

**Hydromorphological Response And Fluvial Management Influence During A
Mediterranean Flood Event (Aude Watershed, France)**

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During two days (November 12-13, 1999), the Montagne Noire and its piedmont received more than 400 mm of rain, resulting in the flooding of the left bank tributaries of the Aude river (discharge 300 times the mean discharge). In the mountains, some talwegs were affected by localized debris flows. In the piedmont, terrace scarps were subjected to deep gulying (vineyards). In the stream beds, the rapid rise and the power of fluvial waters caused notable morphologic reajustments: incision of alluvial bottom and/or accumulation of gravel in the floodplain, enlargement of active channel, fluvial pattern channel change (meandering to braided), loss of land, destruction of built structures, etc. These changes reflect the normal, spasmodic behaviour of these rivers over the past few centuries (cf. deposits constituting their floodplain). They have been enhanced by current forms of landuse and valley management, thus leading to reconsider and discuss the concept of "dominant discharge", very useful to assess flood hazards and risk.

Key words : mediterranean stream, morphogenic flood, valley management, risks.

Coarse Sediment Connectivity in Contrasting Channel Systems

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Coarse sediment, though generally a minor part of the total sediment load, is a major influence on the morphology of channels. Fluvial theory assumes a connectivity in sediment transport through the system yet evidence is increasing of the close relationship between sources and channel morphological features and of localised coarse sediment budgets. Adjacent reaches of contrasting morphology raise questions of whether coarse sediment is transported through reaches in which bars appear to be absent. Greater understanding is needed of the sediment sources and their dynamics, distances and dynamics of transport, and locations and durations of storage. Evidence is presented of the sources, transport and storage in contrasting channel systems, including two gravel-bed perennial rivers, a sand-bed perennial river and gravel and sand-bed ephemeral streams. Measurements on several rivers show the importance of channel sediment sources and the relatively short distances of transport of coarse material in many cases.

Key words: sediment transport, bed load, channel morphology, sediment connectivity, sediment sources

Geomorphologic Control on Flood in Bangladesh
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Bangladesh occupies a major part of the Bengal Basin, which is flanked by the Rajmahal Hills and Archean terrain in the west, the Himalayas and the Shillong Plateau in the north, Arakan-Yoma Hill Range in the east and is open towards the Bay of Bengal in the south. Around 230 rivers emerging from surrounding highlands forming a dense criss-crossed network of the Ganges-Brahmaputra-Meghna river system. Interestingly, the river system converge towards the deep trench in the Bay of Bengal, meet together within this small landmass and form a single conduit. The main physiographic feature of the country is an extensive flood plain and flood basins. The present physiography and cultural pattern are the contribution of surrounding high lands, tropical monsoon climate and the river system. Due to its spatial tectono-geomorphic position with extreme flat topography, tropical monsoon climate, river system, drainage congestion and storm-tidal surge enormous volume of inflow losses their momentum, discharge excessively, takes long time to drain into the Bay of Bengal, overflowing almost evenly and widely and inundate 20%-35% of the country annually. Settlement and urbanization, road and highway, embankment and polder also input stress on geomorphic control towards the magnification of flood. Detailed geomorphic and flood mapping is suggested to produce database for management of flood and sustainable development.

Keywords: Geomorphology, Flood, Bangladesh

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Geomorphology and Management of Danubian Floodplains in Hungary
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River regulation and human utilisation has profoundly changed floodplain environments (from soil dynamics to landscape pattern) along the Hungarian section of the Danube over the last 150 years and particularly during recent decades. Such areas are of great economic and ecological importance and partly under environmental protection. In the paper the present floodplain geomorphology is evaluated from two groups of environmental risks: problems in fulfilling the ecological functions of floodplains (altered hydrological parameters, actual conditions of habitats and ecological corridors) and hazards to groundwater and streamwater quality (buffering and filtering capacities, alkalinisation risk). Planning issues are also considered: how human pressure could be reduced and areas of low productivity optimally utilised.

