

Analysis of S-wave velocity structure in sedimentary plains by P-S converted-wave reflection survey

Takanobu Yokokura[1], Naomi Kano[1], Kazuo Yamaguchi[2], Yoshihiro Kinugasa[3]

[1] Institute of Geoscience, GSJ, AIST, [2] AIST, [3] Dept. of Environmental S&T, TITech

1.Introduction

The S-wave velocity structure down to the basement is one of the key elements for the estimation of strong ground motion in a large sedimentary basin. We demonstrated in the 2002 Japan Earth and Planetary Joint Meeting that P-S converted-wave reflection survey has a unique possibility both to image two-dimensional structure and to estimate S-wave velocity to the deeper part of the basin. In that presentation, we showed processing results in which the deepest basement was only 1.2km deep. In this presentation we argue the applicability of P-S converted-wave reflection survey to a deeper structure and the method to improve imaging quality.

2.Improving data processing

We improve the method of statics corrections to have good imaging quality. Very shallow irregularity of structure and heterogeneity of velocity often lead to deterioration in the imaging quality. Statics corrections remove the effect of irregularity and heterogeneity in very shallow part, and are very important in the processing of P-S converted-wave reflection. The results in last year had apparent gaps in some reflection events that are called cycle skips. The cycle skips were mainly due to mis-identification of first breaks of the S-refraction waves. To avoid such effects, we formulate a method through repeated first-break reading and data processing.

3.Application to data where the basement is deeper than 2km

We process 3-component reflection data that acquired at dry river beds of Tama river, Fuchu, Tokyo. Observation were made by two 144-channel acquisition systems using 96 3-component geophones with fixed spread of 10m interval (totally 288 channels). The fixed spread was made twice (totally 192 stations). Sources were two large vibrators. Vibrating interval was also 10m. Vibrating points were extended beyond the geophone spreads, so the largest offset became 2980m. The processing results show good correlation of reflection horizons between P-wave and PS-wave depth sections: from shallow horizons of the Shimosa and Kazusa groups to the deepest preneogene basement which is deeper than 2km. This indicates that the P-S converted-wave reflection survey is applicable to deeper basins.

4.Towards future research

We will verify and improve the processing method of the P-S converted-wave reflection data through application to the deeper and geologically more complex sedimentary basins. At the same time we will consider how to decrease the limitations of P-S converted-wave reflection survey.