12. The Infiltration-Runoff Processes in Sloping Soil Layers: Application of Tank-Model to a Small Catchment

Tomohiro FURUTA (Tohoku University, Japan)

The knowledge of infiltration-runoff processes in source areas provides fundamental information for hydro-geomorphological studies, as well as environmental management, of a watershed. This study presents the water movement from forest-covered slopes with layered soil to a stream-initiation point in a valley-head. The water movement is based on runoff observed at the pipe-outlet where subsurface water is transformed to streamflow. I succeeded in the interpretation of subsurface-surface water movement by separating four runoff components which are different from each other in lag-time of runoff generation. The difference in lag-time indicates the existence of soil water flow and pipe flow through different layers with different thickness. To estimate subsurface runoff pathway and amounts, a tank model was applied to a very small catchment (with an area of : 1.0×10^{-3} km^2). The model consists of three vertically-arranged tanks, of which the first tank has two outlets and the others have one each. These four outlets indicate four runoff components, respectively. The structure of the tank system and the tank parameters were set, in consideration of geomorphlogical setting, soil thickness, runoff coefficient.

I observed valuable runoff 8-10 month in a year and tried to explain it with a tank model simulation. It made a little more sense about infiltration-runoff processes in response to rainfall input.

Key words: subsurface water movement, runoff, tank model, small catchment

13. A Preliminary Report on Sediment Sources, Erosion Processes, and Sedimentation in Lake Inle in Mid-Eastern Myanmar (Burma)

Takahisa FURUICHI (The Australian National University, Australia)

This paper presents preliminary results from a study into erosion and sedimentation processes in the 5,600 km^2 catchment of Lake Inle; the second largest lake in Myanmar (Burma). The results show that fallout radionuclide concentrations are sufficient to be used to study erosion and sedimentation processes in the catchment, and probably in the surrounding region.

The catchment which is situated at an elevation of 900 m in the mountainous Shan Plateau, receives 1,000-1,500 mm annual rainfall from the prevailing southwest monsoon (May-October). Four major rivers drain into the lake: Nanlet River, Negya River, Kalaw River, and Upper Balu River. The catchment is underlain by mostly Paleozoic, Mesozoic, and Tertiary sedimentary rocks, including limestone and dolomite which occur extensively in western Shan Plateau. The catchment is heavily cultivated and native forest resources have been extensively cleared by the local people for their living and production. Erosion is clearly observed both in numerous red-coloured rivulets in the agricultural land and bareland during the rainy season, and in gullies developed on hillslope as well as flatland. It is also recognized that soil erosion of the catchment has caused sedimentation in the lake, which is of both local and national concern.

In this on-going study into both the past and present erosion and sedimentation in the catchment, we have measured radionuclide concentrations, and determined the geochemistry

of hillslope soils and river sediments. Soil core samples collected from an undisturbed ridge-top under pine forest gave a total inventory of caesium-137 (half-life 30.07 yr) of 719.35 41.72 Bq/m2. Analysis of river sediments collected from each of the four main rivers also yielded detectable levels of Cs-137 and, strikingly, a high concentration of beryllium-7 (half-life 53 days). The high levels of Be-7 in the river sediments suggest intense and rapid surface erosion. Results from the major element geochemistry show that sediments from the Nanlet River can be distinguished from the other sources. The chemical index of alteration indicates that the sediment collected from all of the rivers ($>$ 0.84) are highly weathered.

Key words: sediment sources, erosion and sedimentation, radionuclides, major element geochemistry, Myanmar (Burma)

14. Denudation Surfaces around the Central Plain of Thailand and Lake Tonle Sab in Cambodia

Toshikazu TAMURA (Rissho University, Japan)

Both the Thai Central Plain including Chao Phraya Delta and the plain surrounding Lake Tonle Sab are well known as big accumulation plains in the southern part of the Indochina Peninsula. Recent studies of Chao Phraya Delta have revealed that it is composed of thick sediments which are not restricted in the Holocene and the Uppermost Pleistocene. In the north coast of Lake Tonle Sab , more than 80m thick of sedimentary sequences have been recognized. The thick sediments as well as surrounding mountain ranges suggest that both plains present the filled form of tectonic basins. However, both plain surfaces are fringed with not tectonic scarps but gently sloping surfaces.

The Siem Reap area on the north coast of Lake Tonle Sab consists of the following four geomorphic units: High Plateau, Foot Plateau, Gently sloping Plain, and Lake Margin, among which the latter two are of accumulational origin. On the other hand, the Foot Plateau presents a gently undulating surface where thick red soil profiles with laterite are developed on Mesozoic sandstone. Compiled cross sections show that the Foot Plateau descends underneath the Gently Sloping Plain composed of 60 to 80m of thick alternation of sandy and muddy layers, among which only the uppermost staff of 10 to 15 m thick is Pleistocene fluvio-lacustrine deposits and the lower well-consolidated part is considered to be Tertiary series. Along the western and eastern margin of the Thai Central Plain, weathered subangular gravels with laterite crust form pediment-like gentle slopes or hillocks and are underlain with Paleozoic sandstone and shale. Along the northeastern margin of the plain, weathered sandstone of Permian age exposes shallowly on a very gently undulating surface which is a little higher than the Central Plain proper.

Topographic features, weathering profiles and bedrock lithology as shown above indicate that the gently sloping surfaces surrounding both big accumulation plains have been formed as denudation surfaces which probably began their formation in some age of the Tertiary.

Key words: denudation surface, accumulation plain, Thai Central Plain, Lake Tonle sab