Radiocarbon-based Chronology of Valley Head Deposits: A Case Study of Landslide Scars in Hofu, Yamaguchi Prefecture

Takatoshi Kawano[1], *Tsuyoshi Hattanji[2], Takahisa Furuichi[3], Shoji Doshida[4], Yasushi Tanaka[5]

1. Graduate School of Life and Environmental Sciences, University of Tsukuba, 2. Faculty of Life and Environmental Sciences, University of Tsukuba, 3. Miyagi University of Education, 4. National Research Institute of Fire and Disaster, 5. Komazawa University

Heavy rainfall on July 21, 2009 caused a lot of shallow landslides in Tsurugigawa river basin, Hofu, Yamaguchi prefecture. Most of the shallow landslides occurred around valley heads (hollows) in the basin. This paper discusses geomorphological history of hollows before the landslides based on radiocarbon dating. Samples were collected from buried layers of charcoal (hereinafter, referred to as charcoal layers) in two valley heads with shallow landslide scars. The calibrated radiocarbon years of the charcoal layers are about 1200-1300 cal AD and 1300-1400 cal AD. The development history of the valley heads is estimated as follows. First, wild fires occurred around the valley heads in 1200-1400 AD and then charcoals were produced on the land surface. Subsequently, sandy soil was transported from the upper slopes to the valley heads and a thick sand layer was deposited above the charcoal layers. In addition, the sedimentation rates for landslide scarps and valley heads were calculated based on the calibrated radiocarbon years and thickness of soil layers estimated by comparison of airborne LiDAR DEMs obtained before and after the shallow landslides. The sedimentation rates were 0.9-2.1 mm/year for the landslide scarps and 2.1-6.9 mm/year for the valley heads. Furthermore, these slopes were stable for 600-800 years and shallow landslides of similar magnitude to the event in 2009 probably occurred around or before 1230 AD.

Keywords: Charcoal, Radiocarbon dating, Shallow landslide

