Abstract

Use of bio-fluorescent characteristics for ecosystem monitoring on hydrothermal deposits

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The anthropogenic pressures for the marine ecosystem so far is mostly limited to coastal zone. Landfill, urban effluent, overfishing, oil spill, etc. give most effect to the coastal area. The global climate change is expected to affect to entire earth ecosystem, but the biggest risk prediction is on the coastal ecosystem such as coral reefs and Arctic seashores.

Since DSV Alvin discovered the first hydrothermal vent on the Galapagos Rift in 1977, many hydrothermal vents are reported at many deep-sea areas. The biological community around the hydrothermal vent is remarkable marine ecosystem, because it is independent from Sun light energy, and has peculiar ecological structure based on chemosynthetic bacterium.

Meanwhile, the anthropogenic pressures are spreading their impact to the deep-sea areas recent years. In the hydrothermal area, hydrothermal deposits are formed by sulfides and heavy-metal components settled out from hydrothermal plume, and it is expected to be a good field of the ore resources of gold, silver, copper, lead, zinc, and so on.

A new technology is necessary for the effective monitoring of the deep-sea hydrothermal ecosystem toward the environmental impact assessment of the drilling project. For this purpose, we develop a new deep-sea observation technique using bio-fluorescent characteristics. An ultraviolet (UV) LED illumination and a violet laser illumination are used for fluorescent video recording of a variety of deep-sea organisms. In this study, the observation results of bio-fluorescent patterns and colors of a variety of deep-sea organisms, and its usefulness for the monitoring are reported.