

Three-dimensional crustal and potential model work flow off Sanriku and Shikoku

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Frontier Research Program for Subduction Dynamics (FRPSD) are oriented to; 1) examine and reveal the mechanism of subduction zone earthquakes around Japan, 2) plan and carry out geophysical cruises and make related geophysical and geological observations of the trenches and associated subduction zones around Japan in support of 1). In order to fulfill the above objectives, FRPSD research focuses on dynamics of the deep sea trenches using multi-channel seismic reflection and OBS methods and integration of these and existing data through sophisticated data base procedure. In this paper, an introduction and application are presented of FRPSD's geophysical digital data base. We are developing a universal marine geophysical data base system and making compilations and analyses of these data.

The main objectives of Frontier Research Program for Subduction Dynamics (FRPSD) are to ; (1) examine and reveal the mechanism of subduction zone earthquakes around Japan, (2) plan and carry out geophysical cruises and make related geophysical and geological observations of the trenches and associated subduction zones around Japan in support of (1). In order to fulfill the above objectives, FRPSD research focuses on integration of these and existing data through sophisticated data base procedure. In this paper, an introduction and application are presented of FRPSD's geophysical digital data base.

Marine geophysical data of bathymetry, gravity, geomagnetics, heat flow measurements, crustal structure, seismicity, and event distribution have been accumulated recently in JAMSTEC and other institutions. We are developing a universal marine geophysical data base system and making compilations and analyses using these data interactively.

Geophysical data sets obtained by cruises are entered into the JAMSTEC Data Base. Subsequent selection, editing and formatting are then done to arrange the Frontier Data Base. The Frontier Data Base is then added to as additional Frontier data collected, employed as the basis for further cruise planning in less data dense areas.

The R/Vs Kairei and Yokosuka equipped with the various required marine geophysical instruments have conducted several geophysical surveys of the Japan Trench and Nankai Trough in 1997 and 1998. Following are data analyses work flow; Raw onboard data were filtered to remove noise and sampling bias, and analyzed to determine whether anomalous features were essentially two- or three-dimensional. The resulting dataset has been combined with simultaneously acquired other geophysical data to facilitate interpretation. Such compilation of crustal structure, gravity, and marine magnetic data around Japan are top priorities for understanding the earth surface deformation and revealing the movement process. Work flows are as follows; we use the terms layer and horizon interchangeably to indicate a geologic horizon. Layer density and susceptibility refer to the volume of rock between the model layer and the layer immediately above it. Densities and susceptibilities are assigned between the layers of the model and may be specified to vary vertically, laterally, or to be held constant. Using two- and three-dimensional forward modeling of gravity and magnetic profiles, with seismic structural data in the Frontier Data Base, a qualitative interpretation of the geometry, densities, magnetization and thermal regime of subducting plates is discussed. Further useful tools are added; such discussed model layers are structurally changed by selecting a region of the layer to modify, digitizing the revised depth control points either in map view or along cross sections, and re-gridding the selected region. We modified three-dimensional geophysical data visualization to provide an integrated graphical environment

to access data from a variety of sources and view the data objects in a common scene.

Further integrated Frontier Data Base system with various tools would be constructed to elucidate the dynamic mechanisms by which deformation occurs in circum-Japanese subduction zones.