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Last Glacial Paleopedological Phenomena of Osong Site in the Miho Stream of S. Korea - based on Magnetic Susceptibilty Profile and Radiocarbon and OSL Chronology

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1. Introduction

In Korea many Paleolithic sites are found at the foothill and alluvial plains at a few hundred meters width along the main distributary channels. Among them Osong Paleolithic Site is located along the Miho stream, and at the site landscape surface is distributed at an altitude of about less than 14 above river-bed (either based on the present river bottom or the top of basement rocks). The soil and sedimentary sequences are composed mainly of fluvial deposits and slope deposits of the Last Glacial. This study is aimed to revealing landscape development and soil-sedimentary sequence development of Paleolithic Sites at Osong Sites, Cheongwon County, Korea in order to examine whether or not the existence of terrestrial Heinlich Events are defined in prehistory sites in Korea.

2. Morphostratigraphy

The presence of paleo-fluvial environment can be deduced from the fluvial sand and gravel with several intercalations of organic or peaty clay layers from the boreholes and test pits. OSL datings of sand layers in representative profile (Q28 or Q28-1) indicates it was accumulated as old as 72Ka, i.e, Early Last Glacial Period (Fig.1). This forms a lower fluvial terrace, LT1. This Early or Old Fluvial Sequences was degraded up to the level of 8-6 meters above river-bottom, and it formes a lower terrace LT2. It is composed of young sand and gravel layers and interpreted to be formed after Last Glacial Maximum(LGM). Toward top of profile the sand is replaced by muds and progressively alternated with organic mud layers of 17~11 Ka.

3. Paleosol Formation

During the Last Glacial Period of South Korea a number of paleosol layers are typified by frost cracks, cryoturbations, and foliation structures. These were de- [illegible] from repetitive freezing and thawing process particularly during the Last Glacial period. Brown to red paleosols have a higher Magnetic Susceptibility (MS) than dark brown, yellow, gray non-pedogenetic layers. During the early Last Glacial period, landscape was denudated deeply up to the level below 50m than that of the present in Korean peninsula. It is interpreted by winter monsoon which was more severe than the present and it incurred boreal subboreal climatic regime in Korean Peninsula. In Osong Site a least 4 typical frost- cracked layers were found during the excavation campaign in the Paleolithic sites. As another periglacial process a cryoturbation of sedimentary layers were prevailed on the [illegible]ent rocks. The eroded paleo-landscape surface on

