RECOGNITION OF TECTONIC AND EROSIONAL MORPHOLOGIES ON EARTH USING RECENTLY AVAILABLE TOPOGRAPHIC AND BATHYMETRIC AVERAGES; M.H. Edwards, R.E. Arvidson, McDonnell Center for the Space Sciences, Box 1169, Washington University, St. Louis, MO 63130; and J.R. Heirtzler, Department of Geology and Geophysics, Woods Hole Oceanographic Institution, Woods Hole, Mass. 02543

Elevation data provide boundary conditions for exogenic and endogenic processes operating on and in planets. They also allow identification of tectonic and erosional processes through analysis of landforms. Elevation data for Earth have recently been compiled by the United States Naval Oceanographic Office and the National Oceanographic and Atmospheric Administration at spatial sampling intervals comparable to what the Venus Radar Mapper altimeter will acquire, approximately 10 km by 10 km. In this paper we report on work we are doing to integrate the new Earth elevation data into map and image databases, accomplished using techniques analogous to the techniques used to process PV altimetry data.

Three of the new elevation data sets consist of average elevations in 10 km by 10 km boxes. They are: Digital Bathymetric Database 5 (also known as SYNBAPS 2) compiled by the United States Naval Oceanographic Office; North American and European data available at the National Geophysical Data Center; and the data for Australia, Tasmania, and New Zealand, which we acquired from Columbia University. The fourth data set consists of 20 km by 20 km modal elevations and was compiled by the U.S. Naval Fleet Numerical Weather Service using 100 foot interval contour charts. During our processing, the elevation data sets are first scaled to fit in compatible dynamic ranges. Then, data are merged using a scheme in which the best data were retained for any given location. The data are then displayed in a variety of map forms and using various codings for elevation such as color value, gray value, etc. The merged data will be available as both shaded relief and color-coded map sheets, and as digital data, from the National Geophysical Data Center within the 1985 calendar year.

The elevation data can serve as a basic data set for comparisons with Venus Radar Mapper altimetry data, and even with the higher resolution MGCO altimetry data. We note that landforms associated with both exogenic and and endogenic processes can be seen in the data. In particular, the following features are discernible:

(a) Trenches, ridges, transforms, numerous seamounts, fracture systems, and other marine landforms.
(b) Individual structural provinces on the continents. This is in contrast to PV altimetry simulations using 100 km footprints.
(c) In general, dissection of structural landforms can be discerned, although specific landforms diagnostic of fluvial and aeolian processes can not be distinguished at this resolution. Interestingly, glacial landforms in Canada and the northern United States can be discerned.

The data also depict significant variations in the degree of dissection of continental edges. We are currently pursuing the use of fractals as means of quantifying the extent of dissection for comparisons with tectonic histories and ages of continental edges.