Experimental analysis of seasonal processes in shallow landslide through downscaled observations

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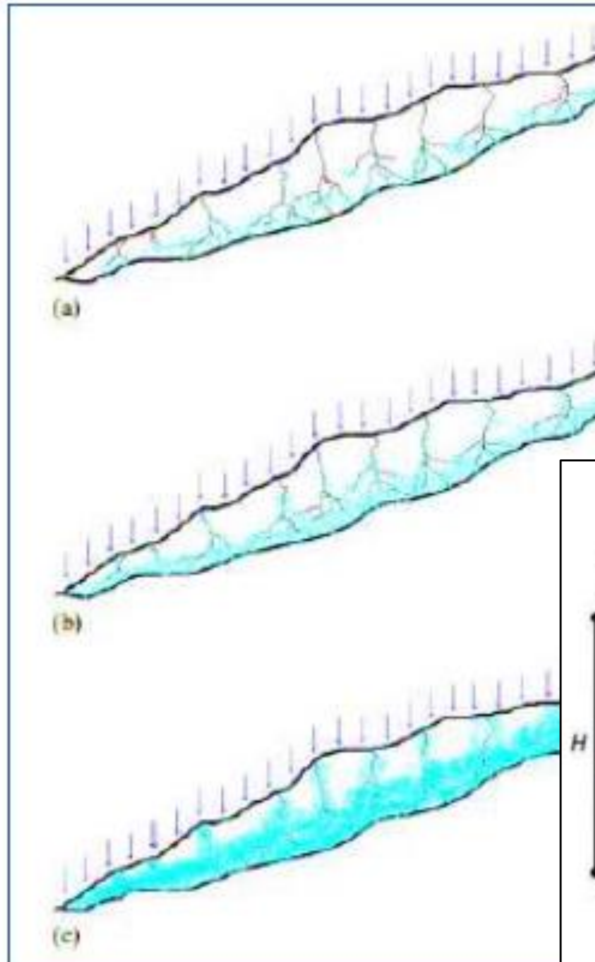
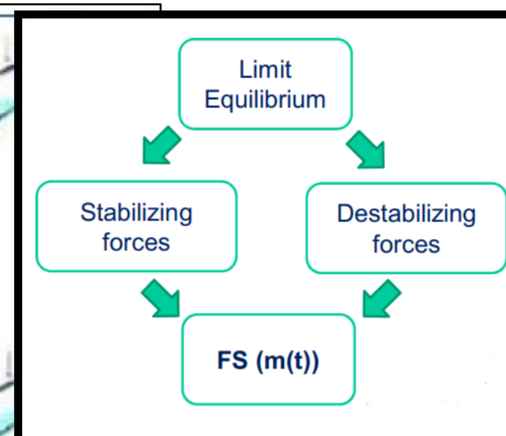
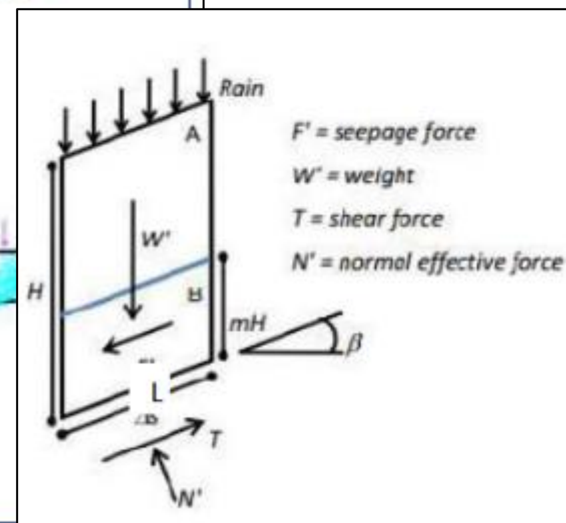
LABORATORY EXPERIENCE:
SHALLOW LANDSLIDE SIMULATOR AND SOIL SLIP MODEL





