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A monitoring activity on bedrock incision in the Cardoso River (Tuscany, Italy)

S. Francalanci (1) and L. Solari (2)

(1) CERAFRI (CEntre of Research and Advanced education For hydrogeological RIsk prevention), (2) University of Florence, Department of Civil Engineering

Bedrock river incision rate is one of the fundamental parameters to be estimated in order to predict adequately the morphodynamic equilibrium configuration of bedrock streams. There are many ways to cause a river to incise into its own bedrock: wear caused as bedload particles strike bedrock; plucking, by which chunks of fractured bedrock are torqued out of the bed by the flow and broken up; macroabrasion, by which these chunks are further broken up as bedload particles strike them. A monitoring activity to estimate the bedrock incision rate was started in the Versilia basin (Tuscany, Italy): the mountain stream of the Cardoso River was found to offer large part of the bedrock exposed to bed-load abrasion, plucking, and seasonal wetting and drying; the hard and intact rock is usually comminute into plates or equal fragments that are removed by higher flows. Field evidence of folia in the bedrock stream was found in the Cardoso River, where the bed is composed by feldspathic metasandstones and fillites. In the study site we chose a reach of uniform bedrock where we observed folia or pervasive weathering features. Following the field activity developed by Stock et al. (2005), we installed a series of cross-section lines with erosion pins to monitor short-term production rates, . The bedrock erosion in the Cardoso River is modeled following both empirical simplified approaches, based either on the local shear stress or the stream power per unit bed area, and the recent mechanistic approach proposed by Chatanantavet and Parker (2005).