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Marie Tharp's Ongoing Legacy in Global Seabed Mapping Efforts

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The illumination of the seafloor through Marie Tharp's lens was instrumental in the plate tectonics revolution and fundamentally transformed our understanding of earth processes. Rather than creating traditional contour maps from isolated soundings, her work yielded physiographic diagrams based on sparse echo-sounding profiles that were complemented by stylized views based on her interpretation of the trends and texture of the seafloor. These maps showed the fabric of seafloor in ways that could not have been achieved or communicated with traditional contour plots. Despite the sparseness of the input data, Marie Tharp and Bruce Heezen's early seafloor maps are remarkably consistent with modern bathymetric maps that are based on orders of magnitude more observations.

An important part of the legacy of Tharp's work is codified in the evolution of bathymetric data synthesis efforts led by several of her contemporaries and successors at the Lamont-Doherty Earth Observatory (LDEO). After Tharp's seminal work transforming bathymetric profiles into the first maps of the global seafloor, efforts were undertaken to digitize echo-sounding profiles creating new opportunities for analysis and integration as well as the development of new software tools and approaches for working with those data. In the 1980s, the availability of multibeam sonars in the academic sector ushered in a new era of mapping by extending the data coverage from profiles to swaths that revealed spatially-continuous areas of the seafloor. The Ridge Multibeam Synthesis (RMBS) Project, which began in the 1990s, built upon Tharp's early work and sought to advance understanding of the global mid-ocean ridge system by integrating swath data from multiple ships and cruises to create detailed bathymetric grids served online via the early web. Just over a decade later, the Global Multi-Resolution Topography (GMRT) Synthesis emerged as the next generation product under the inspiration of William Haxby. GMRT shifted the focus of effort from the mid-ocean ridges to the global ocean, and presented an efficient scalable solution using a tiled approach for providing access to global bathymetric data at native resolution. GMRT continues today and includes a curated collection of bathymetry data from over 1,100 research expeditions covering more than 9% of the global ocean at 100m spatial resolution. This presentation will describe the legacy of Marie Tharp in the context of the continuity of seabed mapping work at LDEO, including the evolution of bathymetry data synthesis and integration projects and how they connect to complementary efforts in the international arena including the Nippon Foundation – GEBCO Seabed 2030 Project.