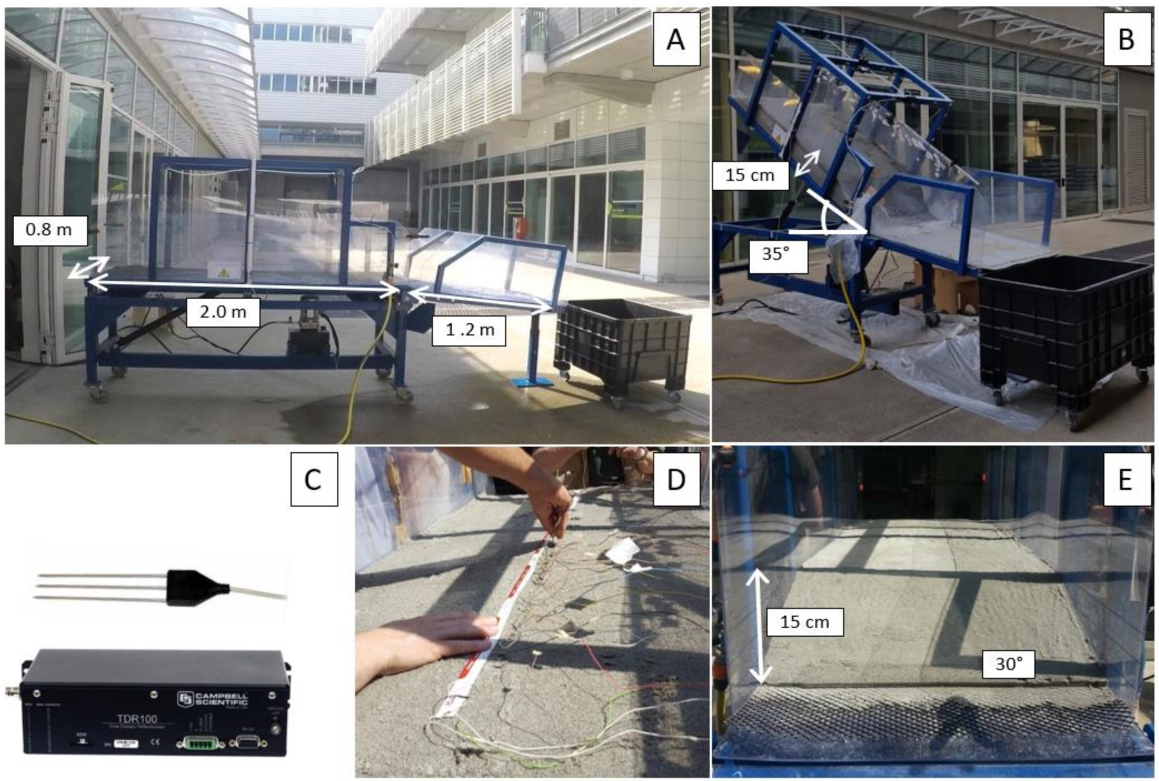


EXPERIMENTAL SETUP

The **type** of the examined terrain, its **state of compaction** and the **initial water content** are crucial for the definition of the initial conditions of the experiment. All those parameters govern how quickly the water will infiltrate in the soil layer and create unstable conditions.

