Paper Number: 275

Global sediment systems in the Anthropocene

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Ongoing climate change (global warming) is exerting a major control on the dynamics and functionality of present-day global sediment systems of mountains, rivers and coasts [1,2]. Changes in climatic forcing, in combination with ongoing pressure on the land surface by human activity, are resulting in a reorganization of sedimentary systems and processes, on a global scale and affecting all sedimentary systems.

The physical basis for observed and projected changes in sedimentary systems and processes are examined in detail in this paper, with particular reference to mountains, rivers and coasts, whose past and contemporary sedimentary systems are spatially well-delimited and constituent processes are well studied [3,4]. Based on our understanding of sediment systems and processes from the geological past, an estimate of geomorphological sensitivity to climate forcing can be established [2]. This can help identify boundary conditions that can constrain future dynamic behaviour of sediment systems in climatically-sensitive depositional settings. The implications of ongoing climate change for the future dynamics of sedimentary systems are discussed, along with the wider implications of long-term sediment preservation potential in the geological record.

The understanding of global-scale sediment systems is vital for all aspects of environmental sustainability in the Anthropocene, including agriculture and food production, near-surface and mountain aquifers and water supply, geohazards, biogeochemical processes including C sequestration and export, and biodiversity. The present lack of interconnections between the scientific study, monitoring and management of these diverse environmental components is of concern with respect to correctly identifying environmental 'tipping points' in the Anthropocene world [5].

References:

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