

Seismic fault slip distribution of the 1703 Genroku Earthquake from marine terrace data using an earthquake cycle model

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1. Introduction

South Kanto district has suffered repeatedly from large earthquakes such as the 1923 Kanto Earthquake and the 1703 Genroku Earthquake. It is important to estimate seismic slip distribution of the large earthquakes in order to understand seismic source processes and reduce earthquake disaster. Since we have seismic and geodetic data on the 1923 Kanto Earthquake, many studies on the event were conducted. On the other hand, the data on the 1703 Genroku Earthquake are only marine terraces and old literatures. Estimation of the slip distribution of the 1703 Genroku Earthquake is difficult because marine terrace data include coseismic, interseismic and permanent displacements, and these displacements could not be divided. This study presents the estimation of slip distribution of the 1703 Genroku Earthquake from marine terrace data using an earthquake cycle model which can estimate the permanent displacements by the steady state subduction and stress relaxation effect of the asthenosphere.

2. Method

Our earthquake cycle model (Matsu'ura and Sato, 1989; Sato and Matsu'ura 1992) reveals that the difference between the data whose phases in the earthquake cycle are the same (for example, data of all marine terraces are in the phase of just before event), but whose ages are different depends only on the permanent displacements. This means that we can estimate the permanent displacements if we have two or more marine terrace data whose ages are different, and can divide the coseismic, interseismic and permanent displacements (for detail, see Sato et al. 'Estimation of seismic fault slip distribution from marine terrace data using an earthquake cycle model' in this meeting).

The data on marine terraces in south Boso region are from Shishikura (2001). These data include displacements due to the 1923 Kanto Earthquake. These displacements can be removed using slip distribution of the earthquake estimated from geodetic data (Noda et al, 2005).

We estimate slip distribution of the 1703 Genroku Earthquake with a constraint of smooth slip distribution using ABIC inversion method.

3. Results

The estimated slip distribution shows more than 20m slip beneath the south end of Boso Peninsula, if we assume that the seismic slip of 1703 Genroku Earthquake occurred on the Philippine Sea plate. Although the estimation error is large, the lower (deeper) limit of slip distribution may be beneath around Futtsu to Katsuura.