Geophysical Research Abstracts
Vol. 21, EGU2019-13845, 2019
EGU General Assembly 2019

A Theoretically Derived Probability Distribution of Scour to evaluate bridge-pier vulnerability

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Bridges are continuously threatened by the action of natural hazards like floods and earthquakes. Every year, many bridges collapse worldwide, causing severe disruption to infrastructure networks, social and economic problems, and in some occasions, inestimable cultural heritage losses. In this context, flood-induced scour is by far the main cause of bridge failure. Recent contributions by Pizarro et al. (2017) and Link et al. (2017) on the treatment of bridge scour under unsteady hydraulic conditions have been a cornerstone in this field, providing the basis for more refined approaches. That is the case of the Theoretically Derived probability Distribution of Scour (TDDS), which represents the first attempt to formalize the scour statistics at the flood-event scale (Manfreda et al., 2018). The TDDS allows linking the main variables involved in the process such as: river basin hydrology, hydraulic characteristics of the river and cross-section, sediment, and pier. The proposed framework allows a better understanding of the impact of each of those components on the scour depth distribution, being a suitable approach to estimate flood-induced scour probabilities. The TDDS couples hydraulic, hydrological, and erosional models in a closed and analytical way, locating it as a fast alternative to evaluate bridge vulnerability to scour.

References:

Pizarro A., C. Samela, M. Fiorentino, O. Link, S. Manfreda, An entropy-based model for bridge-pier scour estimation under complex hydraulic scenarios, Water (MDPI), 2017.

Link, O., C. Castillo, A. Pizarro, A. Rojas, C. Escauriaza, B. Ettmer, S. Manfreda, A model of bridge pier scour during flood waves, Journal of Hydraulic Research, 55(3), 310-323, 2017.

Manfreda, S., Link, O., Pizarro, A. A Theoretically Derived Probability Distribution of Scour, Water (MDPI), 2018.