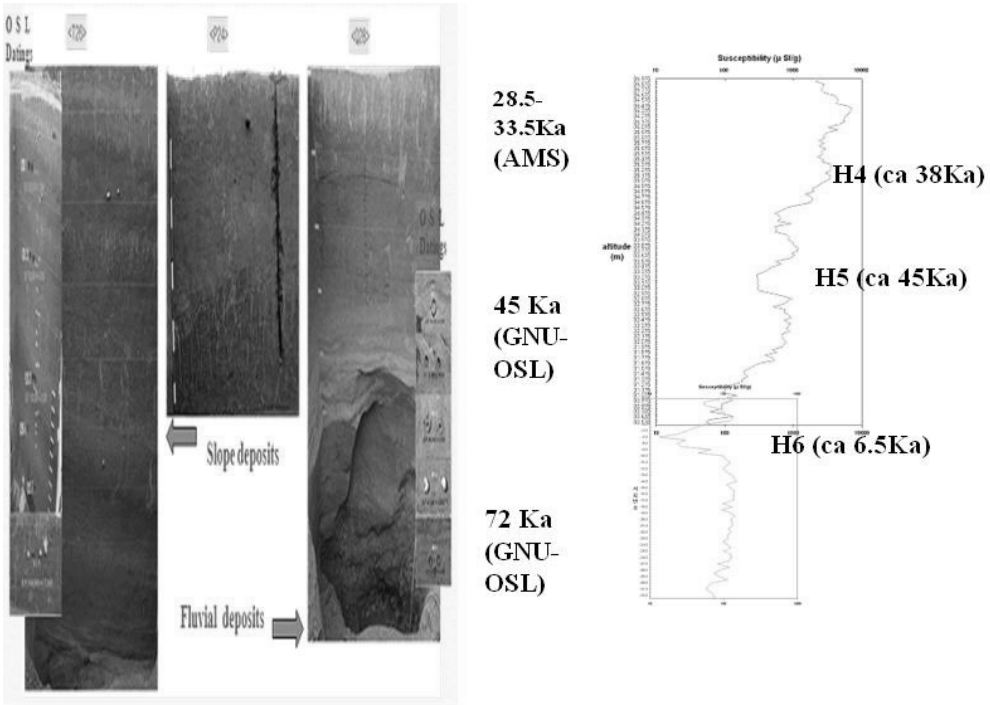

Fig.1. Heinlich Event developed in terrestrial soil and sedimentary sequences of Osong sites based on cyclicity of magnetic susceptibility and chronological datings.

the basement rocks had been revealed as coarse slope sediments in the subaerial condition during 65 ~ 45Ka. It can be interpreted to be accumulated as a response to an advent of terrestrial Heinlich 6 (H6) to H5 events (Fig. 1). The 6th and 5th cultural layers can be defined based on this part of landscape and sedimentary profile. At the middle part of representative profile yellowish brown, brown dense brown slope sediments and paleosols are ubiquitously found in Osong area particularly along the paleo-slope at the level of about 35~40m in altitude. This part of paleosols show a wide and deep rectangular patterned ground which can be one of keybeds for pedo-stratigraphic correlation in Osong Site.

The MS profile of the middle part shows a fluctuation of MS intensity, as well as general increase of MS intensity upwards in stratigraphic column. A numerical datings based on radiocarbon and OSL are indicative of 40 to 28 Ka, which can be correlative with H4 to H3. The 4th and 3rd cultural layers of Osong site are associated with the middle part of representative profile. A pronounced solifluction of paleosol layer such as having bended frost crackings implies one of strong paleo-surface process during the middle Last Glacial Period. The paleosols are composed of some fine sands and much silts, transformed to paleosols after experiencing rather warm and dry climatic to form dark reddish brown to dense brown paleosols (Luvisolic).

Lastly the uppermost part of profile in Osong Site is characterized by dark brown, light yellow to light brown paleosol layers. In Korean Peninsula this paleosols were interpreted to be formed by a strong winter monsoon originated from the Siberian High during 25~18Ka. This

uppermost paleosols are characterized by dark pinkish brown, which formed under a cool and dry condition (pseudo-Podzolic).

4. Conclusion

In South Korea two different pedological phenomena are observed frequently and it was mainly derived from a soil-landscape forming process during middle and upper part of Last Glacial period. In many cases surficial deposits, regardless of their accummulation process (slope/slopewash, alluvial, fluvial, eolian, and so on) are typified by the two types of paleosol layers. The lower dense brown to reddish brown paleosols of strong MS intensity are conjugated by the yellow brown paleosol at the lower part. In many cases it indicates that soliflucted and patterned layers are associated with paleo-land surface. As a chronological viewpoint, the lower paleosols can be correlated with middle Last Glacial Period (possibly MIS 3, or H4~H3).

On the other hand the upper paleosols are ubiquitously prevailed by polygonal structures in plan view, and ground veins or frost cracks (soil wedges) associated with foliation textures in vertical profile. The soil solum shows dark pinkish brown loamy texture with relatively stiffer than paleosols below.

In general the vertical length of frost cracks ranges from several tens of decimeter up to several meters. Lower paleosol shows longer and bigger frost cracking than the upper one. Additionally branching type of cracks is more pronounced in the tangential direction rather than radial direction to contour of the hillslope profile. Micromophologically filling materials in the interstices of cracks are derived from materials of above layers in general. Frost cracks are repetitive in several horizons, showing polygonally glossic textures. The filled materials of uppermost cracks is vertically continuous, light yellow to pale bluish gray in color, but it turns into discontinous and dark reddish brown in the lower cracked-layers. Micromorphologically these types of paleosols have been known by some characteristic textures such as clay coatings and cappings, patches of aggregates of Fe-Mn hydroxides and a number of clay fills in the interstices. The radiocarbon ages of the typical upper paleosols show Last Glacial Maximum, MIS 2, ca 18 ~ 22Ka).