The battle for the abyss: Mining, conservation, and bioprospecting interests square off on the deep sea

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Nearly 60% of the surface of our planet is covered by more than 2000 metres of water. The deep seabed is the largest and least explored ecological region on Earth. With no light for photosynthesis, this cold and high-pressure environment is a food desert, with most organisms feeding on organic debris that sinks from the surface ocean. Yet, there are an estimated 500,000 or more species in the deep sea, many of which occur nowhere else. The abyss has seen relatively little disturbance from human activities, but that situation is poised to change. Economic growth is driving increasing demand for base metals and rare earth elements. Known mineral resources on land will soon be insufficient. Seabed mining is now technologically feasible and regulatory agencies such as the International Seabed Authority are currently finalizing regulations for mineral extraction. Environmental disturbance from seabed mining operations will be significant, with some mining operations at the scale of 10,000 square kilometers or more. This presentation will shine some light on the current debate between deep-sea mining interests and the interests of biodiversity conservation and genetic resource biodiscovery. We will also touch on some of the technologies that are being used for deep-sea exploration. Manganese nodules, cobalt-rich manganese crusts, and polymetallic sulfides comprise the major mineral deposits that are currently being considered for mining. The romantic view of deep-sea mining that emerged in the mid-20th century must now contend with the realization that each of these deposits host unique faunal and microbial communities that would be severely impacted by mining operations. Together, we will explore each of these environments and their inhabitants through imagery collected by research submersibles, and learn more about their biodiversity, their contribution to ocean ecosystem function, and their potential for biotechnological and pharmaceutical applications. We will also introduce some of the players in this battle for the abyss, from regulatory agencies to mining companies, deep-sea biologists and Big Pharma.

Biography: Kim Juniper is Chief Scientist with Ocean Networks Canada (ONC), a University of Victoria-based organization that operates cabled ocean observatories in the Pacific, Arctic and Atlantic Oceans. He is also Professor in UVic's School of Earth and Ocean Sciences and Department of Biology, and holder of the British Columbia Leadership Chair in Ocean Ecosystems and Global Change. He has authored more than 130 peerreviewed publications on the microbiology, biogeochemistry and ecology of deep-sea hydrothermal vents, and low oxygen and other marine habitats. He has contributed scientific leadership and advisory roles to many national and international initiatives including, most recently, the Canadian Healthy Oceans research network (CHONe), the Partnership for Observation of the Global Ocean (POGO), OceanObs'19 and OceanObs Next, the North Pacific Marine Science Organization (PICES), and the European Marine Next, the North Pacific Marine Science Organization (PICES), and the European Marine water column and Seafloor Observatory (EMSOERIC). He served as an occasional advisor to the

International Seabed Authority during the development of regulations for the exploration and extraction of seabed mineral resources in areas beyond national jurisdictions. His current research is focusing on bioprospecting methods for the assessment of the microbial genetic resources associated with seafloor massive sulfide deposits.