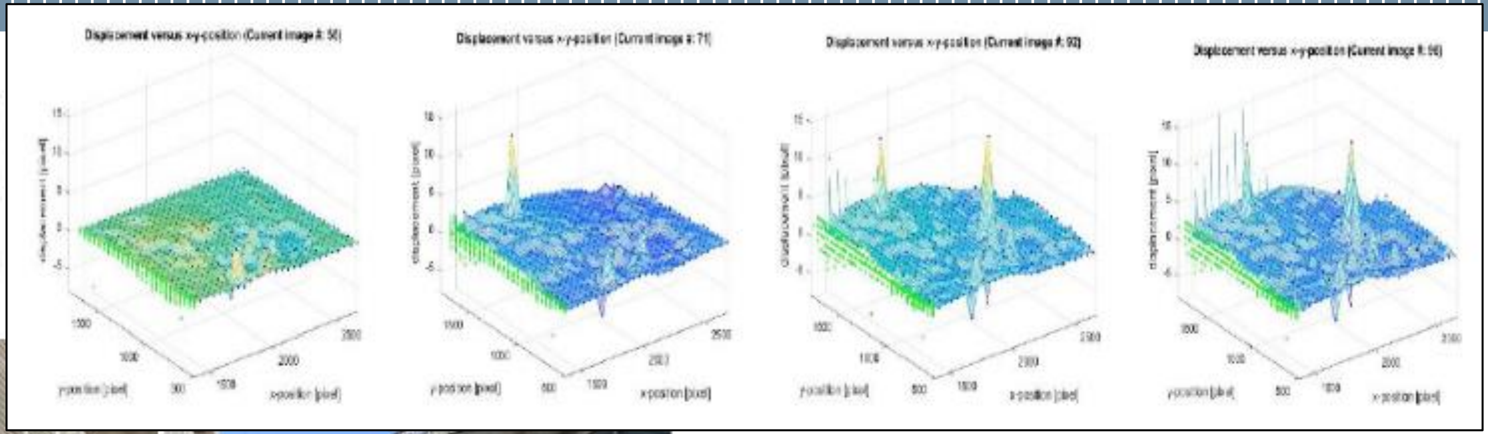
GEORESITIVIMETER

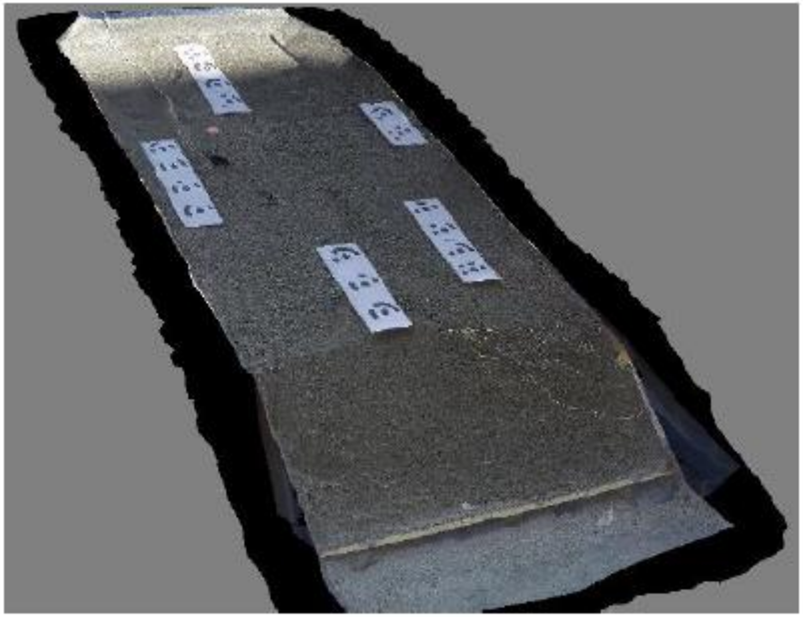
SPRINKLERS



PRESSURE TRANSMITTERS

PHOTOGRAMMETRIC SURVEY: ESTIMATION OF DISPLACEMENTS AND VELOCITIES OF LANDSLIDE

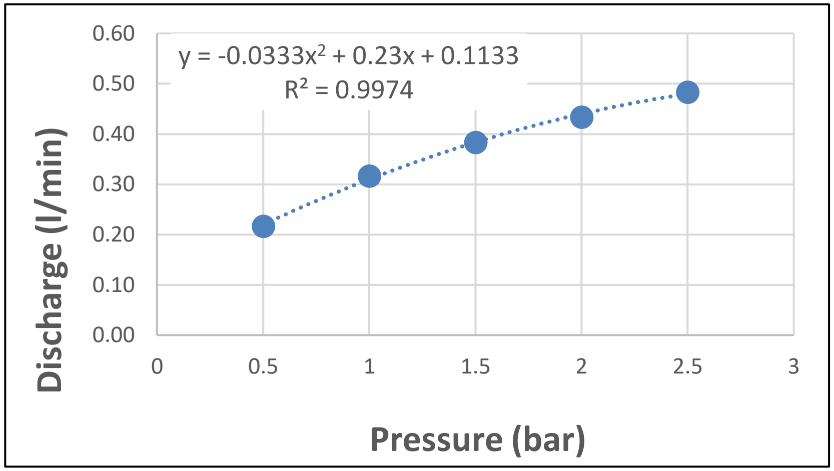




CALCULATION OF THE SIMULATED RAINFALL INTENSITY

Uniform rainfall field.

