論文の内容の要旨

History of the great Kanto earthquakes deduced from the Holocene marine terraces: Development and application of new quantitative methods for the geological and geomorphological analyses
(完新世海岸段丘を用いた関東地震発生履歴の解明：地形学・地質学的データへの新たな定量的解析手法の開発と応用)

氏名　小森　純希

I reevaluated the recurrence history of the Kanto earthquakes in the past 7,000 years, which are the subduction earthquakes along the Sagami Trough, central Japan, by reinvestigating the uplifted marine terraces in the southernmost part of the Boso Peninsula, named Numa terraces. The previous paleoseismological studies have regarded the Numa terraces to be uplifted due to the largest type of earthquake along the Sagami Trough, named Genroku-type earthquakes. However, the long-term crustal deformation process has not been sufficiently examined by kinematically or mechanically supported methods, and the rupture pattern of the past Kanto earthquakes is unclear.

In this study, I first reinvestigated the present distributions and the formation ages of the Numa terraces by new quantitative analysis methods for geomorphological and geological surveys. The geomorphological investigation provided objective and quantitative elevation distributions of the Numa terraces by statistical detection and classification methods using the digital elevation model. The dating analysis via the geological investigation estimated the terrace formation ages with well-constrained confidence intervals by employing the Bayesian method. The newly compiled comprehensive sediment age dataset of the Numa terraces improved the reliability of the estimation. The geomorphological and geological investigations revealed that the Numa terraces have similar relative height distributions up to 7 m and different formation interval times from 1,300 to 2,500 years.

Furthermore, I developed a mechanical model for the plate subduction and earthquake recurrence to relate the present marine terrace heights and the past Kanto earthquakes. This model reproduces the long-term deformation due to plate subduction

by adopting a mechanical boundary condition on the plate interface. I proposed a rupture scenario of the Kanto earthquakes in the past 7,000 years to reproduce the present distributions of the Numa terraces. This model was also consistent with the previous results of geological and geodetic studies outside of this study region.

This study constructed a mechanically supported scenario for the formation of the uplifted marine terrace sequence due to the subduction earthquakes for the first time, which has been opposed by the previous models employing kinematic boundary conditions. The proposed rupture scenario in this study indicated that the Numa terraces, which have been regarded to be formed due to similar Genroku-type earthquakes, were likely formed due to the different source earthquakes and that the Kanto earthquakes possibly had more variability than the previous assumption.