

## 【Grant-in-Aid for Scientific Research (S)】

### Integrated Disciplines (Complex Systems)



#### Title of Project : Toward Mitigating Tsunami Hazards from Outer-rise Earthquakes: Mapping Potential Earthquake Faults and Constructing a Tsunami Database

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Research Area: Natural Disaster

Keyword: Tsunami, Outer-rise Earthquake

#### 【Purpose and Background of the Research】

Following great megathrust earthquakes, large normal-faulting earthquakes commonly occur in the outer rise, seaward of subduction zones (Fig. 1). These seismic events, which may occur decades after megathrust earthquakes, present large tsunami hazards. The tsunami inundation early warning system that is now used for megathrust events functions by comparing observed tsunami waves to a database of synthetic tsunamis that could be generated by numerous well-located potential earthquake faults. However, there is little information about potential earthquake faults in the outer rise seaward of the Japan Trench. Therefore, the main purposes of this project are to gather the necessary data for the tsunami inundation early warning system by 1) compiling a map of potential earthquake faults in the outer rise based on active-source seismic data and earthquake activity of the oceanic plate, and 2) compiling a database of simulated tsunamis caused by earthquakes on these outer-rise faults.

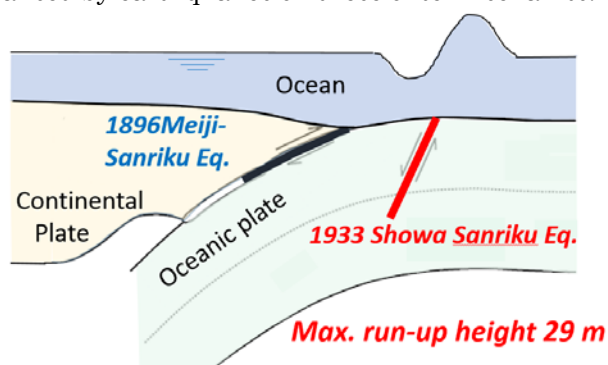


Fig. 1 Schematic diagram of outer-rise earthquake and tsunami wave on the ocean surface.

#### 【Research Methods】

This project uses two research methods: 1) marine geophysical observations to map potential earthquake faults and 2) tsunami simulations to construct a tsunami database. In the marine geophysical observation program, we will conduct large-scale seismic imaging, earthquake monitoring and fine-scale seismic imaging in the outer rise by

using JAMSTEC's seismic exploration system and an ultra-deep ocean-bottom seismometer that we has developed. In the second part of this project, we will compile a map of potential faults capable of generating large earthquakes ( $M > 7.5$ ) and perform a series of tsunami simulations to construct a tsunami database. A tsunami simulation code developed by our research team will be run on the Earth Simulator supercomputer.

#### 【Expected Research Achievements and Scientific Significance】

As specialists in deep-sea marine geophysical observations, we has been implementing a tsunami inundation early warning system for Nankai Trough earthquakes based on a seafloor earthquake and tsunami observation network in the Nankai Trough. In this project we will map potential faults of outer-rise earthquakes in the Japan Trench and expand the existing tsunami inundation early warning system. Moreover, this project will yield fundamental data to more fully utilize the Japan Trench seafloor earthquake and tsunami observation system, which will make a significant contribution to future research in hazard mitigation and prevention.

#### 【Publications Relevant to the Project】

- Fujie, G., S. Kodaira, M. Yamashita, T. Sato, T. Takahashi and N. Takahashi (2013), Systematic changes in the incoming plate structure at the Kuril trench, *Geophys. Res. Lett.*, DOI: 10.1029/2012GL054340
- Obana, K., Kodaira, S., Nakamura, Y., Sato, T., Fujie, G., Takahashi, T., & Yamamoto, Y. (2014). Aftershocks of the December 7, 2012 intraplate doublet near the Japan Trench axis. *Earth, Planet. Space*, 66, doi:10.1186/1880-5981-66-24.

【Term of Project】 FY2015-2019

【Budget Allocation】 154,300 Thousand Yen

【Homepage Address and Other Contact

Information】 <http://www.jamstec.go.jp/donet/e/>