Pressure – discharge relationship for the sprinklers

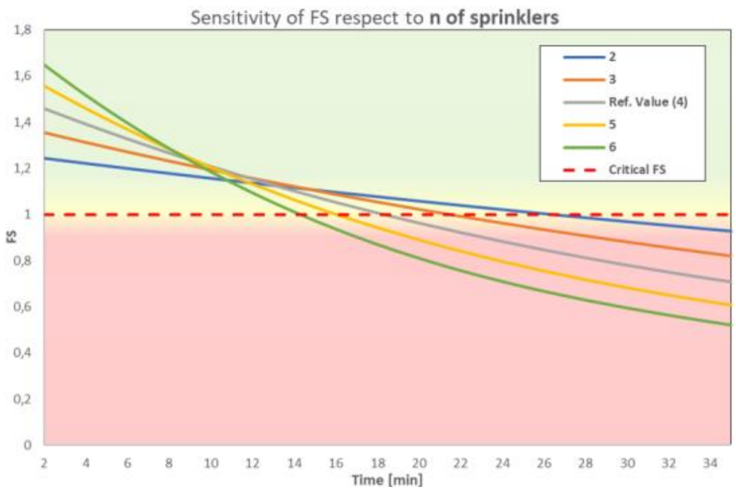


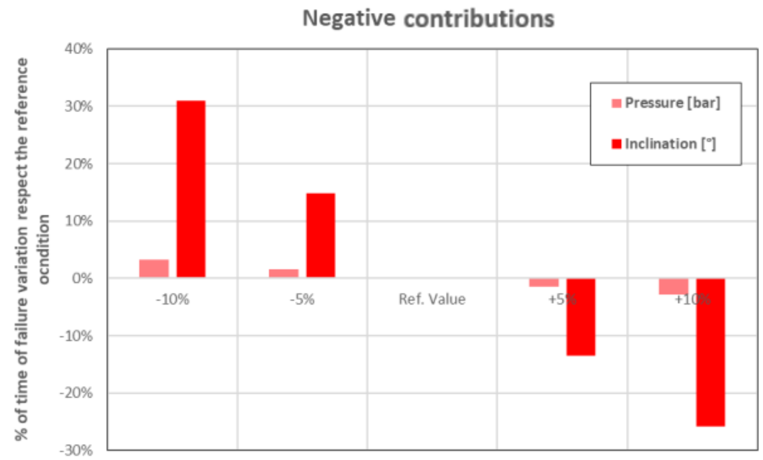
Each of the 6 sprinklers is calibrated to release a certain discharge according to the pressure with which the water is fed to it.
The relationship provided by the producing company is given on the graph.

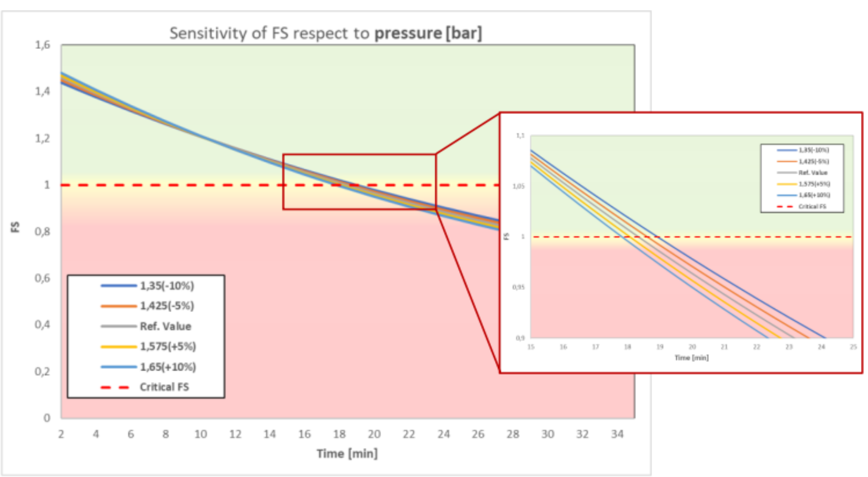
Rainfall intensity [mm/h] = N x (Sprinkler discharge [l/min] x 60)/Area [m^2]