Keywords: floodplain, landforms, landscape ecology, land use

Interaction of Lithologic, Topographic, and Sedimentologic Factors in Stream Basins of the Valley and Ridge Province of Southeastern Tennessee, USA

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Stream gradient, meander wavelength, sinuosity, channel cross-sectional form (width, depth, and cross-sectional area), drainage basin area, basin mean slope, floodplain particle size, and bedrock were compared in sixteen drainage basins in diverse sedimentary-rock terrane of the Valley and Ridge province. Channel width is less than, depth is greater than, and cross-sectional area about the same as previous generalized relationships reported for the eastern USA. Sinuosity shows a relatively high correlation with basin area, a relationship not previously reported. Mean floodplain particle size correlates inversely with the percent of the basin underlain by shale and with the mean basin slope. The percent silt+clay in stream banks shows no significant correlation with the channel width/depth ratio, contrary to some previously reported findings, although there is a weak but significant correlation between silt+clay and sinuosity. However, there was no significant correlation between sinuosity and channel width/depth ratio. Thus, whereas lithology and topography affect sediment particle size, the latter seems to have minimal effects on stream morphology.

Key words: drainage basin, stream channel, flood plain, particle size, lithologic effect

Fluvial Processes and Relief Structure in the Japanese and Korean Mountain River Basins

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Longitudinal profiles, channel slope and relief distribution were investigated in Japanese and Korean mountain river basins to discuss the fluvial processes and relief structure in two regions. In the Japanese mountain river basins the relief component is well related to the distribution of the sediment transport processes derived from the channel slope. In the high relief basins debris flow is the dominant processes as the debris transport processes from the headwaters to the main streams. In the low relief basins sediment transport by traction is the dominant processes and sorting processes are effective. On the contrary in the Korean mountain river basins the relief component of the basins does not relate directly to the sediment transport processes. Because the channel slope of the headwaters of the Korean river is very steep and the slope decreases downstream abruptly, debris flow is dominant processes only in the headwaters and strong sorting processes operate below there. The effect of the sorting processes correlates to the flow directions of the rivers from the Taebak Mountains. The eastward rivers have large concavity of the longitudinal profiles than the westward rivers, so that stronger sorting processes operate along the eastward rivers.

Key words: fluvial process, mountain river, relief, Japan, Korea

Modeling the Effects of Riparian Vegetation on Channel Migration

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Interaction of hydraulic forces near the bank toe and gravitational forces acting on bank material control streambank mechanics and rates of channel migration. Riparian vegetation influences both the hydraulic properties of the flow and the geotechnical properties of bank material. It can, therefore, be assumed that riparian vegetation will also affect channel migration, yet the exact nature of this impact is unclear. A numerical model has been developed to evaluate the effects of stream-side vegetation on bank erosion and channel migration. The model combines a two-dimensional flow and sediment transport model with a geotechnical bank-stability analysis. The effects of vegetation are accounted for through process-based simulation of the interaction with river flow and bank material. The model has been used to identify the conditions under which riparian vegetation is beneficial or detrimental to bank stability. The impacts of various assemblages of vegetation on bank erosion and channel migration have been assessed for both idealized and natural river reaches.

Key words: bank erosion, riparian vegetation, channel migration, meandering, numerical modeling

The Impact of Morphometry of the Relief on the River Runoff**T.G.VARDANIAN**Department of Physical Geography, Yerevan State University
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Being a result of climate, the river runoff is impacted by the morphometry of the relief. The impact becomes more definite in mountainous countries. The morphometry of the relief is characterised by an integral system of quantitative indices which helps to expose and evaluate the role of climate as well as exogene and endogene agents in runoff formation. Our researches, done for more than 100 rivers in the Republic of Armenia, refer to the impact of the height, the depth and the dissection of the relief on the river runoff. The conclusions of the researches are: 1) In mountainous countries the run-off volume per unit of area is closely related to the height of the relief. For more than 90 % of the studied rivers, the correlation coefficient is about 0,6-0,9. In folded block-mountain regions the relation is more definite and expressive, the run-off volume per unit of area increases depending on the height, while in volcanic mountain regions – the relation is weak but the run-off volume per unit of area decreases. 2) The more densely and deeply dissected river basins are, the more water-bearing rivers are with a stable alimentation regime (at the expense of deep water). In contrast to the relief height, the relation of the density and depth of dissection with the runoff is poorly manifested.

