Figure 1. Poster for current Imax film, “Volcanoes of the Deep Sea” (courtesy of the Stephen Low Company; website http://www.volcanoesofthedeepsea.com).

Screening of documentary, “Volcanoes of the Deep Sea”

Description of Ecosystems of the Deep Seabed

Synopsis of presentation of Professor Peter Rona of Rutgers University to the Informal Consultative Process on the Law of the Sea, United Nations Headquarters, 7 June 2004 (rona@imcs.rutgers.edu)

The current award winning IMAX film, “Volcanoes of the Deep Sea”, was screened at this conference because it illuminates clearly for the first time a part of the deep ocean included in the UN Convention on the Law of the Sea (UNCLOS) where the Earth is being created, life may have begun, and living and non-living resources are present. The film was made by combining Hollywood technology (lighting and cameras) with cutting edge science. The team that made the film includes Executive Producer James Cameron, Director Stephen Low, Science Director Richard Lutz, and Associate Science Director Peter Rona with major support from the U.S. National Science Foundation and Rutgers, The State University of New Jersey.

Professor Rona discussed the setting of the film on the seafloor in the deep ocean, the biodiversity at the setting, and gave a perspective on exploration of the deep ocean with reference to formulation of biodiversity provisions for UNCLOS, as follows:

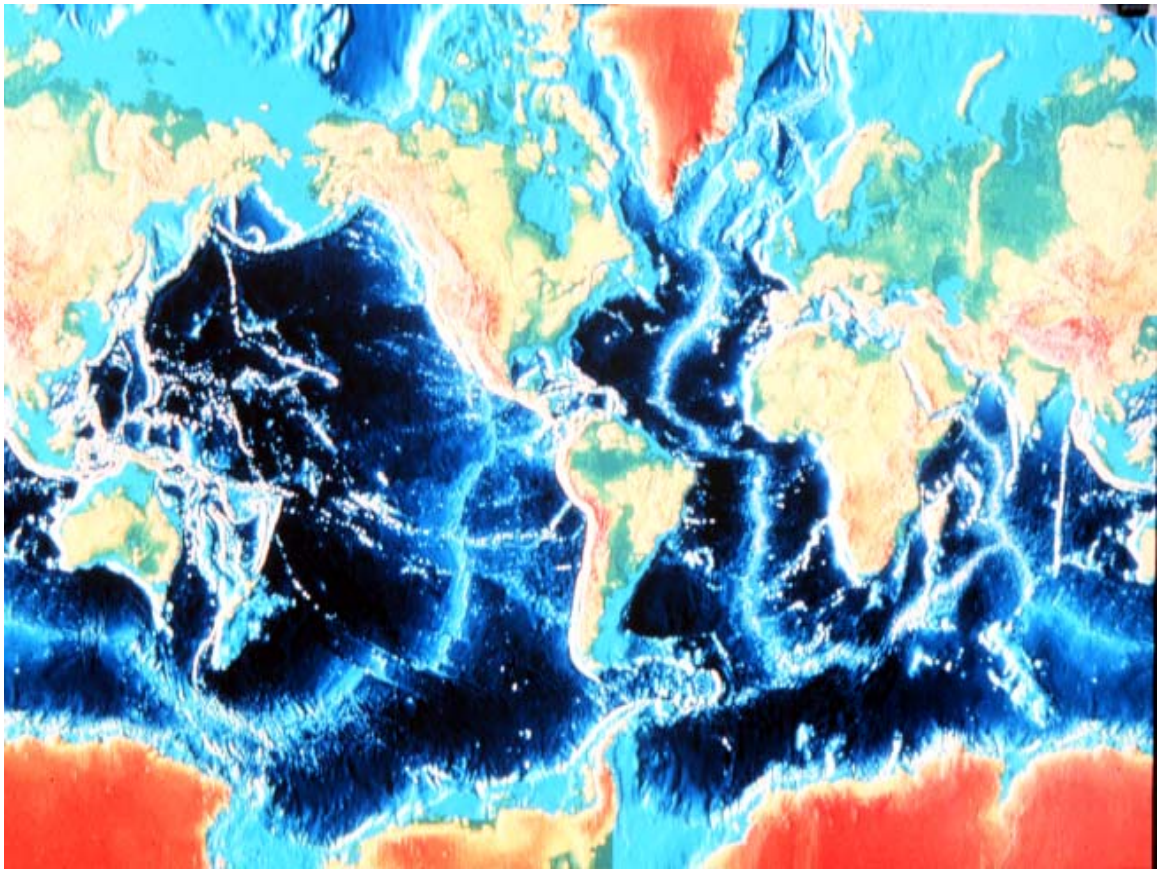

Figure 2. World map showing the ocean ridge system (light line near center of oceans), a submerged volcanic mountain range that extends continuously through the center of the Atlantic Ocean, the Indian Ocean, and the Pacific Ocean as the largest geographic feature on Earth (map courtesy of NOAA/NGDC).

1) Setting: The setting for the film is the ocean ridge system, a volcanic mountain range submerged at water depths of 2 kilometers (1 mile) to 5 kilometers (2.5 miles) that extends through all the ocean basins of the world as the largest geographic feature on Earth. Volcanic activity along the axis of the ocean ridge creates new seafloor in the process of seafloor spreading and produces hot springs. Similar volcanic activity and hot springs are associated with the volcanic island chains that rim the western margin of the Pacific Ocean.
2) Biodiversity: The hot spring provide chemical energy used by microbes to manufacture carbohydrates (sugars and starches) to nourish themselves. The microbes are at the base of a food chain that supports over 500 species of animals all new to science that live at the hot springs. The “heat-loving “ microbes at the hot springs are important both for understanding the origin of life and as a source of commercially useful compounds with growing applications for industry and

medicine. The same hot springs that provide chemical energy to the microbes also transport the metals that are deposited as polymetallic sulfides. This creates a dilemma in that mining the polymetallic sulfides at hot springs will destroy the ecosystems. The best way to avoid destroying biodiversity of microbes and larger animals at hydrothermal vents is to limit any potential mining to older polymetallic sulfide deposits that are no longer active.

3) Perspective: We are at the earliest stage in our exploration of the ocean. Less than 5 percent of the ocean has been explored. More remains to be discovered than has already been discovered. The most important message is to maintain flexibility in any provisions to sustain biodiversity under UNCLOS in order to accommodate new discoveries (for more information see website http://www.sciencemag.org/cgi/reprint/299/5607/673.pdf)