

Relation between reflection characteristics from plate boundary and source process at the area of the 1994 Off-Sanriku Earthquake

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1. Introduction

From many studies of slip distribution of the 1994 Off-Sanriku (Sanriku Haruka Oki) Earthquake ($M_w=7.5$), the distribution of coseismic slip indicates that large slip occurred at the central and western parts of the rupture area. The slip distribution is very heterogeneous around the epicenter, and aftershocks occurred where the coseismic slip was small. There are extremely low aftershock areas around the epicenter, where are also low moment release. It is important to examine whether they are non-asperity or not. To investigate the possibilities of non-asperities and causes of this heterogeneity of slip distribution, we conducted seismic refraction-reflection surveys. Characteristics of reflection from the plate boundary are key to reveal the cause of the heterogeneity.

2. Analysis methods

First, we construct seismic velocity structures using the first and later arrival data (Tomoda et al. 2005). Then, we identify reflection phases from the plate boundary, and estimate intensity of the reflection phases. During the estimation, we calibrate energy of shot pulses and degree of coupling between OBS and ocean floor.

3. Results

Strong reflections are shown from the areas where are extremely low aftershock and low moment release around the epicenter. This can be explained that there are water and/or clay minerals on the plate boundary of the areas. The epicenter of the 1994 earthquake seems to be located at a gap of the strong reflection regions. This may suggest that a part of the strong reflection regions is the region of the rupture nucleation.