UNIVERSITÀ DEGLI STUDI DI PADOVA

ICEA — INGEGNERIA CIVILE EDILE ED AMBIENTALE

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BOKU

## Automatic procedure of calibration that:

1. Extracts a huge number of parameters from a normal user-defined distribution.

2. Writes all the input files, updating the values of each parameter.

3. Runs automatically all the simulations.

4. Converts the output data in different formats, that allow an accurate comparison with the physical data.

5. Identifies the simulation with the lowest error compared to the equivalent real case.

6. Applies the Ensemble Smoother Algorithm to obtain an even more precise calibration.

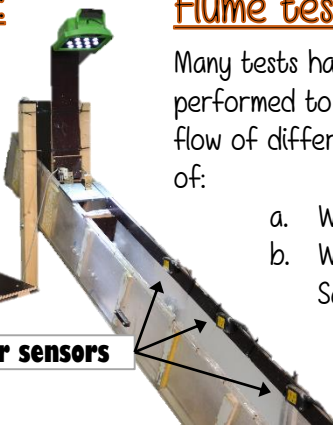# Parameters optimization for a SPH model applied to the analysis of earth-flows propagation.

Lorenzo Brezzi

Laboratory tests:

Rheometer tests to identify rheological parameters of fine matrix.

Laser sensors

Photogrammetry
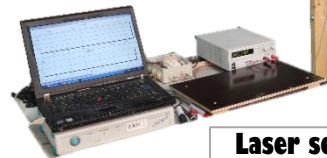
Sense 3D Laser Scanner

Flume tests:

Many tests have been performed to study the flow of different mixtures of:

a. Water & Kaolin;
b. Water, Kaolin & Sand.

GeoFlow–SPH model
### (Pastor et al. 2009-2014)

Characteristics of the code

- ✓ Integration of small wave equations.
- ✓ Quasi-Lagrangian approach.
- ✓ Different rheological laws available.
- ✓ Constant material parameters.
- ✓ Basal erosion can be considered.

GLOBAL GOAL: define a method that help to calibrate a numerical model, using indices to evaluate the likelihood to the reality.

Real case study:

In November 2010, 320.000 m^3 of material travel for 4 km along the **Rotolon stream**. A Lidar survey has been suddenly developed.
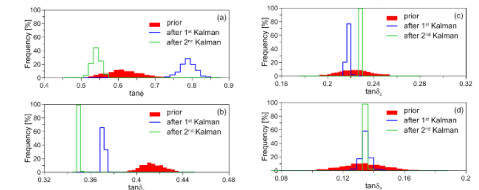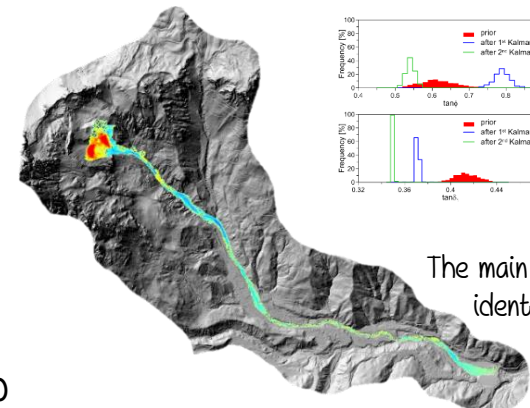
The main goal to reach is the identification of the best combination of parameters for reproducing the real phenomenon. For that reason, a Lidar data elaboration and the definition of the rheological law to use were necessary.