

Study of shallow subsurface geology based on analysis of sedimentary cores drilled in the Aizu Basin, Northeast Japan

*Takeshi ISHIHARA¹, Takehiko SUZUKI², Misao HONGO³, Youhei UCHIDA¹

1. AIST, 2. Tokyo Metropolitan University, 3. Alps Technical Research Co., Ltd

1. Introduction

Aizu Basin is one of tectonic basins aligning with north-south direction in the south part of Northeast Japan. Along the west and east margin of the basin, the West Aizu Basin Fault Zone and the East Aizu Basin Fault Zone, active reverse faults, stretches respectively (e.g. AIST, 2007). Quaternary geological structure of the Aizu basin and tectonic histories of both fault zones are still not clear because of lack of chronological studies of underground sediments of the basin, except Suzuki et al (2013, 2016) discussed tephrochronology in the basin and activity of the West Aizu Basin Fault Zone since middle-Pleistocene based on analysis of a sediment core (AB-12-2, 179.1m asl, 99.5m depth) drilled in the western part of the basin.

AIST drilled two sediment cores (GS-SOK-1, 175.99m asl, 130m depth; GS-AZU-1, 208.36m asl, 100m depth) in the eastern part of the Aizu Basin and reported their stratigraphy based on tephra and fossil pollen analysis (Ishihara et al., 2015, 2016). In this report, we discussed a shallow subsurface geology by correlating each stratigraphy of GS-SOK-1, GS-AZU-1, and AB-12-2 cores.

2. Geological stratigraphy of cores in the Aizu Basin

GS-SOK-1: Sn-SK tephra (220ka, Suzuki et al, 2004) is included in the depth of 81.1-81.7m. Twelve local pollen assemblage zones (SOK-I, -II, ..., and -XII, in ascending order; added to Ishihara et al., 2016) are divided. Tertiary flora (e.g. *Metasequoia*, *Keteleeria*, *Carya*) are slightly included in SOK-I zone (111.1-126.7m depth; Ishihara et al., 2016). On the basis of tephra, pollen, and 14C analysis, we divided stratigraphy of GS-SOK-1 into the following: Holocene (0.0-6.0m depth), upper Pleistocene (6.0-45.0m), middle Pleistocene (45.0-110.5m), and lower Pleistocene (110.5-130.0m).

GS-AZU-1: Five tephra layers are identified as follows (depth: tephra name and age), 13.35-13.38m: AT (29-30ka, Machida, 2011), 30.25-30.30m: Aso-4 (87ka, Aoki et al., 2008), 34.10-35.10m: Nm-SB (110ka, Suzuki et al, 2004), 52.35-52.40m: Sn-MT (180-260ka, Suzuki et al, 2004), and 70.5-76.3m: Kachikata ignimbrite (one of the Shirakawa ignimbrites; Yoshida and Takahashi, 1991; Kurokawa et al., 2008). On the basis of tephra and 14C analysis, we divided stratigraphy of GS-SOK-1 into Holocene (0.0-5.0m depth), upper Pleistocene (5.0-36.5m), middle Pleistocene (36.5-52.5m), and lower Pleistocene (52.5-100.0m).

AB-12-2: On the basis of Suzuki et al (2016), geological stratigraphy of AB-12-2 is divided into Holocene (0.0-ca. 8.5m depth), upper Pleistocene (ca. 8.5-44.5m), and middle Pleistocene (ca. 44.5-99.5m).

3. Shallow subsurface geology in the Aizu Basin

Accumulation rate of the sediments at GS-AZU-1 are 0.45m/kyr between ground surface and AT, and 0.26-0.27m/kyr between AT and Nm-SB, whereas the accumulation rates of AB-12-2 (Suzuki et al., 2016) are 0.46-0.55m/kyr between ground surface and DKP (55-66ka; Suzuki et al., 2016), and 0.19-0.23m/kyr between DKP and TG (129ka; Aoki et al., 2008). Similarity of accumulation rates between GS-AZU-1 and AB-12-2 indicates that vertical average slip rate of the East Aizu Basin Fault Zone is comparable with rate of the West Aizu Basin Fault Zone if the accumulation in the basin corresponds to the activity of both fault zones. Difference in changing period of accumulation rate implies time lag of each fault activity and/or local variation of sedimentary environment.

Boundaries between lower and middle Pleistocene in the Aizu Basin are, at 50-60m depth in Aizu-Wakamatsu, 110-120m in Shiokawa, 50-60m in Atsushio (Tohoku METI, 1999) from south to north, indicating structure of lower Pleistocene inclining toward central basin from south and north margin. By contrast, in Aizu-Bange, western part of the basin, stratigraphy of AB-12-2 (Suzuki *et al.*, 2016) and well columns indicates lower Pleistocene lies below 100-150m depth, showing incline westward of lower Pleistocene. These results are important to clear tectonic histories of both fault zones.

Keywords: Aizu basin, Quaternary, Pleistocene, shallow subsurface geology, tephra, fossil pollen