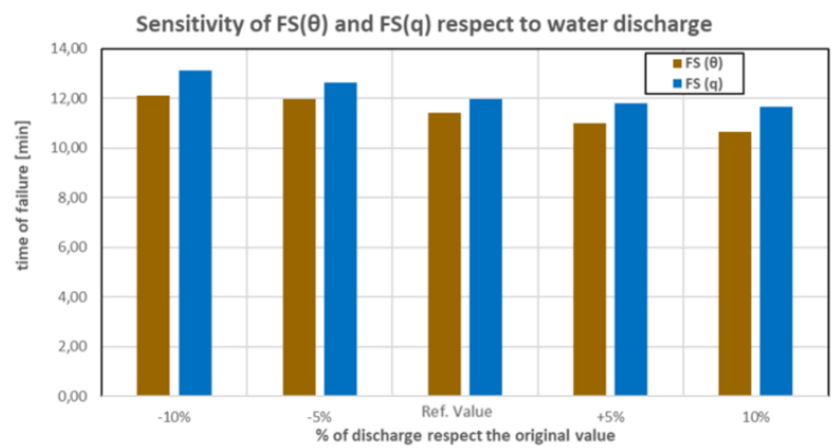
N = number of sprinklers used.

SENSITIVITY ANALYSIS



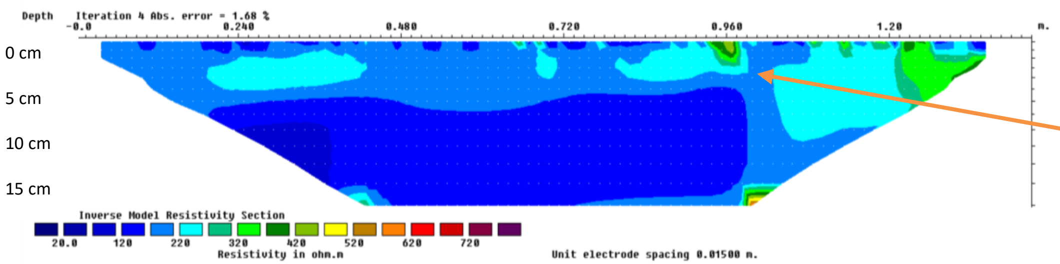






RESULTS: COMPARISONS AMONG TECHNIQUES CONSIDERED

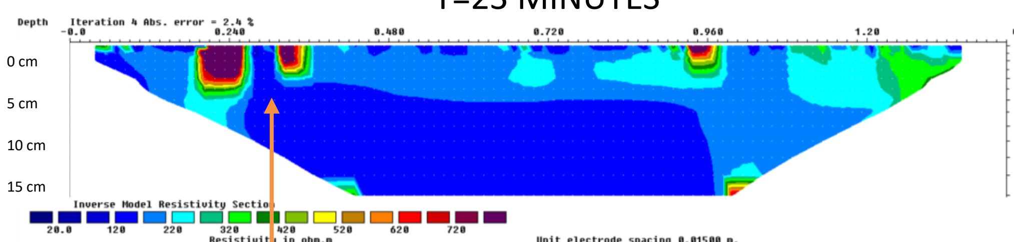
downstream T=19 MINUTES upstream



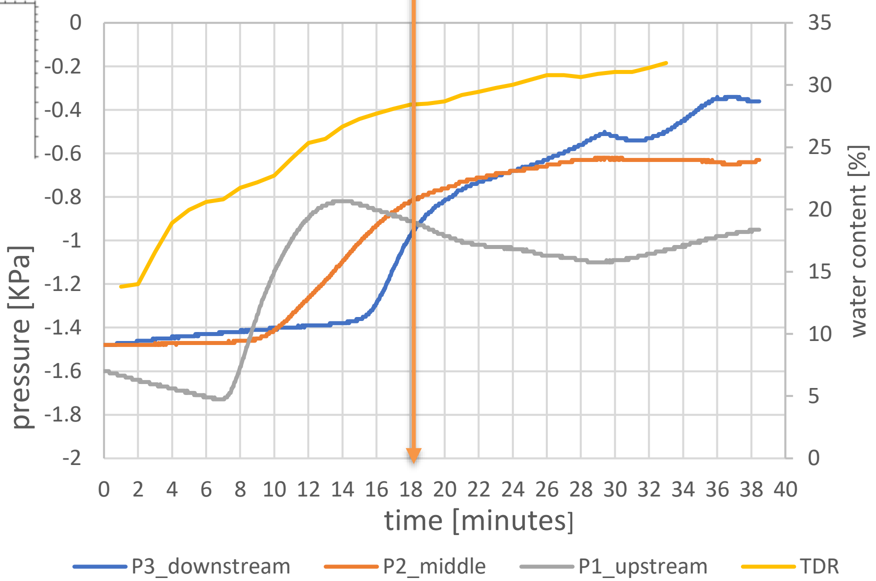
T=20 minutes

FIRST CRACK OCCURRENCE

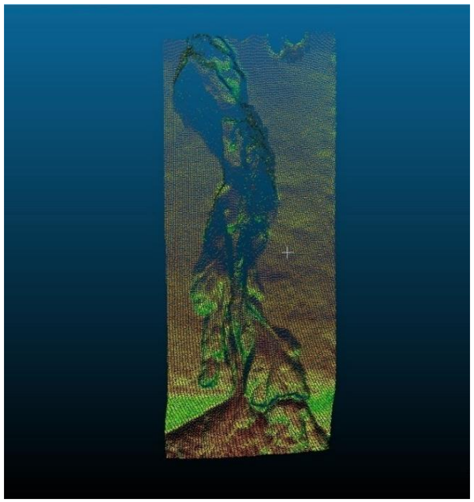
T=23 MINUTES

