

Comparison of geological stratigraphy between three drilling cores and analysis of shallow geological structure in the Koriyama Basin, Northeast Japan

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1. Introduction

The Fukushima Renewable Energy Institute, AIST (FREIA) has surveyed shallow subsurface geological analysis (ca. 100 m depth) in the Koriyama basin as part of researches to compile a suitability map for installation of ground source heat pump system. Ishihara et al. (2018) reported geological stratigraphy of an all-cores (GS-KR2015K-1, 251.60 m asl, 100 m depth) in the central part of the Koriyama basin and Kasahara et al. (2017) reported a tephro-stratigraphy of KR-11-1 core drilled in the northern part of the basin. In this study the authors reported geological stratigraphy of a new all-core (GS-KRC-1, 249.4 m asl, 80 m depth) in the southern part of the Koriyama basin and consider the shallow subsurface geological structure of the basin.

2. GS-KRC-1 core

Lithofacies: In the depth from surface to 29 m, silt and sandy-silt beds are dominant. Gravel layers are also intercalated at 3-8 m, 13.5-14.0 m, and 18-24 m depth. A tephra layer (volcanic glass ~ pumice sand beds) is detected from 27.0-27.4 m depth. Facies from 29 to 80 m mainly consist of gravel layer and a pyroclastic flow sediment is intercalated at 52-65 m depth.

Dating result: Two radiocarbon ages of wood fragments obtained from the core (1.78 and 2.12 m depth) show ca. 50,000 cal yBP, respectively. A FT age of pyroclastic flow sediment (55-59 m depth) shows 3.4 ± 0.4 Ma.

3. Discussion

Based on stratigraphic correlation between GS-KRC-1 and other two cores (GS-KR2015-1 and KR-11-1), it was interpreted that silty-dominant layers with a depth of 0-29 m is the upper Koriyama Formation and gravel layers with a depth of 29-52 m is the lower Koriyama Formation or the Shirakawa Formation, respectively. The age of the pyroclastic flow sediment is well correlated with the age of the pyroclastic flow sediment (3.2 ± 1.3 Ma) of GS-KR2015-1 (41.9-49.0 m depth), indicated that they are the same pyroclastic flow sediments.

The pyroclastic flow sediments of the GS-KRC-1 core is distributed at about 184.4-197.4 m asl, which its base level is 10 m lower than the pyroclastic flow sediment of the GS-KR2015-1 (202.6-209.7 m asl). It is indicated that terrace or hilly landform existed just before deposition of the pyroclastic flow sediments.

Keywords: Koriyama Basin, drilling core, subsurface geological stratigraphy, tephra