Key words: morphometry, river runoff, relief, depth and density of dissection, correlation

5th International Conference on Geomorphology
August 2001, Chuo University (Tokyo, Japan)

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**Geomorphic Characteristics and Formation of the Anastomosing
 Distributary System in the Middle Yangtze River**

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The distributary river system consisted of Songzi, Hudu, Anxiang and Ouchi Rivers disparts from the trunk channel of the middle Yangtze River and flows to Dongting Lake. It shows a multiple channel system separated by wide floodplains. Its channel width/depth ratios are less than 40. The average channel gradient is close to 0.04‰ and the sedimentation rate is high than 30mm/a. All of these indicate that the distributary system is a typical anastomosing system. The main cause for the formation of that system is the avulsion of the chunk channel during high flood period. Taipingkou avulsion in 1644 and the Songzikou avulsion in 1826 played very important roles. The initial distributary channel migrated continually after the avulsion and evolved gradually to an anastomosing system. The evolution mechanism is the channelization in floodplains and two models with three stages are summarized. One model is that avulsion is first, unstable multi-channel is second and the single channel is the third stages, e.g. the formation of Hudu River was caused by Taipingkou avulsion. Another is also with avulsion, unstable multi-channel stages, but the third stage is stable multi-channel, e.g. the formation of Songzi River caused by Songzikou avulsion.

Key words: anastomosing river, geomorphic characteristics, channel avulsion

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Measurements of boundary layer parameters and sediment transport over intertidal mudflats, Jiangsu, China

The intertidal mudflats are of very important by representing an important habitat for wild life and a potential land resource for reclamation, and protecting coastline from erosion. However, they have been relatively poorly researched in comparison with sandy beaches and saltmarshes since it is difficult for accurate *in situ* measurement over the intertidal mudflats. The bad weather, easily subsidence, complex interaction between the physical, sedimentary, biological and chemical processes are responsible for the difficult fieldwork. Nevertheless, the boundary layer parameters (i.e., roughness length, shear velocity and drag coefficient), playing an important role on sediment transport, would help to understand some of these processes.

A velocity-SSC (suspended sediment concentration) monitor system (ASMS) was constructed by Nanjing Hydraulic Research Institute, China. The instrument has 5 velocity-turbidity sensors for current velocity ($\pm 2 \text{ cm s}^{-1}$) and SSC measurements. Experiments are carried out over the intertidal mudflats along the Jiangsu coast, by using this instrument and a water-depth meter. The velocity-turbidity sensors have distances of 10, 36.8, 60.5, 100 and 160 from seabed. All the data are recorded by a PC with a interval of 20 s. During the measurements, water samples are also collected for the purpose of calibration. Furthermore, a ZSX-3 direct-reading current meter is mounted on a pole out of the observation platform, with a distance of 36.8 from the seabed, in order to give an assessment of the current sensors. We also collected 36 sediment samples in the study area.

It shows that the velocity sensor is highly agreement with the direct-reading current meter. Then an internal consistency analysis is used to establish realistic logarithmic velocity profile, in the calculation of boundary layer parameters over the intertidal mudflats. By *in situ* measurements, SSCs of 5 water layers are estimated. Therefore, the suspended sediment transport during a tidal cycle is calculated. Finally, grain-size trends analysis model is used to determine the net bedload transport directions.

Key words: boundary layer parameters, sediment transport, intertidal mudflats, China

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Modeling and Simulation of River morphologyT. YANAGITA^{1*}, H. NISHIMORI² and T. KONISHI³¹Research Institute for Electronic Science, Hokkaido University²Graduate School of Engineering, Osaka Prefecture University³Department of Physics, School of Science, Nagoya University

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One of the macro-structure of alluvial streams such as the formation of meanders and braided is considered. Assuming hydrostatic pressure distribution in verticals and ignoring the velocity variations in verticals, we obtain basic two-dimensional flow dynamics. We use a model which consists of the basic two-dimensional balance equation coupled with a phenomenological dynamics which is a soil erosion and a deposition of the suspended sediment. Through extensive simulations, the morphologies corresponding to straight, meandering and braided are found by changing the initial slope of a drainage area. A initially straight stream is stable if the slope of the river bed is small. By increasing the initial slope of the river bed, the straight stream becomes unstable and forms a meandering river, also stream line itself moves down with time. Beyond a critical slope, the meandering river changes to form a braided stream channel. The morphological change of river channel is characterized by the area of the river, time averaged mean flux of water, and depth-to-width ratio of a river.