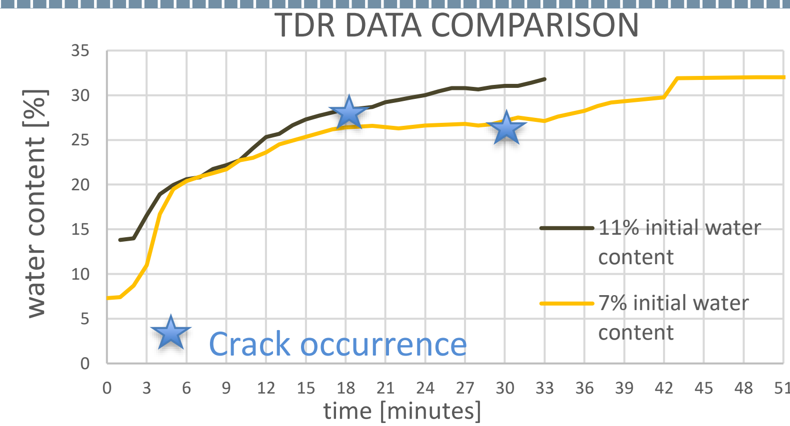


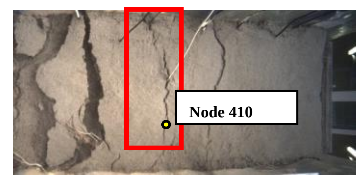
T=25 minutes

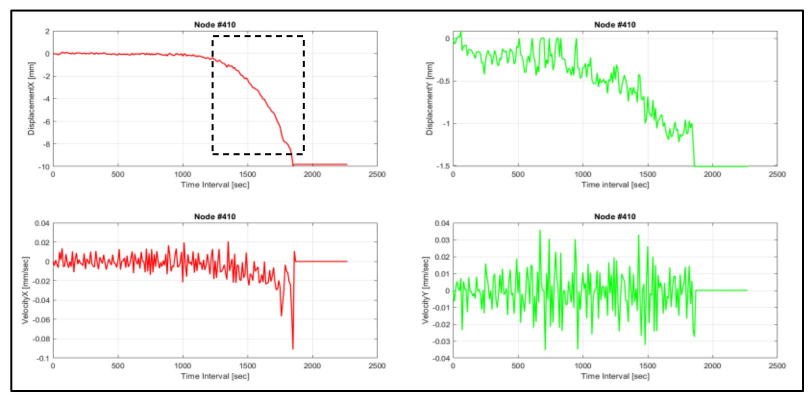


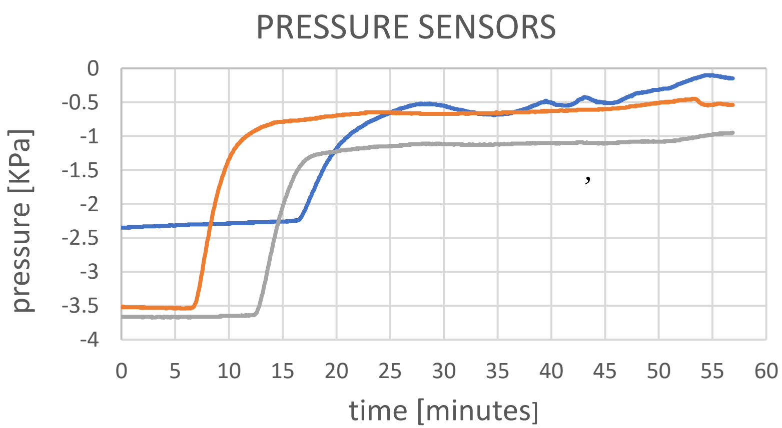
EXPERIMENT 2: SENSORS DATA





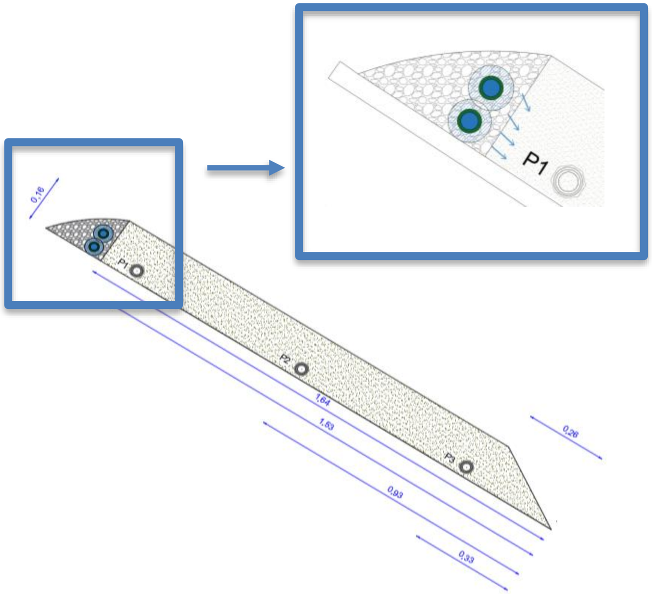






EXPERIMENT 3

Data and time	**16 July 2019** **Start: 10:54** **end: 11:29**
Slope inclination	35°
Initial geotechnical parameters	n= 0.51 w= 10.5%
Drain upstream	Starts at 10:54 with a discharge of 1,7 liters per minute.
Monitoring system: **GoPro cameras** **TDR** **Georesistivimeter** **Pressure transmitters**	

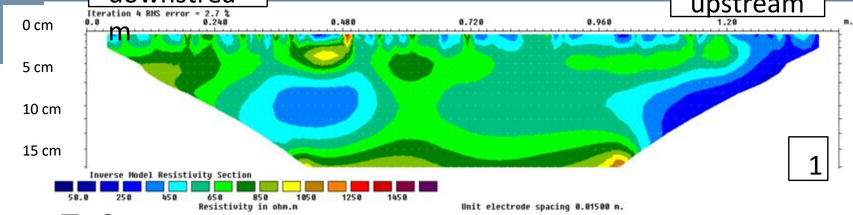


The same inclination and discharge similar to the one coming from the rain of experiment 2. The difference is the way the water is provided to the landslide body, indeed it is homogeneously drained from a portion of terrain upstream.

