



## **Identifying the trend of the morphological change of a natural river using the Hilbert Huang Transform (HHT) method**

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This study introduces a more recent data analysis method, Hilbert Huang transform method (HHT), to analyze transport of sediment particles of a non-stationary and non-linear nature. In order to improve the modeling of the sediment concentrations and bed elevation change, it is proposed to first process the data using the Empirical mode decomposition (EMD) method from HHT to obtain a collection of intrinsic mode functions (IMFs). In this study, an analysis of time series of bed elevations, sediment concentrations, and flow rates is proposed. Multiple time scales exist in the system of flow, sediment transport and bed elevation change processes. With EMD method, we could decompose the original data into several independent intrinsic mode functions (IMF), each of which may be caused by various factors at different time scales. Then, we use HHT to transform every IMF from time-dependent functions into frequency-functions. A case study of the Chou-Shui River in Taiwan is presented. This study will present an alternative for identifying the trend and variability of the bed elevation change, sediment concentration and flow rate. It is hypothesized that the behavior of bed elevation change can be better described at a different time scales using HHT. The lag between the change in flow, sediment concentration and the bed elevation can also be identified in this study. It is expected that the HHT method can provide a viable alternative for an enhanced understanding of sediment transport processes in natural rivers.