# 32$^{nd}$ IGC - Florence, 2004

## Abstract title

GIS TECHNOLOGY TO MAP LANDSLIDES, ASSESS LANDSLIDE HAZARDS AND EVALUATE LANDSLIDE RISK: AN ITALIAN EXPERIENCE

## Authors

GUZZETTI FAUSTO [1], CARDINALI MAURO [1], REICHENBACH PAOLA [1], ARDIZZONE FRANCESCA [1], GALLI MIRCO [1]

presenter's e-mail: F.Guzzetti@irpi.cnr.it

1 - IRPI CNR

## Keywords

Landslide

Hazard

Risk

Map

GIS

## Abstract

Many different triggers cause landslides, including intense or prolonged rainfall, snow melting, and earthquake shaking. Mass movements can occur singularly or in groups of up to several thousands. Multiple landslides occur simultaneously (e.g., when slopes are shaken by an earthquake) or over a period of hours or days (e.g., when failures are triggered by intense rainfall or rapid snow melting). The extraordinary breadth of the spectrum of mass-movement phenomena makes it difficult to define a single methodology to ascertain landslide hazards and to evaluate the associated risk. Despite the fact that the main causes and effects of landslides have long been known, and that several different methods and techniques have been proposed to identify and map slope failures, to evaluate landslide hazards, and to ascertain landslide risk, no general agreement has been reached on how to accomplish these tasks effectively.

In the presentation we discuss the use of geographical information and of GIS technology to map landslides, to assess landslide hazards, and to identify the risk associated with mass movements, at different scales and in different physiographical environments. We show how GIS technology can be used to: a) compile archive, historical, and event landslide inventory maps, b) assess the quality and reliability of landslide maps, c) prepare and validate landslide susceptibility and landslide hazard maps, d) estimate the specific (direct and indirect) risk at which vulnerable elements are subject due to the presence of mass movements, e) determine the impact that mass movements can have on the population, the structures and the infrastructure of a region. We show examples of landslide hazards assessment and risk evaluations obtained through different methods (statistical and deterministic), which exploit GIS technology and geographical information. We further outline some of what we consider to be the main inadequacies of the existing approaches to landslides mapping, hazard assessment and risk evaluation, and we offer some recommendations on the basis of experience gained in 15 years of landslide hazards and risk assessment in Central and Northern Italy.