

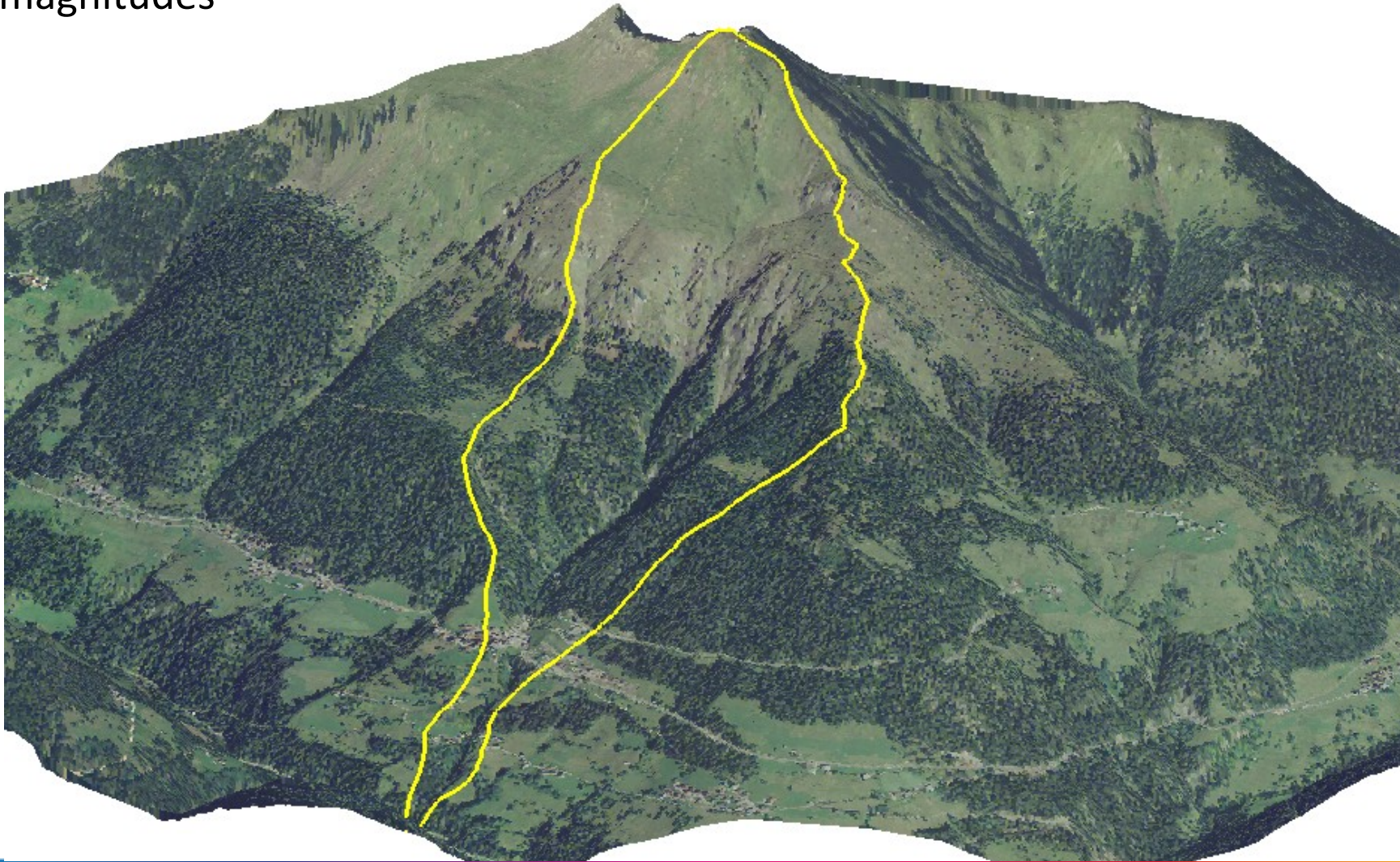


