

Epicenter of the Ansei Hietsu Earthquake in 1858 inferred from ratio of dead persons in each village

KOMATSUBARA, Taku^{1*}

¹Geological Survey of Japan, AIST

1. Introduction

Historical documents are key data for reconstruct the features of paleo-earthquakes. However, it is still rare to restore the source mechanism and/or location of epicenter of paleo-earthquakes from human damage data. The presenter tries to estimate the epicenter of the first shock during the Ansei Hietsu Earthquake in 1858 ($M=7.0\sim 7.1$; Usami et al., 1979) which are considered to be double earthquakes from ratio of dead persons in each village.

2. Features of the 1858 Ansei Hietsu Earthquake

The Ansei Hietsu Earthquake occurred on mid-night on 9 April 1858. Historical documents described that this earthquake is composed of two large shocks on 12PM and on 01AM (Cabinet office, 2008). Damages of human and houses by this earthquake are described by Takayama Gundai (local governor) in detail. We can analyze the damages quantitatively by these documents. They denote that damage of houses were bitter along the Atotsugawa fault, where 50~100% houses collapsed, damage of houses occurred along the Miboro fault, where 20~60% houses collapsed, and much less damages occurred in other areas (Usami et al, 2013). Trenching survey (Tsukuda et al., 1986) and detailed dating of active fault outcrops (Doke and Takeuchi, 2009) revealed that the Atostugawa fault is the source of this earthquake.

3. Estimated epicenter of the first shock of the Ansei Hietsu Earthquake inferred from the human damages described in Ansei Go Uma-no-toshi Hishu Muramura Jishin Ikken (A report on the aspects of damages by the Ansei Hietsu Earthquake)

This earthquake occurred in mid-night, the almost all peoples would be in the houses at the first shock. So peoples near the epicenter of the first shock were thought to be hard to escape from collapsing houses, on the other hand, peoples near the epicenter of the second shock would be able to escape from the damages by largest shock.

The ratio of dead persons is high (4~54%) along the central part of the Atotsugawa fault (from Amou village to Suganuma village), and it is low (less than 4%) along the eastern part of the Atotsugawa fault. All villages along the Miboro fault is 0% in the ratio of dead persons.

This fact indicates the first shock occurred on the central part of the Atotsugawa fault, and epicenter of the second (or later) shock was near the Miboro fault.

References

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