Efficient radiocarbon dating method for precise age estimation of tsunami deposit

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Depositional age of tsunami deposit can provide valuable information for the tsunami hazard assessment. Radiocarbon (^{14}C) dating method is commonly used for estimating a depositional age of tsunami deposit. The advantage of this method is wide applicability in age and its reliability. However, the accuracy of the dating result depends on the gradient of the calibration curve which represents the time series variation of ^{14}C age and calendar age. Therefore, during the period with wiggles in the calibration curve, ^{14}C age has chance to be correlated to multiple calendar age, and consequently the estimated calendar age shows large statistical error.
To solve this problem, some statistical method based on a series of large number of ^{14}C measurement has been used for constraining the dating results. For example, sequentially measured ^{14}C age can be wiggle-matched to the gradient of the calibration curve, and thus calendar age is estimated precisely. Alternatively, adopting a Bayesian approach is another way to constrain the sequentially measured ^{14}C age by their stratigraphic order. However, these methods need large number of ^{14}C measurements, and it is costly. In case of tsunami sedimentology, precise dating should be conducted at wide area to estimate the size and recurrence interval of tsunami, so it is important to discuss minimum required measurement number to securely obtain high precision calendar age.
In this study, we present the efficient measurement method of ^{14}C age for precise age estimation of tsunami deposit. Based on the correlation with the calibration curve, required sampling positions and their priorities for measurement, and measurement number of ^{14}C age are discussed. Using this method, precise dating of tsunami deposit can be conducted with high cost-effectiveness, and thus it can be contribute to hazard assessment of tsunami.

Keywords: tsunami deposit, radiocarbon dating

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