

The Origin and Significance of Hanging Glacis Flanking Some Valleys of the Southern Apennines; Evidence from Molise Region.

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In the Molise region, the eastern flank of the Apennine chain is cut by two main rivers: the Trigno and Biferno. Their valleys have never experienced important phases of valley floor aggradation (ancient terraced deposits are lacking). The valley side slopes are often characterised by stepped profiles, whose elements are relics of almost planar surfaces dipping toward the valley axes of 3 to 8 degrees. These elements are interpreted as *glacis d'erosion en roches tendres* shaped during a periods of nil or much decreased downcutting rates. The main valleys show more generations (up to three) of *glacis* hanging at different elevations above the thalwegs. The lowest one is tentatively ascribed to Last Glacial. Downslope this last *glacis*, a steep element (up to 20 m high) follows, representing the effect of the last phase of fluvial deepening. The mapping of these valley side *glacis* has shown their irregular distribution along the valleys (with change in number of orders and elevation) and therefore they should be treated more prudently than fluvial terraces in studies aimed to reconstruct the long term evolution of a region. In fact, their genesis seems to be controlled not only by external perturbations (climatic change, tectonics, eustasy) but also by local factors related to the lithological setting which give rise to autocyclical mechanisms.

Key words: Valley evolution, Valley side glacis, Molise region, Italy.

**Segmentation of Coarse-Grained Alluvial Rivers Based on Downstream
Changes in Channel Slope and Gravel Size**

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Many researchers have reported on the discontinuities of channel slope and/or grain size at the transition from gravel- and sand-bed. However, such discontinuities also exist in the relative steep gravel-bed reaches. In this study, the relationships between the channel slope and the gravel size of bed materials were examined in the coarse grained alluvial rivers in Japan where the gravel inputs from the tributaries are negligible. A river channel with the slope of 0.001-0.08, dominated by the tractional transport process, is divided into from 2 to 3 segments based on the downstream change in channel slope. A significant boundary appears in only a few kilometers as a discontinuity of the channel slope from 0.03 to 0.01. Within this slope transition, the coarsest size gravel, approximately 250-500mm (-9 to -8 phi), disappears abruptly with a marked change in the size composition of bed sediment. This suggests that the selective sorting of the coarsest population having a specific size from bed contributes to form a boundary of channel segments in the bedload reach.

Key words: gravel-bed river, channel slope, gravel size, selective sorting, bedload

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**Hydrological Setting of Low-productivity Species Rich Wetland in Warm
Temperate Zone, Southwestern Japan**

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The habitat of plant in a headwater wetland is generally influenced by local groundwater discharge that supplies base cation, pH/alkalinity and nutrient to the site. We measured detailed groundwater flow and water chemistry by piezometers and groundwater wells settled on lines of cross section from hillslope to the valley bottom through a small spring-fed wetland underlying little peat, S. W. Japan. Wetlands with low - productivity vegetations were developed on the upward seepage zone. Such vegetations were described in previous studies if the underlying mineral substratums of the wetlands are well-leached sand, chart, granite or rhyolite in warm temperate zone, Southwestern Japan. The plant-species composition had been said to be parallel to high moor in cool temperate zone, northern Japan. However their water was maintained by the groundwater discharge from bare mineral soil. This result shows that low cation availability effect the water acidity and that poor mineral condition are representative of northern ombrotrophic (rain-fed) condition.

Key words: eco-hydrology, groundwater, Japan, seepage, vegetation

Interaction Between Fluvial Geomorphology and Woody Debris in Different Geological Setting in Japanese Streams

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Distribution of woody debris and their roles on channel morphology vary with geological and hydrological setting as well as relative size of woody debris. Woody debris pieces in Japanese streams are small because secondary forest dominates riparian zone where they are mainly recruited. For every piece of woody debris over 0.1m diameter and 1.0m length, their size, orientation, decay class and type of retention were measured to examine their distribution pattern in small streams having different water discharge regime, substrate, and geomorphology superimposed by geology. The position and size of pool in study segments were also measured in order to evaluate the effects of woody debris on channel morphology. The main objective of this study is to clarify the dominant factors controlling distribution of woody pieces and their roles on channel morphology.

Key word: woody debris, channel morphology, geology, substrate, water discharge regime

**Channel form changes of Yosasa River by the flood of August 1998
in the northern Tochigi Prefecture, Japan**

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Heavy local precipitation in August 1998 generated a large flood event, causing severe damage along the Yosasa River in Tochigi Prefecture, Japan, especially in the low gradient downstream section. In the steep upstream section, however, the damage was relatively slight. In addition, the characteristics of change in channel form in the two sections appear to differ. One of the most important characteristics of bars is their migration downstream. However, in recent years, including the August 1998 flood, bars have been stationary in the steep upstream section. Two factors are thought to account for this: steep gradient, and the accumulation of large boulders. Therefore the effect of each of these factors was examined experimentally in laboratory flume studies.

Key words: bar migration, stationary bar, steep channel, large boulders, emergence

Development of Mountains and Alluvial Fans in Eastern Asia

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Relationships have been discussed quantitatively between development stage of mountains and alluvial-fan existence and size in tectonically active Japan, Taiwan, and the Philippines. As the development stage of mountains progresses, number and size of alluvial fans in addition to relief ratio increase, especially from the older-middle substage of the growing stage. In drainage basins over 100 km^2 , the relief ratio of 30‰ is determined to be an important threshold for the existence of an alluvial fan. In the older-middle substage almost all rivers have high relief ratios over 30‰, while only 63 % of the rivers show such high relief ratios in the younger-middle. Size of alluvial fans in rivers with relief ratios higher than 60‰ is greater than size with relief ratios lower than 60‰. The percentage of rivers with relief ratios over 60‰ in the older-middle is markedly higher than that in the younger-middle. Increase in rivers with higher relief ratios from the older-middle substage provides good conditions for the development of alluvial fans and for larger fans. Besides, the regression line between drainage-basin areas and alluvial-fan areas in the Philippines is not the lowest. This indicates that tropical climates do not necessarily produce only small fans.

