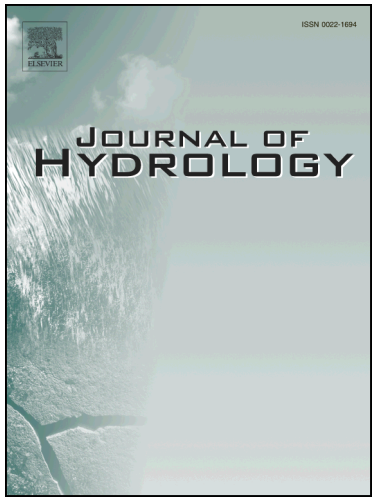

Research papers

Estimating actual and potential bare soil evaporation from silty pyroclastic soils: Towards improved landslide prediction

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PII: S0022-1694(18)30332-9
DOI: https://doi.org/10.1016/j.jhydrol.2018.05.005
Reference: HYDROL 22782

To appear in: *Journal of Hydrology*

Received Date: 29 June 2017
Revised Date: 3 May 2018
Accepted Date: 4 May 2018

Please cite this article as: Rianna, G., Reder, A., Pagano, L., Estimating actual and potential bare soil evaporation from silty pyroclastic soils: Towards improved landslide prediction, *Journal of Hydrology* (2018), doi: https://doi.org/10.1016/j.jhydrol.2018.05.005

Title

Estimating actual and potential bare soil evaporation from silty pyroclastic soils: Towards improved landslide prediction

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Abstract

The estimation of evaporative fluxes and their effects on soil suction is assuming a prominent role in the field of interpretation and early-warning prediction of rainfall-induced landslides. Evaporation models refer essentially to sands or plastic (silty and clayey) soils. Models validated specifically for non-plastic silty pyroclastic soils, usually characterized by very high porosity, are instead unavailable. This deficit arises although silty pyroclastic covers are widely spread across the world, increasingly involved in rainfall-induced landslides and recognized showing particular hydrological behaviour. A number of questions may be raised about the issue: (i) may any evaporative models be reliably extended to silty pyroclastic soils?; (ii) what atmospheric variables need to be monitored at least to reliably predict evaporation fluxes in these soils?; and (iii) how accurate evaporation estimations are if they are referred to silty pyroclastic covers for early warning purposes? This study addresses these questions by assessing the capabilities of several simplified models in estimating evaporative (potential and actual) fluxes for silty pyroclastic soils. To this aim, a large-scale lysimeter, consisting in a silty pyroclastic layer exposed to the atmosphere and comprehensively monitored for both weather forcing and hydrological soil variables, is adopted. It provides a dataset of observations suitable to calibrate and validate the selected evaporation models. Moreover, the