CHARACTERISTICS OF LATE PLEISTOCENE GEOARCHAELOGICAL ENVIRONMENTS OF KOREA

Ju Yong KIM*, Dong Yoon YANG*, Chang Gyun HAN**

*Quaternary Research Team, Korea Institute of Geosciences and Mineral Resources,
**Dept. of History Education, Hannam University

1. Introduction

Hundreds of prehistory archaeological sites in Korea are distributed at the alluvial environment, the age of which ranges from the palaeolithic to neolithic, and even to Bronze age. Among these upper Pleistocene archaeological sites are often located at proluvial, alluvial and fluvial environments along the river valley. The river valley is thought to be the most suitable places for supplying water, food and stone resources for old people in Korean peninsula. This study is focused on the stratigraphic profiles of Late Pleistocene archaelogical sites in Korea, older than 10,000yrs B.P. During the Late Pleistocene, ranging from 125,000 -10,000yrs B.P, numerical datings like C-14 rediometric methods, OSL datings and relative correlation of pedo-sedimentary profiles can be adopted to interprete stratigraphic context of the archaeological sites. Sedimentary and pedo-stratigraphic profiles of alluvial geoarchaeological environments are generally composed of 3 different sequences : 1) saprolites, slopewash, and colluvium-proluvium as mass movement, as well as weathered basement rocks at the bottom, 2) subsequent alluvial deposits or fluvial sands and gravels in the middle, and 3) paleosols of different origins with horizontal-vertical cracks and fragipan textures. Typical Late Pleistocene archaeological sites, including Jeongok-ni, Seokjang-ni, Soro-ri, Suyanggae and so forth are reviewed to interpret stratigraphic and site formation contexts.

2. Geoarchaeological sequence and environment

2-1. Saprolite, Colluvium and Proluvium

The weathered basement rocks of archaeological sites are predominantly composed of acidic plutonic rocks like Jurassic granite (Seokjang-, Noeundong, Yonghodong, Pyeongchangdong archaeological sites, volcanic rocks like Cretaceous ryolite, Ryodacite and Andesite(Dosan, Goryeri palaeolithic sites), volcanic basic rocks like Quaternary alkali basalts (Jeongok, Janghunh-ri palaeoloithic sites), meta-sedimentary metamorphic rocks like Pre-cambrian granitic gneiss and schist (Naeheungdong, Ilsan sites), porphyritic rocks like Jurassic quartz porphyry (Ojeongdong), and volcanic sedimentary rocks like Cretaceous Dacitic tuff(Jangheungri). Saprolites are weathered products of various basement rocks and their reworked products in a short distance. Saprolitic layers contain original rock texture,

even though the textures are distintegrated and minuted frequently during pedogenetic process in the matrix. Particularly colluvium of Late Palaeolithic sites are characterized with disintegrated and angular rock fragments in the matrix of minuted fragments and decomposed fragments of basement rocks. Many pebble-sized angular gravels are derived from mass movement involved cryo-pedogenic processes under the boreal-periglacial environment.

2-2. Alluvial and Fluvial Deposits

In Korea, several meters of thickness of repetitive alluvial and fluvial sedimentary deposits are prevailed along the reaches of 5 main rivers. The old alluvial and fluvial sands and gravels overlie the saprolites and mass movement mensioned-above. The old fluvial deposits are recognized on the river terraces which are mainly composed of sand and gravel deposits. A set of successive terraces is present at many places of the present river valleys. Each terrace represents relatively an extended flat surface and the altitude of the surfaces gently rise upvalley in accordance with the present stream gradient. The height of 2nd terrace above the present river floor remains 10-20m, and the height is quite constant along the valley. The age of the 2nd terrace gravels is interpreted to be from last Interglacial(75,000-125,000yrs BP, OIS=5a-5e). The 3rd terrace gravels distributed at the level of about 30-40m above the present river floor. This formation age of 3rd terrace is assumed to be 7-9 of the stable isotope stage.

Many paleolitic artefacts were found on the paleo-surfaces of either the 2nd or the 3rd terraces. They formed the old fluvial deposits, but they are underlain by the slope deposits and paleosols during the last glacial period. These deposits were formed in response to the climatic change of the Korean peninsula and its surrounding offshore area like Yellow Sea and part of East China Sea during the last glaciation. The alluvial and fluvial deposits are associated with fining-upward sequence composed of gravels, sands, silts in the ascending order of lithostratigraphic profile. This sequence is composed of fluvial sand and gravels, peaty clays formed during interstadial (50,000-35,000yrs BP, OIS=3). The peaty clays, as old backswamp deposits, are frequently intercalated in the fluvial deposits, and they are typified by a few tens of centimeter of peaty clay or organic clay. Younger fluvial sands and silts are formed above the peaty layer, and represented by repeated flooding deposits after Last Glacial Maximum(LGM) and before the uppermost Pleistocene. The young fluvial sands and silts, intercalated with younger peaty clays, were formed during 9,500-17,300yrs B.P.

2-3. Paleosols

Landscape development during the Last Glaciation in Korean peninsula is prevailing with excessive valley cutting and seasonally freezing and thawing ground, as well as discontinuous cryo-turbations like multiple involutions of bedding planes. There are numerous peogenetic sedimentary layers formed during last glacial period. Paleosols having cracks of different origin are ubiquitous in upper part of lithologic sequence. They have generally a soil solum of

glossy texture with dark brown paleosol imprinted by fragipan at top, and frequent horizontal and vertical frost cracks in the middle and mottles , bands and nodules of Fe-Mn hydroxides at bottom. The color of paleosols changes in cyclicity, from yellowish brown to dark brown. The cracks are filled with dark brown clays film and hydrated clays. This is typified by excessively cold, seasonally freezing and thawing processes under the boreal climate. And this soil is different from cracks derived from swelling and shrinkage in dry soil solum, as seen in E. Africa. Any vertical cracks formed under the dry season is not developed at the same place of crack-fomation, where dry cracks are several cm in width and several decimeters in depth.

3. Summary and Conclusion

The formation age of the old alluvial deposits on the 2nd fluvial terraces is thought to be younger than the Last Interglacial. Many Late Palaeolithic cultural layers in Korean peninsula are related to the young fluvial deposits, which had been formed since the late Pleniglacial period(LGM), and some of them were particularly continued as late as the Pleistocene to Holocene Transition Period. Cultural Layers of Neolithic and Bronze age were, however, buried by the flooding episodes of fluvial system after Holocene Climatic Maximum. Notonly based on a geochronological base for subdividing palaeolithic cultures, but specific stratigraphical context and material context were employed to subdivide the paleosols of the upper part of archaeological profiles in S. Korea. Two typical paleosol layers are prevailing in prehistory geoarchaelogical sites, and they are mostly imprinted with several horizons of frost cracks or soil wedges. They were associated with an abundances of dark coniferous flora like *Picea and Abies,* and grasses formed under the boreal-periglacial climatic regimei.e., extremely cold-dry climate, during the last glacial period in Korea. When compared to the geochronological age of the paleosol profiles, it may be postulated that the upper pedogenetic sediments contains frost cracks formed during the late Late Pleistocene(LGM), dated as 25,000 and 15,000 years ago. And the lowermost layer is temporarily compared to early Late Pleistocene, as old as 55,000 - 75,000yrs B.P.