

# ROCK-FALL HAZARD IN THE YOSEMITE VALLEY, CALIFORNIA

F. Guzzetti (1), **P. Reichenbach** (1) and G.F. Wieczorek (2)

(1) CNR-IRPI, via della Madonna Alta 126, 06128 Perugia, Italy (2) U.S. Geological Survey, Reston, VA, USA

Rock slides and rock falls are the most frequent slope movements in Yosemite National Park, California. In historical time (1851-2001), more than 400 rock falls and rock slides have been documented in the valley, and some of them have been mapped in detail. We present the preliminary results of an attempt to assess rockfall hazard in the Yosemite Valley using STONE, a 3-dimensional rock-fall simulation computer program. The software computes 3-dimensional rock-fall trajectories starting from a digital terrain model (DTM), the location of rock-fall release points (source areas), and maps of the dynamic rolling coefficient and of the coefficients of normal and tangential energy restitution. For each DTM cell the software also calculates the number of rock falls passing through the cell, the maximum rock-fall velocity and the maximum flying height. For the Yosemite Valley, a DTM with a ground resolution of 10 x 10 m was prepared using topographic contour lines from USGS 1:24,000-scale maps. Rock-fall release points were identified as DTM cells having a slope steeper than 60 degrees, an assumption based on the location of historical rock falls. Maps of the normal and tangential energy restitution coefficients and of the rolling friction coefficient were produced from a surficial geologic map. The availability of historical rock falls mapped in detail allowed us to check the computer program performance and to calibrate the model parameters. Visual and statistical comparison of the model results with the mapped rock falls confirmed the accuracy of the model. The model results are also compared with a geomorphic assessment of rock-fall hazard based on potential energy referred to as a "shadow angle" approach, recently completed for the Yosemite Valley.