

Development history of concentrated sackung features around northern tip of the active Neodani fault, central Japan

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Sackung features such as linear depressions and up-hill-facing scarps are receiving attention as precursors of deep-seated landslides. Recent high-resolution airborne LiDAR revealed that many sackung features are concentrated around the northern tip of the active Neodani fault, central Japan. These features are hidden under forest canopies, and thus high-precision dating of deformation episodes would be feasible by AMS-¹⁴C ages from carbon-rich sediments that fill sackung depressions, which is a big advantage over previous similar studies in alpine areas. In order to examine the relation between the fault activity and the formation of these features, we conducted hand auger coring (down to 1.5-3.4 m depth) and pit excavation (down to 1.5 m depth) at five sites out of ~20 gravitational depressions that occurred in our study area.

On the basis of AMS-¹⁴C ages of leaves, seeds, and twigs collected from peaty and lacustrine sediment as well as results of tephra analysis, it proved that all studied depressions were formed after the last glacial, but the formation ages vary from depression to depression: the oldest one was formed ~11,000 years ago whereas the youngest one occurred ~2,000 years ago. In addition, our pit excavations revealed that the sediments are deformed after their deposition, suggesting that some of the sackung scarps grew at least twice after ~3,600 years ago, and the most recent growth may have occurred associated with the 1891 Nobi earthquake on the Neodani fault. Multiple Holocene events of sackung-scarp formation and growth are consistent with earthquake recurrence interval of the Neodani fault (~2000-5000 years), so they may have a synchronicity.

Keywords: sagging, sackung, active fault, Mino mountain, AMS-14C ages, tephra analysis