

Studies of High-resolution Morphodynamics with Special Reference to River Bank Erosion

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Synopsis

Many alluvial rivers in Japan have recently undergone effects of degradation due to such factors as river training for flood control, excessive riverine sand mining, or reservoir sedimentation. This study focuses on bank erosion in clayey sediments of the Uji River floodplain that has occurred over a period of several decades or longer. It applies digital photo-theodolite surveying to precisely measuring the rate and extent of erosion on a 250m-long section of the left bank of the main channel of the Uji River. The maximum rate of erosion proved to be as high as 6m over a 9-month period. The volume of erosion (or sediment supply) over the 250m-long section was estimated to be equal to 3000m³. Notably, the erosion took place even under relatively mild stream conditions. An important consideration is the presence of intercalated granular soil layers in an otherwise thick deposit of clayey sediments. Our field observations point to the following progressive nature of erosion: 1) A granular soil layer is scoured by stream flows, forming caves; 2) The overlying clayey sediment then collapses in blocks; 3) The fallen clay blocks stay as a kind of talus at the foot of the bank wall for some time; 4) Stream flows drift such natural protections downstream over a period of time, then process 1) resumes, allowing the river bank to retreat by an amount.

Keywords: river bank erosion, high-resolution geomorphometry, sedimentary environments

河岸侵食の高分解能地形計測と氾濫原堆積環境に関する考察

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要旨

地球規模で温暖化が加速している昨今、異常気象の極値の増大および発生頻度の増加にともない、氾濫原での都市化が進行しているわが国では水災害リスクが確実に増大している。氾濫原の治水安全度を評価する際には、河岸や堤体の侵食速度の評価が非常に重要となる。そこで本研究では、デジタル写真測量解析により、宇治川43.0km地点における低水路河岸侵食の高分解能地形計測を行い、侵食土砂量を評価した。また、過去70年にわたる河床横断地形データおよび地質断面図をもとに、河岸侵食による河床形態の長期変化特性について考察した。さらに、河岸の侵食プロセスと出水特性との関係についても考察を加えた。

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