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Accumulation curves of the incised-valley fills in the Echigo Plain, central Japan

Ayako Funabiki^{1*}, Yoshinori MIYACHI¹, Katsumi Kimura¹, Atsushi Urabe², Yukihiro Kamoi³

¹Geological Survey of Japan, AIST, ²Research Center for Natural Hazards and, ³Kowa Co. Ltd.

1. Introduction

The Echigo Plain faced on the Japan Sea coast is a sedimentary basin governed by subsiding effect of the Echigo Plain Western Margin Fault Zone. The incised valley under the Echigo Plain is filled with the sediment of the Shinano and Agano Rivers as the sea level rose during the last deglacial. The thickness of the sediment is up to 160 m. The plain is still interseismically subsiding at a rate of about 3mm/yr at the coast. In this study, we illustrated the accumulation curves based on the radiocarbon data of 27 boreholes taken from the Echigo Plain. Then, we discuss the sedimentary environment and accumulation rates.

2. Shinano River lowland

The Shinano River lowland consists of the western part of the Echigo plain, located on the downthrown side of the fault. In this area, the fluvial and marine sediments aggraded from the last glacial maximum to early Holocene. During this period, the accumulation curve of each borehole site documented similar trend. After 9 cal kyr BP, the barrier-lagoon system documented relatively high accumulation rates (average: 10mm) and prograded seaward with several times interation of transgression and regression.

The western edge of the plain consists of the uplifted side of the fault and the Kakuta-Yahiko Mt. The estuarine sediments covered the late Pleistocene sediments without fluvial sediments. They are located at -20 to -10 m in elevation and the accumulation rate is less than 2 mm/yr. The Kakuta-Yahiko Mt. leads to the Yotsugoya anticline on seafloor. The accumulation rate of the core taken from Yotsugoya anticline is about 2.5 mm/yr. It illustrates a gentle curve indicating less subsiding effect and distance from the depositional center.

3. Agano and Kaji River lowland

In the Agano River lowland, the eastern part of the plain, delta system has prograded since 8 cal kyr BP instead of the barrier-lagoon system. The accumulation rate of the delta sediments are about 8 mm/yr. The Agano River's incised valley was almost filled with the deltaic sediments by the middle Holocene, while the most of the Shinano River lowland remained inundated.

The northern part of the Echigo Plain consists of Kaji River lowland. In this area, the accumulation rates of the incised valley-fills are about 3 mm/yr and much smaller than the Shinano River and Agano River lowland. This is because the thick alluvial-fan related sediment deposited before Pleistocene filled sedimentary basin and limited the accommodation space.

Keywords: incised-valley fills, Echigo Plain, accumulation curve, maximum flooding surface, radiocarbon dates