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The impact of Tohoku earthquake and tsunami on coastal environments in Tohoku area in Japan

On March 11, 2011, thrust faulting on or near the subduction zone plate boundary between the Pacific and North America plates resulted in 9.0 magnitude's earthquake, which hit the Tohoku coastal region or northern part of Japan. The epicenter was located 70 km off the coast of Miyagi prefecture, a part of Tohoku region. This earthquake extended approximately 450 km long and 150 km wide. The tsunami waves traveled at a speed of about 700 km/hour and reached the Japan mainland in 25-30 minutes. Waves up to 39 meters or generally 10-20 meters pounded the coastal areas more than 5 km inland. The height was due to the ria coast land morphology characterized by narrow, short and funnel-like valleys. This earthquake and tsunami caused destruction of infrastructures in towns along the coast. More than 18,000 people lost their lives or are still missing. Although damages to terrestrial environments and humanosphere are evident, very little is known about marine ecosystems. Following questions were then raised: What happened to the marine ecosystems? Are there any vulnerable particular environments? Are they recovering to the original systems? If not, what kinds of processes are going on? And what controls such processes? In January 2012, we started 10 years scientific project, Tohoku Ecosystem-Associated Marine Sciences (TEAMS), funded by the Ministry of Education, Culture, Sports, Science and Technology, Japan. The major purposes are to answer the question stated above and also to contribute to the recovery of the fisheries, because fisheries are the major industry in the area. The basic structure of TEAMS (Tohoku Ecosystem-Associated Marine Sciences) is shown in Figure-1. Tohoku University (representative institution), Atmosphere and Ocean Research Institute, the University of Tokyo (AORI) and JAMSTEC (Japan Agency for Marine-Earth Science and Technology) are the core institutions of this project. More than 200 scientists and students have been conducting research in Tohoku area. The study show that the damages varied with environments, location and biological species. The recovery processes are noticed but the condition is complicated due to the developments in terrestrial environments. The scientific achievements and our efforts to communicate with local people, especially fishermen will be described and discussed.

Biography

Kazuhiro Kogure was graduated from the University of Tokyo in 1975 and obtained his PhD at Ocean Research Institute, the University of Tokyo (ORI) in 1980. After spending two years as a Postdoctoral Fellow in ORI, he moved to the University of Maryland as a Postdoctoral Fellow in Professor Rita R. Colwell's laboratory. In 1983, he moved back to ORI as an Assistant Professor in Division of Marine Microbiology, ORI. He was then promoted as Associate Professor in 1993 and then as Professor in 2001. In 2010, ORI moved to a new Kashiwa campus and then restructured as Atmosphere and Ocean Research Institute, the University of Tokyo (AORI). He has been conducting research in the Center for Earth Surface System Dynamics in AORI. He has been the Director of this center since 2015. His research is on the ecology, physiology and genomics of marine microorganisms. Since the earthquake in 2011, he has been the PI of TEAMS group at AORI and conducting extensive field works in coastal areas in Tohoku region, Japan.

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