

**Summary:** If rain gauges indicate a rainfall event longer than 12 hours (without interruption of rain for more than 6h), the accumulated rainfall and its duration are compared against threshold values. A computed infiltrated water derived from previous 24 h of rainfall and/or snow melting is also considered. Threshold values are derived for 2 macro-regions and, within those, for 4 elevation levels.

## Types of landslides

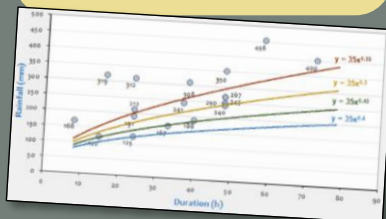
Shallow landslides

## Monitoring

400 rain gauges  
 (sub-hourly values)

## Types of assessment

- Cumulated rainfall vs. Duration thresholds per region and elevation
- additionally: number of likely landslides per km<sup>2</sup>, set for each Thiessen polygon (hazard zonation)

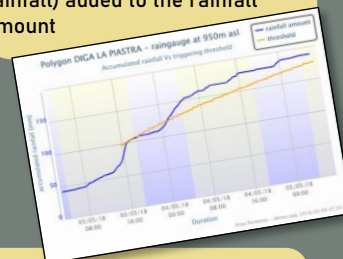


## Spatial discretization

Thiessen polygons (based on rain gauges) within 2 areas: Alps and Hills-Apennines

## Formulation

- Accumulated rainfall [mm] and duration [h] calculated for rainfall events (> 12h rainfall, without interruptions >6h)
- soil water content derived from hydrological model (24h rainfall) added to the rainfall amount



Human consultation before issuing a warning?

No

## Warning zones

Thiessen polygons (based on rain gauges)

## Warning levels

- 1: no rainfall event
- 0: rainfall event < threshold
- 1: rainfall event > threshold

## Warning time

Updating interval of 1 hour

## Information type

- Automatic e-mail alert to geo-hydrological hazards defense officers
- Officers inform the public by a bulletin published on institutional website

SLOPS:  
 Shallow Landslides  
 Occurrence  
 Prediction System  
 (operational  
 from 2019)

It is a major update  
 of the system  
 SMART:  
 Shallow landslides  
 Movements  
 Announced through  
 Rainfall Thresholds  
 (operational  
 from 2008)

Landslide data:  
 >30000 landslides during 25 rainfall  
 events, years 1990-2016