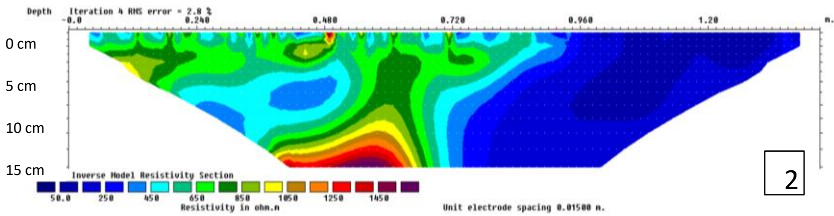
EXPERIMENT 3
GEORESISTIVITY DATA

downstream

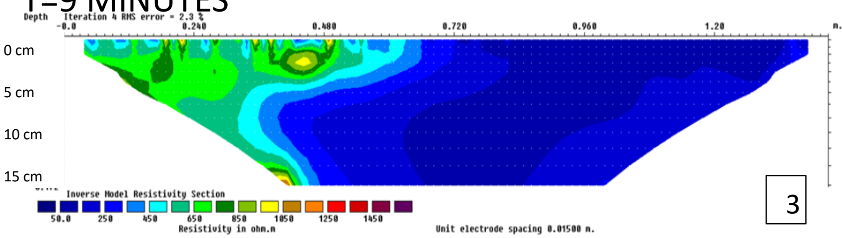
upstream



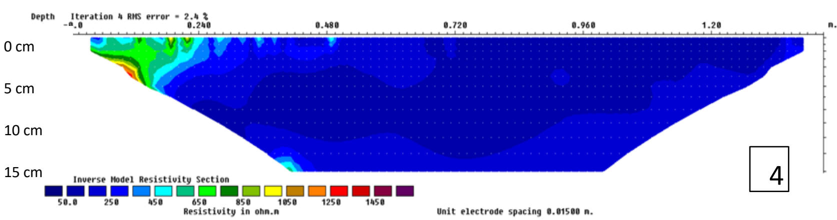
T=0



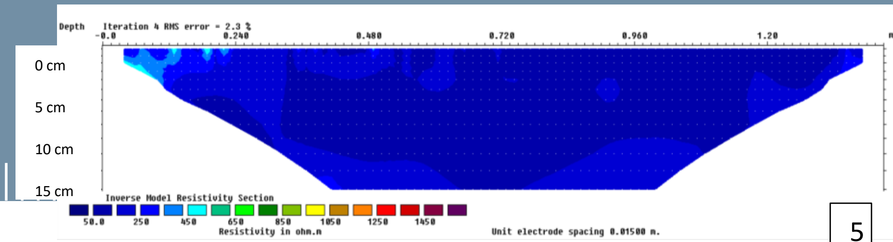
T=9 MINUTES



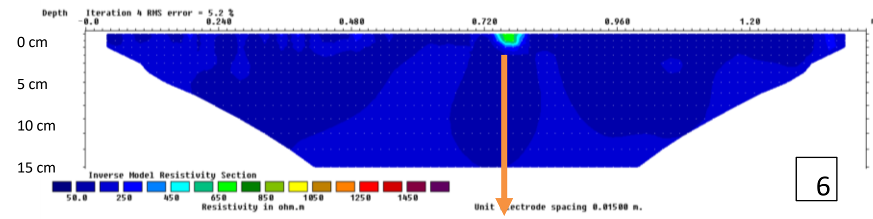
T=17 MINUTES



T=25 MINUTES

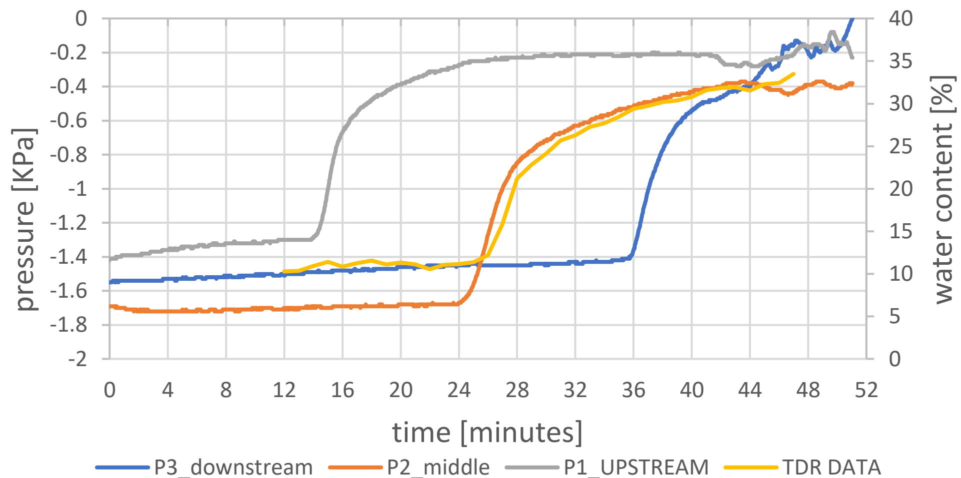


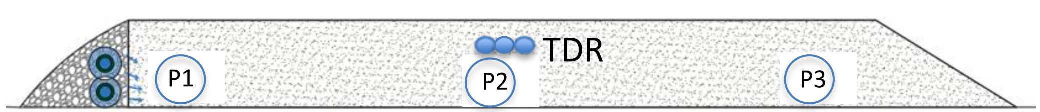
T=29 MINUTES



T=33 MINUTES

CRACK





DIFFERENT POSSIBLE SETTING

EXPERIMENT 1 - RAINFALL

EXPERIMENT 3 - DRAIN

EXPERIMENT 3 – SNOW COVER