Key words: alluvial fan, development of mountains, Japan, Taiwan, Philippines

**Modeling Global Sea-level Change from Quaternary Deposits
in a Tectonically Subsiding Basin**

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Our knowledge of global sea-level change during the early and middle Pleistocene is limited in spite of its importance to evaluate long term geomorphic development. The *Nobi* basin, bounded by active reverse faults and facing the Pacific coast of Central Japan, has been subsiding rapidly at up to 1 m ka^{-1} over the past 1 Ma. It has been filled with fluvial gravels and marine sediments alternatively controlled by concurrent glacial eustacy and basin subsidence. The youngest ten gravel layers deposited during the full-glacial periods of MIS 2, 6, 8, 10, 12, 14, 16, 18, 20 and 22 based on the seismic reflection profiles and a 600 m-deep core of GS-NB-1, which includes widespread tephra layers of Sakura(ca.520ka) and Azuki(ca.850ka). Using the gravel layers, we reconstructed the buried river long profiles, whose mouths indicate the glacial sea-level fall plus the amount of regional subsidence after the deposition of the gravels. Considering the subsidence rate based on the age-depth plot for the 600m core, we modeled global sea-level change during the past 1 Ma.

Key words: sea-level change, tectonic subsidence, deep core stratigraphy, seismic profile, river long profile

The Role of Reservoirs in the Formation of Relief Morphosculptures (on the Pattern of the Republic of Armenia)

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Among the exogene forces influencing the formation of relief morphosculpture, the anthropogene factor can be distinguished as a separate group. Under the conditions of modern scientific-technical progress, the human economic activity in nature brings about considerable relief change, which is: erosion process activization, landslide appearance, levelling of the positive and negative relief forms, etc. The relief change is considerably affected by the building and use of reservoirs. After building the reservoirs, river runoff is regulated, runoff regime changes, depth erosion decreases, water-accumulative morphosculptures appear and so on. This process develops rapidly in Armenia, and is conditioned mainly by the continental climate, extensive demand for irrigation water and etc. On the small territory of Armenia – 30000 km², there are about 100 small and big reservoirs containing more than 2 billion m³ of water (about 1/3 of annual river runoff). The mentioned changes bring about the transformation of other components of environment, landscapes and natural processes.

Key words: morphosculpture, erosion, reservoir, river runoff, landscape

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The Channel formation of Hongcheon River as branch of Bukhan River is contrasted between midstream and downstream. The midstream of Hongcheon River flows straight southwestly that connected with the lineament to the direction of NE-SW, and the downstream flows westly as incised meander, and joins Bukhan River. The bedrocks of drainage basin of the west side of the midstream and the downstream are composed of gneisses, the east side of the midstream is composed of granites, and the upstream is mixed with gneisses and granites. River terraces along the midstream are widely distributed over both side of valley, but those of downstream parts are narrowly distributed over the paleo-pointbar of incised meander. These characteristics are caused by geological difference between the drainage basin of the midstream and that of the downstream, and difference of channel development, and existence of the lineament. Typical river terraces are distributed on each level with the several heights in Hwagye Basin, which is located on the lower part of the midstream. The changes of the channel and meander cut-offs were repeated in the basin at several times.

Key Words: geologic difference, river terraces, incised meander, meander belt.

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Distribution of *Zelkova serrata* Reflecting Ground Surface Instability on Micro-landforms in a Small Watershed

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Locations of all trees of *Zelkova serrata* were investigated in a small watershed where natural forest is preserved near Sendai, northeastern Japan. The watershed comprises seven micro-landform units; crest slope, upper sideslope, headmost wall, head hollow, terrace-like gentle slope, lower sideslope, and footslope. The former five slope units are above a distinct convex break of slope that is named Postglacial Dissection Front (PDF) in Japan. The numbers and density of *Zelkova serrata* show obvious difference among the slope units, both are large and high in the three units, headmost wall, lower sideslope, and footslope. These units are either below the PDF or steeper than 40°, the surface disturbance on them is estimated to be more active than that of the others. Such spatial distribution of *Zelkova serrata* probably reflects the ground surface instability on each slope unit. This relationship between plants and slopes implies the possibility that we can estimate the historical change in slope instability, especially activity of dissecting processes by landslides, from pollen analysis.

Key words: micro-landform, Zelkova serrata, ground surface instability, Postglacial Dissection Front, pollen analysis

Influence of Forest Growth on Suspended Sediment Yield in Small Mountainous Catchment, Miyazaki, Japan

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In small mountainous catchments, it is commonly thought that a large component of the suspended sediment load of streams derives from the washload of hillslopes. It is, however, unclear how suspended sediment load changes according to forest growth and cycles of clear cutting. To this extent a research trial was conducted to measure the temporal fluctuations in suspended sediment load at the mouths of six small mountainous catchments, which were characterized by age of artificial forest. Results firstly indicated that suspended sediment load was found to increase with duration of rainfall, rather than the total amount of rainfall or rainfall intensity of any one period. Secondly, it was found to increase markedly with age of forest plantation, reaching a maximum at about 15 years, after which it declined to a constant value irrespective of forest age. From the investigations of vegetation and geomorphology it appears that saturated overland flow is the dominant erosion process. The results imply that grass, which covers hillslopes in the early stages of forest succession, has a large role to play in stabilizing hillslopes against surface erosion.

Key words: mountainous catchment, suspended sediment, washload, forest growth, vegetation