Earthquake and volcanic eruption prediction science through integrated onland, seafloor and ocean drilling observations
-Challenge of the spatio-temporal informatics in subduction zones-

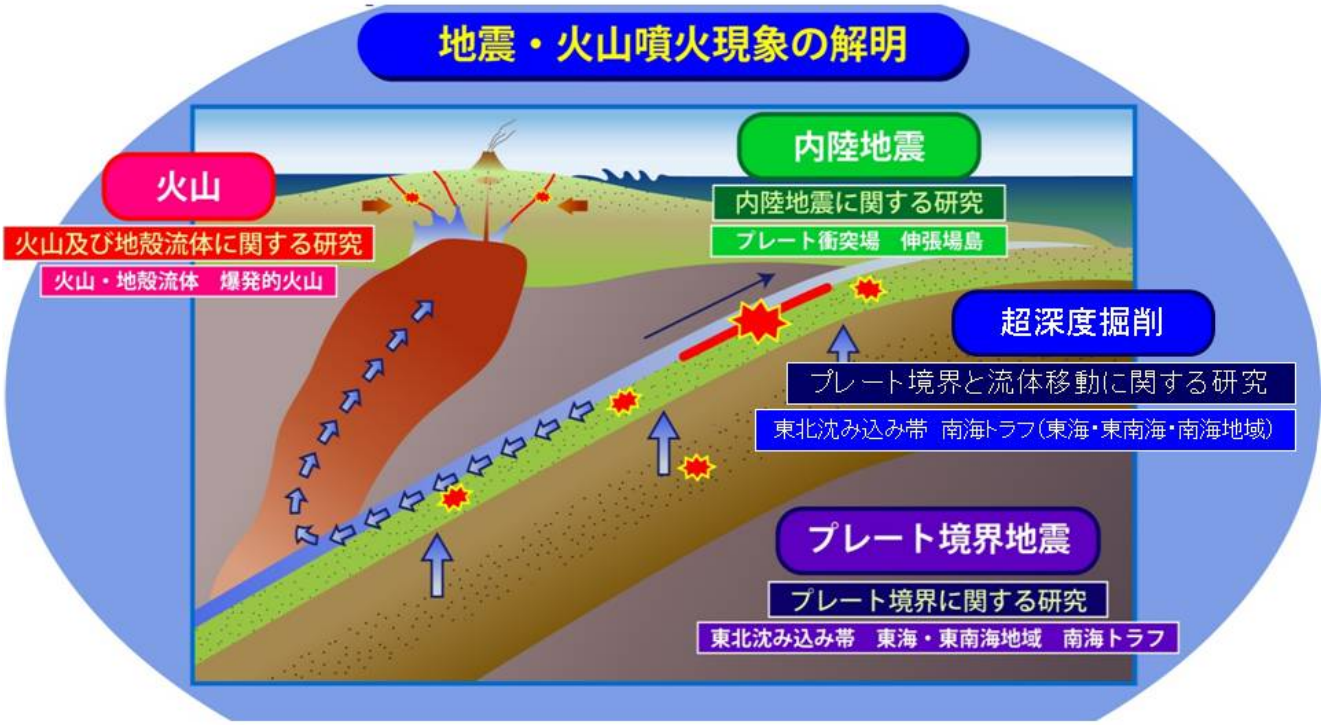
*Naoshi Hirata[1], Masataka Kinoshita[1], Masanao Shinohara[1], Toshiki Watanabe[1], Hiroshi Nishi[3], Yasuhiro Yamada[5], Fumio Inagaki[2], Masafumi MURAYAMA[4], Tsuyoshi Ishikawa[2]

1.Earthquake Research Institute, University of Tokyo, 2.KCC/JAMSTEC, 3.Center for Academic Resources and Archives, Tohoku University, 4.KCC/Kochi Univ., 5.ODS/JAMSTEC

Japan, located in a tectonically active plate convergent zone in the world, is most vulnerable to natural hazards. Subduction of oceanic plates beneath Japan islands causes water and CO2, which are essential energy sources and materials driving the earth and life systems, absorbed in the crust. It leads to a sudden loss of life and social infrastructures caused by natural disasters such as earthquakes, tsunamis, or volcanic eruptions. Since their recurrence interval is much longer than human life, their memories and lessons are difficult to inherit. What we the scientists can contribute is to record and describe the whole process as much as possible, to construct testable models as geological phenomena, and to challenge the assessment of the urgency of these natural hazards and their forecast.
Through the installation and integration of seafloor/onland seismological and geodetic observatory network and ultradeep borehole observatories, this Master Plan attempts to understand the phenomena unique to subduction zones (e.g., formation and evolution of island arc, convergent plate interaction by means of plate motion and mantle rheology, magma formation and upwelling, earthquake cycle and fault zone coupling, physical and chemical processes related to the fluid-rock interaction and fluid migration, life, fluid and energy in deep earth , etc. These new findings are essential for uncover the secrets of earthquake and volcanic eruption, contributing to construct the physical model that serves to create a novel prediction science.
For the seafloor real-time cable network, we propose 1050 seafloor and 150 (shallow) borehole observatories connected with 21,000 km cables around Japan islands. They are installed as a complementary system with the existing networks. Onland, we propose to install ~10,000 observatories with the next-generation dense seismic and volcanic monitoring sensors. Within 5 years, we envision to have the ultradeep drilling into the Nankai seismogenic fault at 5 km below the seafloor off Kii Peninsula. We also plan to drill shallow (~1000m) boreholes in Nankai Trough off Muroto and off the Japan Trench.
The initiative for the seafloor onland observatories is taken at the Earthquake Research Institute, the University of Tokyo. The initiative for the ocean drilling project is taken at 7 leading universities and JAMSTEC, under the umbrella of J-DESC. We agreed that these two initiatives cooperate tightly through exchange of liaisons to each other.

Keywords: Prediction Research for earthquake and volcanic eruption, Earth science in subduction zones, Observatory network of earthquake and geodesy, IODP Ultra-deep drilling, YOTIKYO, J-DESC

沈み込み帯の科学：地震・火山現象の解明



2015/12/25 1

