

Estimation of the influence of pyroclastic flow on formation of climatic controlled fluvial terrace

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Vertical crustal movements in an inland area are estimated generally using the height distribution of river terraces. This method is based on the model that elevation of a river bed is controlled mainly by climate, and that the longitudinal river profiles formed in similar climatic conditions have a similar geometry. For example, height difference of the terraces formed in Marine Isotope Stage (MIS) 2 and 6 (=TT value) is often used for estimation of uplift rates. However, in volcanic area, vast volcanic debris has been supplied to river basins and it obscured perturbation of fluvial system. Therefore, it is difficult to recognize climatic controlled fluvial terraces and to obtain TT values in volcanic areas (Tajikara and Ikeda, 2005). In this study, in order to evaluate fluvial response to deposition of pyroclastic flow, we mapped depositional surface of pyroclastic flow deposits and fluvial terraces, and estimate incision rate of pyroclastic deposits in the drainage of the Nagaki River, the Gonohe River, and the Kumahara River. In the study area, Hachinohe pyroclastic flow deposits (To-H; ca. 15 ka; Machida and Arai, 2003) are widely distributed. Continuous fluvial terraces, which lie at 20-30 m above present channel, are widely distributed along the rivers in the study area. Depositional surface of To-H was eroded by the rivers in the study area to form these terraces. Here, we called these fluvial terraces as ft2'. We estimated the age of ft2' is close to that of To-H, because the age of the terrace lower than ft2' along the Gonohe River is estimated as 5-6 ka (Yamato, 1988, 1989). Wide and continuous distribution of ft2' implies that period of quasi-equilibrium state existed after deposition of To-H. Height differences between ft2' and To-H depositional surfaces (incision between ages of To-H and ft2') are 20-30 m along the Gonohe River, 10-30 m along the Kumahara River, and 10-80 m along the Nagaki River. Assuming that interval between ages of To-H and ft2' is 10 kyr, incision rate of To-H deposits is calculated as 1-8 mm/yr. Variation of incision rates is large and distribution pattern of ft2' is similar to that of climatic controlled fluvial terraces in non-volcanic areas. These facts imply that thick pyroclastic flow deposits incised instantly and that climatic controlled fluvial terraces were formed again after erosion of pyroclastic flow deposits. Based on the above mentioned facts, we judged that effect of pyroclastic flow deposits on climatic controlled terrace formation is relatively small, and that TT values can be obtained in depositional area of pyroclastic flow.