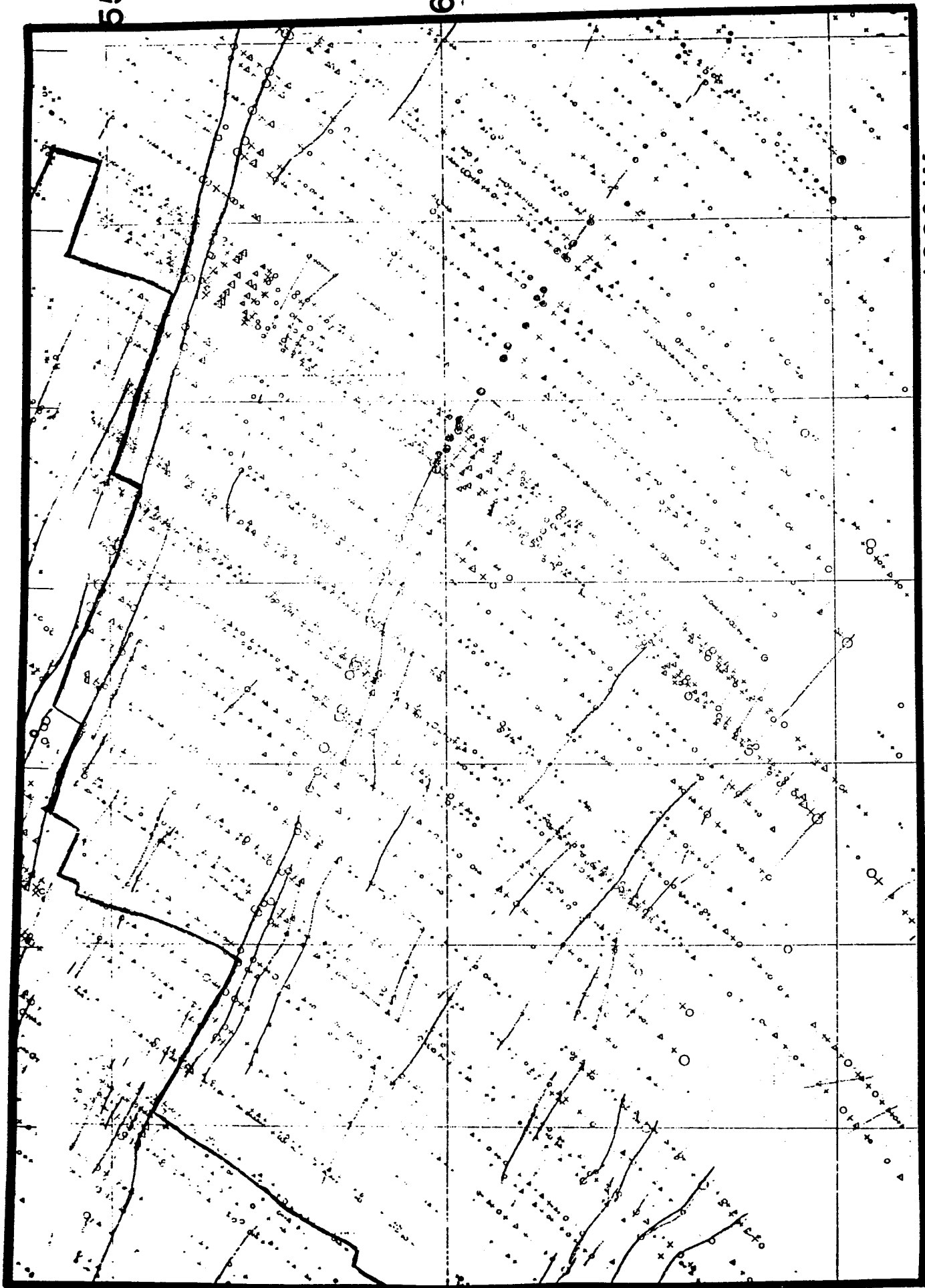
Canadian Hydrographic Service, 1981, General Bathymetric Map of the Oceans (GEBCO), scale: 1:10,000,000.

Sandwell, D.T., 1984, Along-track deflection of the vertical from Seasat: GEBCO overlays, NOAA Tech. Memo., NOS NGS-40.



* work underway
 ** lineations digitized

Figure 1



55° S

60° S

120° W

140° W

Figure 3