Key words: river morphology, simulation, model, meander, braided

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The world's highest river terrace, largest number of terraces and thickest loess: the highest Qinghai-Tibet Plateau, the affected area, the form and influence of its uplift

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In the expedition process of 45 years, particularly in the on-foot investigation of 1111 days to the whole course of the Yellow River and the Yangtze River, which is for the first time in China, the author had many important discoveries

1. The world's highest terrace of the Three Gorges of the Yangtze has an elevation of 1350 m a.s.l, and a relative height, 1250 m. And it contains unique pebbles of basalt and andesite of the upper reaches.
2. The largest number of 32 terraces with 32 pebble beds in the world ,is at the northeastern end of the Tibet Plateau (in The Longyang Gorge of the Yellow). The base of the oldest terraces is the lacustrine clay of 0.1 Ma and has 750 m a.r.l.
3. As a product of the atmospheric circulation's change after the uplift of the Plateau the largest visible thickness of the loess bed of the world is 315 m. of the north bank of the Yellow in Lanzhou, northeast of the Plateau (Yang, 1964).

These discoveries show that the uplift of the highest Qinghai-Tibet Plateau affected the Three Gorges on its eastern side at least and is characterized by very frequent intermittences at the northeastern end of the Plateau since 0.1 Ma B.P and there is a atmospheric circulation's change and a very thick loess bed, more than 315 m, on the same margin.

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Soil and Gully Erosion in the Russian Plain: Aspects of the Anthropogenic impact

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Investigations of spatial and territorial regularities of soil and gully erosion were conducted in the Middle Volga basin. Within the forest, forest-steppe and northern part of steppe landscape zone of Russian plain on the area of 150000 km². Mass ploughing of the slopes has principally changed the vector of spatial organization of interbasin structure of erosion. Natural-anthropogenic modification of slope erosion-accumulative process, forming on agriculturally developed soils, has a number of principal differences from natural-historical erosion. Parallel with anormally high speeds of the process, typical for its natural-anthropogenic modification, chorologic organization of slope fluvial geosystem acquires emergent properties. From the focus-areal type of spatial development it transforms into belt anizotropic class of geosystems' vector structures. The established belt structure of the slope erosion is the greatest extent defined by the level of agricultural development of basins and only then by relief, by structure of composing rock and soils. There with maximum areas in the basins are occupied by belts of sheet and linear erosion. These belts of river watershed of all orders have continued character of distribution whereas the belts of drop rain-drop destruction and gully erosion in the basins are developed discretely.

Keywords: soil, gully erosion, structure, basin

OK

Catchment Scale Variability in Bank Erosion Rates and Processes in the River Swale, U.K.

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A systematic testing of the rates and timings of bank erosion was undertaken on the River Swale, U.K. Nine sites were monitored from the upland source area to lowland floodplains 120 km downstream. A total of 288 erosion pins were measured at a fortnightly interval over 2 years. The erosion pins provided temporally lumped erosion rates whilst 11 Photo-Electronic Erosion Pins (PEEPs) were used to measure bank surface elevation changes at 15 minute intervals. Catchment erosion rates were modelled using quadratic equations, simulating a mid-basin peak of 3.58 m a^{-1} . Rates of erosion were low upstream, 0.07 m a^{-1} , and also downstream, 0.12 m a^{-1} . Subaerial processes, especially frost action, dominated upstream. Fluvial entrainment was most influential mid-catchment. Mass failures were most efficient downstream, but were more frequent mid-catchment. Piping, sapping and cantilever failures did not follow the same trends and were modelled separately. The length of the erosion season increased downstream as the number of active processes increased.

Key words: bank erosion, catchment scale, process dominance, downstream change

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