Baselines Data Support for Developing of Environmentally Sound Nodule Mining Systems

Valcana Stoyanova
Interoceanmetal Joint Organization
Szczecin, Poland

ABSTRACT

Deep-sea mining of polymetallic nodules is expected to cause directly and indirectly disturbance of the abyssal benthic ecosystem. Acquisition of baselines data of each mining area is essential for evaluation of the environmental impacts as well as for development of site-specific mining design in the way to ensure reasonable protection and conservation of the marine environment. For the purpose of this study, a perspective mineable block of about 3800 km² was delineated within the Interoceanmetal (IOM) licensed area in the eastern part of Clarion-Clipperton Fracture Zone (NE Pacific), with average nodule abundance of 12.6 kg/m² (dry nodules), and resources of 33700 Mt dry nodules sustaining for more than 10 years life of mining operations at the rate of 3 million tons per annum. By means of data on the local geological, geotechnical and environmental conditions, the seafloor that would be directly impacted per mining operations was sized and optimized; both the amount of mobilized sediment and the value of benthic biomass intercepted by the nodule collector were estimated. Nevertheless, in order to minimize the adverse effect on the benthic community, some technical approach in developing the mining system components and ultimate reliance on the environmentally sound exploitation strategy were proposed.

KEY WORDS: Deep-sea mining, polymetallic nodules, Interoceanmetal, minable site,

INTRODUCTION

Although deep-sea mining does not become yet economically feasible and technologically vitality, interest to explore deep-sea mineral resources (in particular, polymetallic nodules) rapidly increases in the last couple of years. Currently, the International Seabed Authority (ISA) has entered into 15-year contracts for exploration for polymetallic nodules and polymetallic sulphides in the deep seabed with thirteen contractors, thus eleven of these contracts are for exploration for polymetallic nodules in the CCZ with two contracts for exploration for sulphides in the South West Indian Ridge and the Mid Atlantic Ridge (http://isa.org.jm/en/scientific/exploration/contractors).

As a contractor with the ISA since 2001, the main objective of the Interoceanmetal (IOM) activity during the third 5-years period is to delineate nodule blocks and identify nodule resources/reserves within prime areas that could be mined in the future. IOM has made considerable progress in geological exploration using multi-beam echo-sounder system, deep-tow photography survey, bottom sampling and performed a huge amount of analysis of physical, mechanical and chemical properties of sediments and nodules (Kotlinski at al., 1996; Kotlinski and Zadornov, 2002; Kotlinski and Stoyanova 2007; Dreiseitl, 2010). Keeping in mind that comprehensive baseline knowledge of the local-scale environment of mineable sites/blocks seems to be essential in development of components of mining system, this paper will discuss the probable path to optimize and limit the environmental concerns of deep-sea mining of polymetallic nodules.