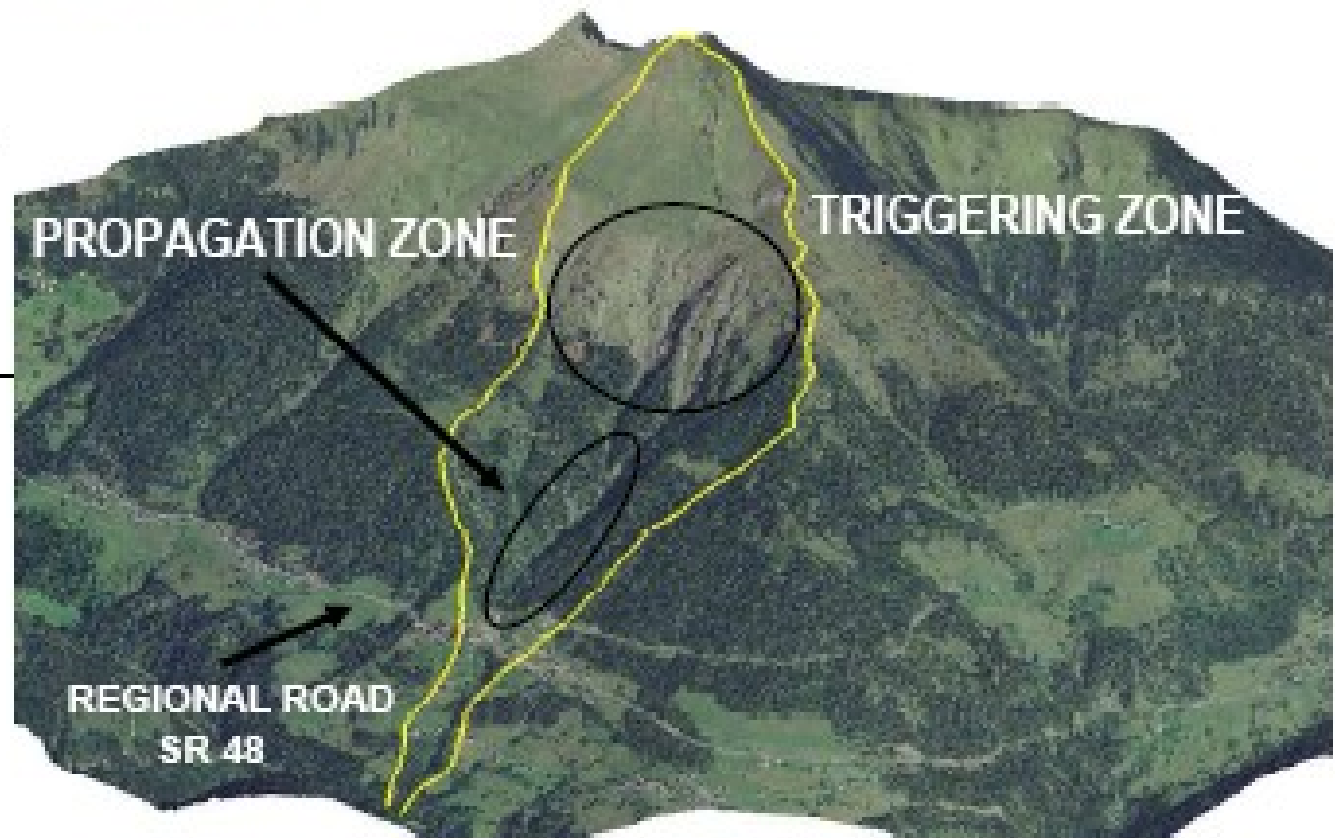
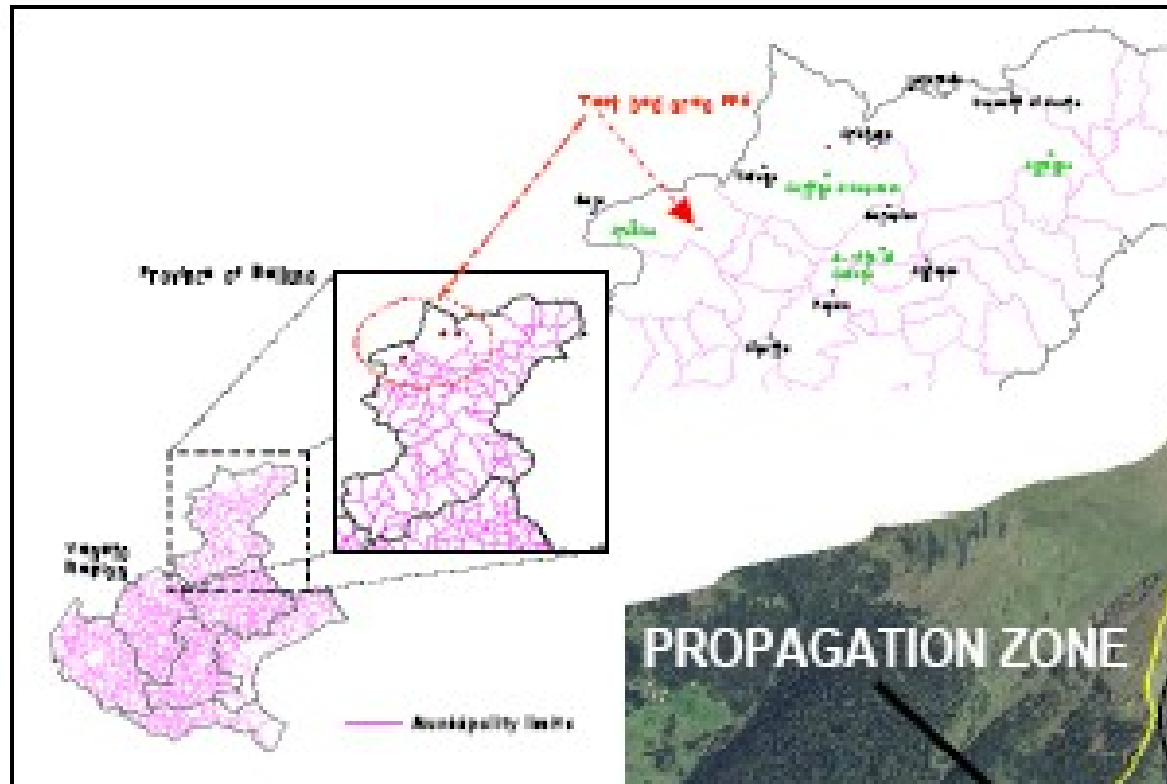
Rio Chiesa
Veneto region
Belluno province

