

Identification and correlation of tephra in aeolian deposits covering marine terraces on the northern Sanriku Coast

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Numerous geographical or geological researches on the northern Sanriku Coast have been conducted since 1960s. In the Kamikita Plain, Miyauchi (1988) and Kuwabara (2009, 2010) revealed stratigraphic, lithologic and petrographic characteristics of Toya tephra (112-115 ka: Machida and Arai, 2003) which is available as correlation of the Last Interglacial (LIG) marine terraces. On the northern Sanriku Coast, although Yonekura (1966) correlated the marine terraces based on geomorphological analysis and sedimentary facies, few studies focusing on the terrace ages on the basis of tephrochronology have been conducted since then. Thus, this study concerns features of tephra layers (e.g., stratigraphic position, lithofacies, refractive index and morphological classification of volcanic glass shards) in the Kamikita Plain as a reference. We also identified tephra layers on the northern Sanriku Coast based on correlation to those reported in the Kamikita Plain to improve of accuracy for age estimation of the LIG marine terraces.

In this study, we first mapped the LIG marine terraces by aerial photograph interpretation, and then conducted field surveys and collected tephra samples. In tephra analysis, we observed grains in tephra sample under a polarizing microscope and clarified their grain composition and shape of their volcanic glass shards. In addition, for some tephra samples refractive index of their volcanic glass shards were measured by using RIMS2000.

In Kamikita Plain, the Takadate surface (Miyauchi, 1985), one of the LIG marine terraces, is well developed. We collected tephra samples (To-H, To-BP1, To-G, To-Kb, To-Ok₂, To-AP, Toya, ZP2) at Mitateyama reported as a type locality of tephra covering the Takadate surface by Miyauchi (2001). To-H is composed of several fall units. Its volcanic glass shard content is high and its glass type is mainly pumice type. To-Ok₂ is composed mainly of coarse-grained pumice. To-AP contains blue-gray lithic fragments in the upper part of the layer. Toya appears as a gray-white ash layer. Its volcanic glass shard content is high and its glass type is characteristically bubble-wall type. We measured refractive indices of its volcanic glass shards at n=1.493-1.497. These characteristics are similar to the ones in the previous reports (Machida and Arai, 2003; Kuwabara, 2010).

On the northern Sanriku Coast, the Taneichi surface, reported as a LIG marine terrace by Yonekura (1966), are developed at 20-30 m a.s.l.. From field surveys, it is presumed that terrace deposits of the Taneichi surface are marine beds because they consist of well-sorted sand layers and rounded gravel layers, which are similar to modern beach deposits. In addition, we identified four tephra layers (Tephra 1-4 in descending order) covering the Taneichi surface. The Tephra 1 is interbedded with the upper part of aeolian deposits and consist of a few fall units. Its glass type is mainly pumice type, and refractive index of its volcanic glass shard is n=1.503-1.513. These characteristics are similar to To-H and thus we correlated this tephra with To-H. The Tephra 3 is probably correlated with To-AP because it contains blue-gray lithic fragments in the upper part of the layer. The Tephra 2 is probably correlated with To-Ok₂ because of its stratigraphy and consistency with the thickness from an isopach map in Miyauchi (1985). The Tephra 4 is correlated with Toya because its volcanic glass shard content is high, and its glass type is mainly bubble-wall type.

In this study, we found four tephra layers covering the Taneichi surface on the northern Sanriku Coast and preliminarily correlated them with To-H, To-Ok₂, To-AP and Toya. Consequently, we estimated that the Taneichi surface was a LIG marine terrace because Toya covered immediately above marine beds. In the meeting, we will report more detailed petrographic characteristics of the tephra and results of correlation and chronology of LIG marine terraces on the northern Sanriku Coast.

Keywords: the Sanriku Coast, marine terrace, tephra, Toya tephra