

Forecasting landslide activations by means of GA-SAKe. An example of application to three case studies in Calabria (Southern Italy)

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GA-SAKe - the Genetic-Algorithm based release of the hydrological model SAKe (Self Adaptive Kernel) – allows to forecast the timing of activation of landslides [1, 2], based on dates of landslide activations and rainfall series. The model can be applied to either single or set of similar landslides in a homogeneous context. Calibration of the model is performed through Genetic-Algorithm, and provides families of optimal, discretized solutions (kernels) that maximize the fitness function. The mobility functions are obtained through convolution of the optimal kernels with rain series. The shape of the kernel, including its base time, is related to magnitude of the landslide and hydro-geological complexity of the slope. Once validated, the model can be applied to estimate the timing of future landslide activations in the same study area, by employing measured or forecasted rainfall.

GA-SAKe is here employed to analyse the historical activations of three rock slides in Calabria (Southern Italy), threatening villages and main infrastructures. In particular:

- 1) the Acri-Serra di Buda case, developed within a Sackung, involving weathered crystalline and metamorphic rocks; for this case study, 6 dates of activation are available;
- 2) the San Fili-Uncino case, developed in clay and conglomerate overlaying gneiss and biotitic schist; for this case study, 7 dates of activation are available [2];
- 3) the San Benedetto Ullano-San Rocco case, developed in weathered metamorphic rocks; for this case study, 3 dates of activation are available [1, 3, 4, 5].

The obtained results are quite promising, given the high performance of the model against slope movements characterized by numerous historical activations. Obtained results, in terms of shape and base time of the kernels, are compared by taking into account types and sizes of the considered case studies, and involved rock types.

References

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