www.sedalp.eu

The small alpine catchment is located inside the dolomitic region (Veneto Region), in the north-east portion of the Italian Alps.

The Rio Chiesa catchment (1.2 km²) is monitored for the debris flow events magnitudes



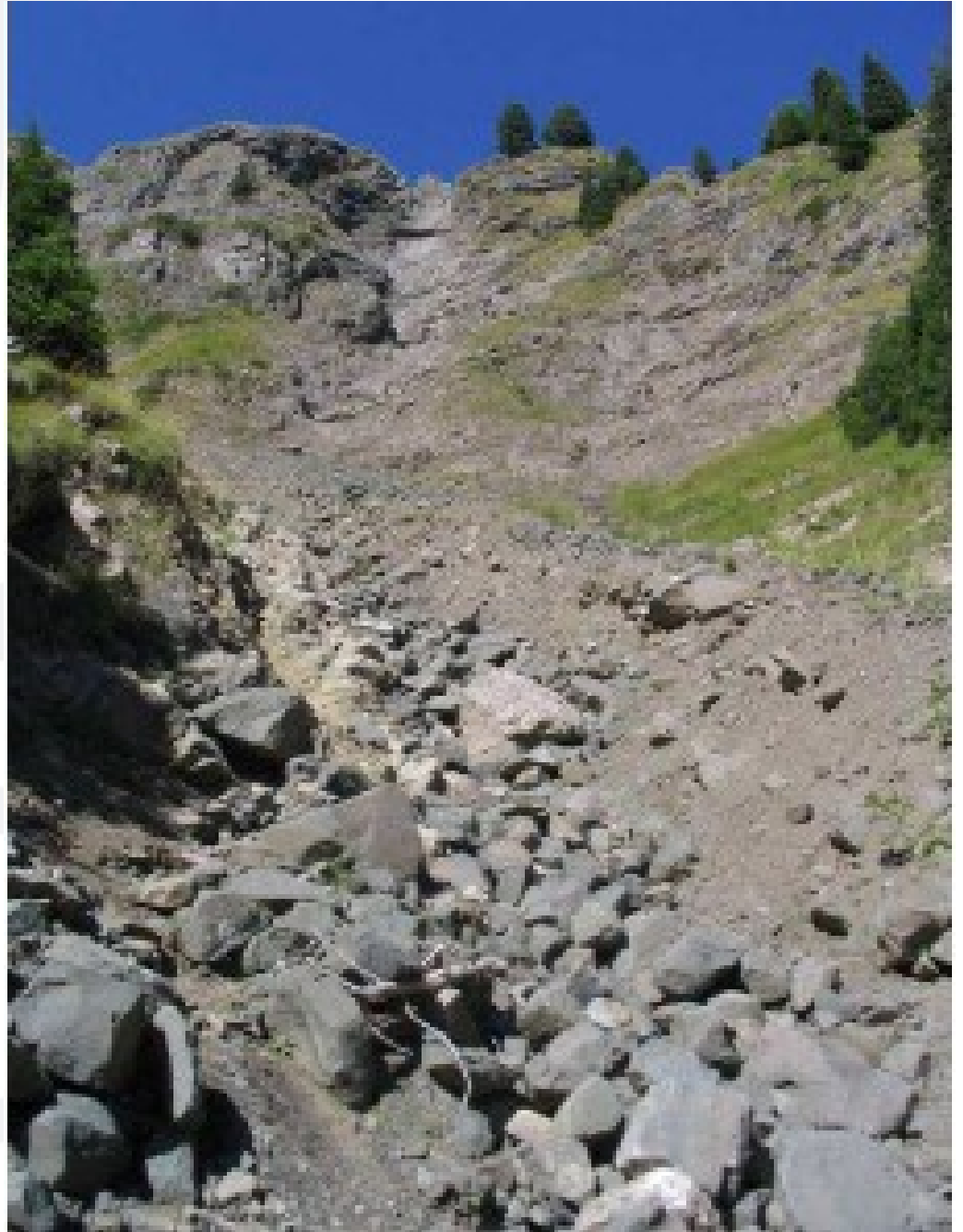


Rio Chiesa	
Catchment area (km ²)	1.17 (0.95 at Livinallongo)
Minimum elevation (m a.s.l.)	1175
Maximum elevation (m a.s.l.)	2462
Average elevation (m a.s.l.)	1780
Mean catchment gradient (%)	75
Mean stream channel gradient (%)	45
Mean annual rainfall (mm)	1200
Length of the main stream (km)	1.75

Geology: Quaternary moraine, Wengen volcanic sediment, Werfen and Livinallongo formation

Land use: Thick woodland 65%; Unproductive 21%; Shrubs 7%

The Rio Chiesa catchment (1.2 km²) is monitored for the debris flow events magnitudes; it is provided with a simple but effective warning system for debris flows phenomena which often occur along the main channel. The test area is dominated by a debris flow activity and then subjected both to a monitoring activity and to test of debris flow triggering. The hazard phenomena in the basin are debris flows or mud flows that start in the upper part of the basin in a range of altitude from 1900 m to 2100 m a.s.l. in an area subjected to erosion.





The main analysis in the test area are three:

- 1) *Design of hazard maps, field surveys, inquiries in local public offices and office work*
- 2) *Implementation of an early warning system related to the rainfall monitoring and activated by the effective flow of debris (a rain gauge of University of Padua is already installed in the upper part of the basin just in correspondence of the debris flow triggering area).*
- 3) *Test of the early-warning system for debris flow occurrence and evaluation of the performance of the tested system with field set-up, according to institutions concerned and the involved observers.*

