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HYPSOMETRY, VOLUME AND PHYSIOGRAPHY OF THE ARCTIC OCEAN AND THEIR PALEOCEANOGRAPHIC IMPLICATIONS

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Recent analyses of the International Bathymetric Chart of the Arctic Ocean (IBCAO) grid model include: Hypsometry (the distribution of surface area at various depths); ocean volume distribution; and physiographic provinces [Jakobsson 2002; Jakobsson et al., in press]. The present paper summarizes the main results from these recent studies and expands on the paleoceanographic implications for the Arctic Ocean, which in this work is defined as the broad continental shelves of the Barents, Kara, Laptev, East Siberian and Chukchi Seas, the White Sea and the narrow continental shelves of the Beaufort Sea, the Arctic continental margins off the Canadian Arctic Archipelago and northern Greenland. This, the Worlds smallest ocean, is a virtually land-locked ocean that makes up merely 2.6 % of the area, and 1.0 % of the volume, of the entire World Ocean. The continental shelf area, from the coastline out to the shelf break, comprises as much as 52.9 % of the total area in the Arctic Ocean, which is significantly larger in comparison to the rest of the world oceans where the proportion of shelves, from the coastline out to the foot of the continental slope, only ranges between about 9.1 % and 17.7 %. In Jakobsson [2002], the seafloor area and water volume were calculated for different depths starting from the present sea level and progressing in increments of 10 m to a depth of 500 m, and in increments of 50 m from 550 m down to the deepest depth within each of the analyzed Arctic Ocean seas. Hypsometric curves expressed as simple histograms of the frequencies in different depth bins were presented, along with depth plotted against cumulative area for each of the analyzed seas. The derived hypsometric curves show that most of the Arctic Ocean shelf seas besides the Bar-

ents Sea, Beaufort Sea and the shelf off northern Greenland have a similar shape with the largest seafloor area between 0 and 50 m. The East Siberian and Laptev seas, in particular, show area distributions concentrated in this shallow depth range, and together with the Chukchi Sea they form a large flat shallow shelf province comprising as much as 22%. Besides being the world's smallest ocean with the by far largest shelf area in proportion to its size, the Arctic Ocean is unique in terms of its physiographic setting. The Fram Strait is the only real break in the barrier of vast continental shelves enclosing the Arctic Ocean. The second largest physiographic province after the continental shelves consists of ridges, which is in contrast to the rest of the World's oceans where abyssal plains dominate. As much as 15.8 % of the area is underlain by ridges indicating the profound effect they have on ocean circulation.

Jakobsson, M., Grantz, A., Kristoffersen, Y., and Macnab, R., in press, Physiographic Provinces of the Arctic Ocean, GSA Bulletin.

Jakobsson, M., 2002, Hypsometry and volume of the Arctic Ocean and its constituent seas, *Geochemistry Geophysics Geosystems*, v. 3, no. 2.