Study on distribution of uplift of inland areas and characterization of uplift/subsidence in Japan

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1. Introduction

We have investigated characteristics of the uplift/subsidence of about the past 100000 years in the Japanese islands as a part of the examination of the long-term change of the geology environment. In this study, we have draw the map of distribution of uplift/subsidence of about the past 100000 years of the Japanese islands.

2. Method

(1) Literature survey

We have mainly used the following former shoreline data (FS value) for mapping of the coastal areas: Atlas of Quaternary Terraces in the Japanese Island (ed. Koike and Machida, 2001), Quaternary Maps of Japan (Japan Association of Quaternary Research, 1991) and Last interglacial shoreline map of Japan (Ota et al., 1992). In the area which lacked data, we considered the topographic and geologic information from Land condition maps of coastal areas by GSI, geological maps by GSJ and so on, and estimated marine terrace distribution. On the other hand, we have used uplift/subsidence data which were showed in some literatures for mapping of inland areas. In the plane and basin areas, we considered the area which had no terrace to be a subsidence area during Quaternary, and estimated average subsidence rates using depth and age of the base of Quaternary formation.

(2) Air-photograph survey in the inland areas

Our estimation of inland-area uplifting by the air-photograph survey is based on the TT and FS' methods by Yoshiyama and Yanagida (1995). The TT method considers a difference in height above sea level of the MIS6 and MIS2 river terraces to be uplift between the last glacial age (MIS2) and the former one (MIS6). The FS' method consider a difference in height above sea level of the MIS5 river terrace and present river bed to be uplift between the present and MIS5.

At first, we draw the terrace distribution map. Second, MIS2, 5, and 6 river terrace were picked up on the basis of the characteristics of the distribution and topographic feature, referring to the characteristics of MIS6-river-terrace showed by Yoshiyama and Yanagida, and previous dating data. Third, we draw longitudinal river profiles and picked up TT and FS' values using the 1/25000 topographical maps of GSI.

(3) Uplift/subsidence map of about the past 100000 years

At first, we draw the base map which put the data obtained from the literature survey and air-photograph survey. Data on each point were put in order in every source on every the estimate method. Furthermore, we classed point data into three reliability grade: A/reliable, B/probable, using interpolation sea level data of either MIS2 or MIS6 river terrace, C/possible, either MIS2 or MIS6 river terrace is covered by a overburden layer.

Second, we made the map that showed uplift/subsidence by six steps with distribution of active faults and Quaternary volcanics. We considered TT, FS', FS values to be equal in consideration of the survey precision.

3.Results and conclusions

(1) Over 1mm/y uplift areas are as follows:

*coastal area along the Sea of Japan from Hokkaido to Hokuriku

*coastal area along the Pacific Ocean from Kanto to Southwest Islands

*inland area along the Itoigawa-Shizuoka Tectonic Line and the Fujigawa fault zone

*area along the Yanagase-Sekigahara-Yoro-Kuwana-Yokkaichi fault zones

*Kanto Mountains

*North-West Osaka area (Rokko Mountains)

(2) The maximum uplift rate during last 100000 years in this study is about 3mm/y of the Hida Mountains.

(3) The tight-folding area along the Japan Sea from Hokkaido to Hokuriku is limited to coastal area. However, the characteristics of uplift/subsidence are different on the west side of that the Yanagase-Sekigahara-Yoro-Kuwana-Yokkaichi fault zones.

(4) The Ou and Chubu mountains areas are composed by the block divided by a fault. Uplift of each block in these areas is less than that of coastal area along the Japan Sea.

(5) Okhotsk coastal area, North Shikoku area and Chugoku area are uplift areas, but uplift rates of these area are less than 0.2mm/y.