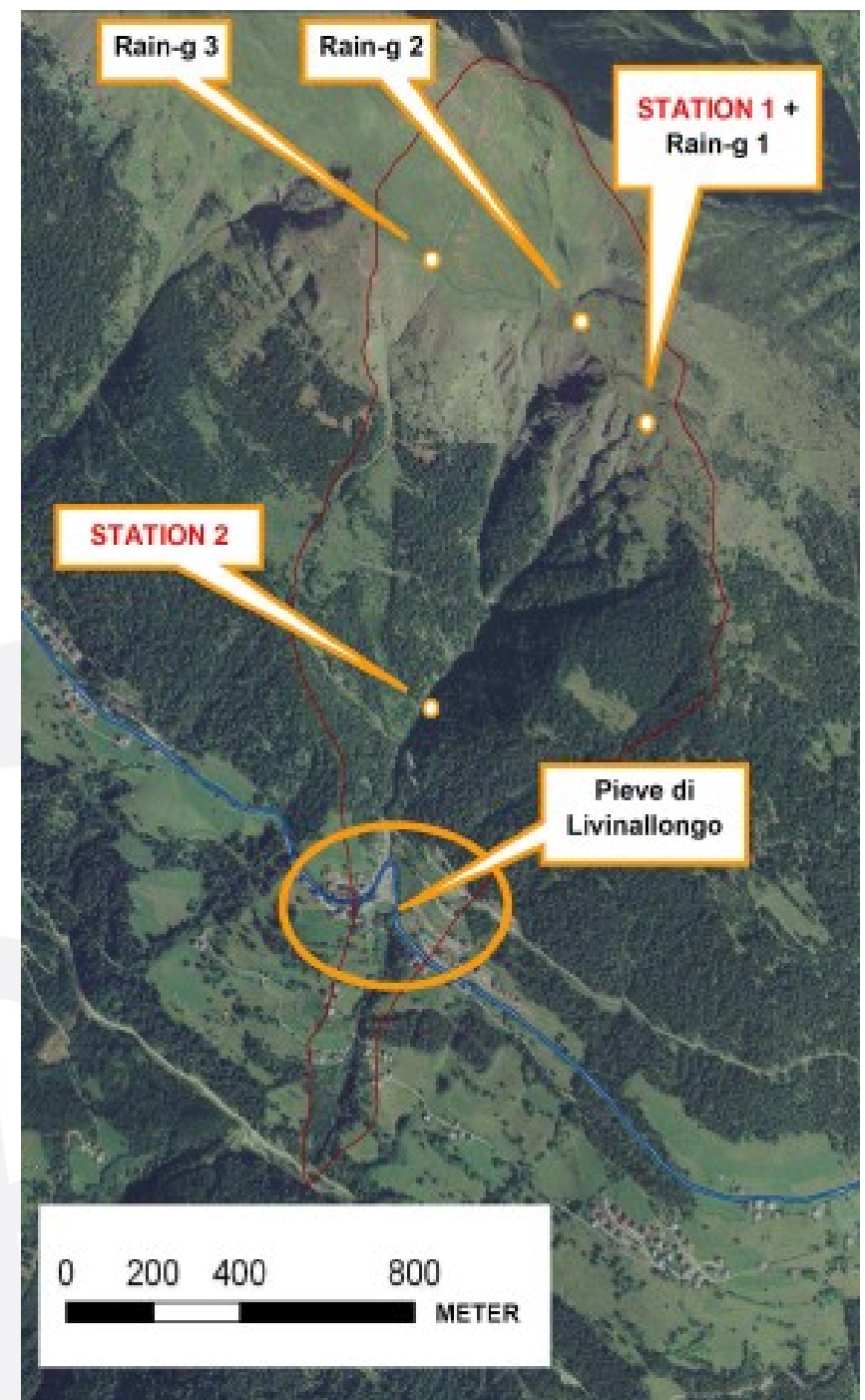
In 2007 the Regional Forest Service of Belluno carried out a permeable check dam about five hundred meters upstream the regional road n.48. This work represents a solution for little events with a limited quantity of debris (lower than 5000 m³)



With the aim to furnish a good alert signal in time, the debris flow monitoring system has been projected with 2 distinctive phases:

- *Monitoring of the intense rainfalls able to produce a debris flow phenomenon;*
- *Debris flow monitoring.*

The system is composed by two stations:



Station 1 (*upstream station, ST1*)

located at 2120 m a.s.l., in the upper portion of the catchment (detachment zone) for the huge rainfalls monitoring;

It is provided with:

- *3 tipping bucket rain gauges ;*
- *1 thermometer;*
- *1 ultrasonic anemometer with three axes;*
- *1 webcam;*
- *recording and transmission data unit, via UMTS and UHF;*
- *photovoltaic panels for supply energy, batteries voltage regulator;*
- *box for instrumentation recovery.*



Station 2 (*downstream station, ST2*)

located at 1570 m a.s.l., just upstream the village of Pieve di Livinallongo, for the debris flows monitoring.

It is provided with:

- *1 thermic camera;*
- *4 ultrasonic sensors (echo sounders);*
- *2 cable pulls;*
- *recording and transmission data unit, via UMTS and UHF;*
- *photovoltaic panels for supply energy, batteries voltage regulator;*
- *box for instrumentation recovery.*

