Tectonism and Volcanism along the Gakkel Mid-Ocean Ridge [5°-74°E]: Initial processing and analysis of SCAMP sidescan data from SCICEX `98 and `99

Gregory J. Kurras & M.H. Edwards (University of Hawaii, School of Ocean Earth Science & Technology, Dept. of Marine Geology & Geophysics, Honolulu, Hawaii 96822; 808-956-3593; email: gkurras@soest.hawaii.edu); J. Cochran (Dept. of Geology & Geophysics, Lomont-Doherty Earth Observatory, Palisades, NY 10964); B. Coakley (Dept. of Geology, Tulane University, New Orleans, LA 70118)

The Gakkel Mid-Ocean Ridge (MOR) is the slowest spreading center on the planet with full-spreading rates between 1.33 cm/yr along the Greenland end to 0.63 cm/yr along the Siberian end. Connected to the Knipovitch Ridge by the Spitzbergen transform, the ridge continues northeast through the center of the Eurasian basin before terminating into the Laptev shelf. Aeromagnetic surveys reveal relatively straight continuous magnetic lineations indicating an active MOR with organized symmetric seafloor spreading since the ridge's initial formation in the late Paleocene (~58mybp).

In 1998 and 1999 a joint effort by the U.S. Navy and NSF resulted in two SCICEX cruises acquiring geophysical data along the Gakkel Ridge in an effort to examine the nature, origin, and evolution of the Eurasian basin. The Arctic cruises, onboard the USS Hawkbill, utilized a newly designed geophysical survey system called SCAMP (Seafloor Characterization And Mapping Pods) to simultaneously acquire gravity, sidescan, swath bathymetry, and chirp sub-bottom profiler data. These data represent the first detailed examination of the basic structure, morphology and history of the Gakkel Ridge. The SCICEX 98 cruise surveyed to 50 km on either side of the Gakkel Ridge axis for ~200 km along two discontinuous segments of the ridge [27°-49°E & 52°-74°E]. The SCICEX 99 cruise returned to fill in and extend the 1998 survey for complete coverage to 50 km on either side of the ridge axis [5°-74°E]. The combined survey images seafloor to about 8.5 Ma in age, covering a range of spreading rates from 1.0 to 1.3 cm/yr. The sidescan data collected by the SCAMP survey are used to map volcanic and tectonic features along the Gakkel Ridge axis and flanks. Where possible, variations in sidescan intensity have been used to map lava flow distributions and estimate relative flow ages. Maps of flow distributions are combined with SCAMP bathymetry and magnetics data from previous published surveys to characterize the neovolcanic zone. Statistical analyses of faults in the axis and along the flanks are compared with analogous results for the Mid-Atlantic and Southwest Indian Ridges to document similarities and differences observed along the Gakkel Ridge.