

Holocene paleoenvironment and crustal movement in Yamada plain, south of Sanriku coast in northeast Japan

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Background, Objective

The Sanriku coast in northeast Japan forearc is a typical ria coast and has geologically uplifted but geodetically and seismologically subsided (e.g. Miyauchi, 2012). In order to solve the paradox, Holocene lowland development in south Sanriku coast area is a clue.

The purpose of this study is to clarify the Holocene environmental changes and crustal movement in the south of Sanriku coast areas using drilling core sediments.

Study Area, Methods

This study focused on Yamada plain in Iwate Prefecture in south of Sanriku coast because the plain locates in a typical enclosed environment without marked river systems and located inner part of Yamada bay, and because many borehole cores were drilled and available.

We conducted landform classification, sedimentary facies analysis, grain size analysis, elementary analysis, diatom analysis, identification of shell species, tephra analysis, and high-resolution AMS 14C dating.

Results, Discussion

Reconstruction of Holocene paleogeography in Yamada plain

The alluvium in Yamada plain is divided for five units, based on the facies, grain size, total sulfur content, and occurrence of shell fossils. The paleogeography of the study area can be characterized by four stages associated with glacial eustasy as follows: wetland in the early Jomon Transgression (about 10,000 cal BP-8,000 cal BP; unit1) ; enclosed bay after tidal flat in Jomon Transgression (about 8,000 cal BP-4,200 cal BP; unit2) ; tidal flat or shallow marine in the eastern (sea) side (unit3) and coastal lowland in the western side (unit4) in the period of regression (about 4,200 cal BP-300 cal BP; unit3, 4) ; and wetland or beach ridge (about 300 cal BP-present; unit5) .

Holocene crustal movement in Yamada plain and south of Sanriku coast

To estimate the trend of Holocene crustal movement, we compared the age-depth curve obtained from the core and theoretical sea level curve (Okuno et al., 2014) which does not take into account the local crustal movement. The age-depth curve when Yamada plain was intertidal zone roughly shows local sea-level. Therefore, if the local crustal movement was not in the past, the age-depth curve should overlap with the theoretical sea level during the same time. However, the former is clearly below the latter, indicating that Holocene crustal movement in Yamada plain is more or less subsidence trend. In addition, the average subsidence rate of the past was 1.5-2.3 mm / yr at about 7,500-8,000 years, about 2.3 mm / yr at about 1,700 years.

This study revealed that the trend of Holocene crustal movement in Yamada plain is more or less subsidence trend. This result is the same trend as it of the last 100 years. It is also suggested that the trend of Holocene crustal movement in whole south of Sanriku coast area is subsidence trend by comparing with previous study in Rikuzentakata plain (Niwa et al., 2014).

References

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