

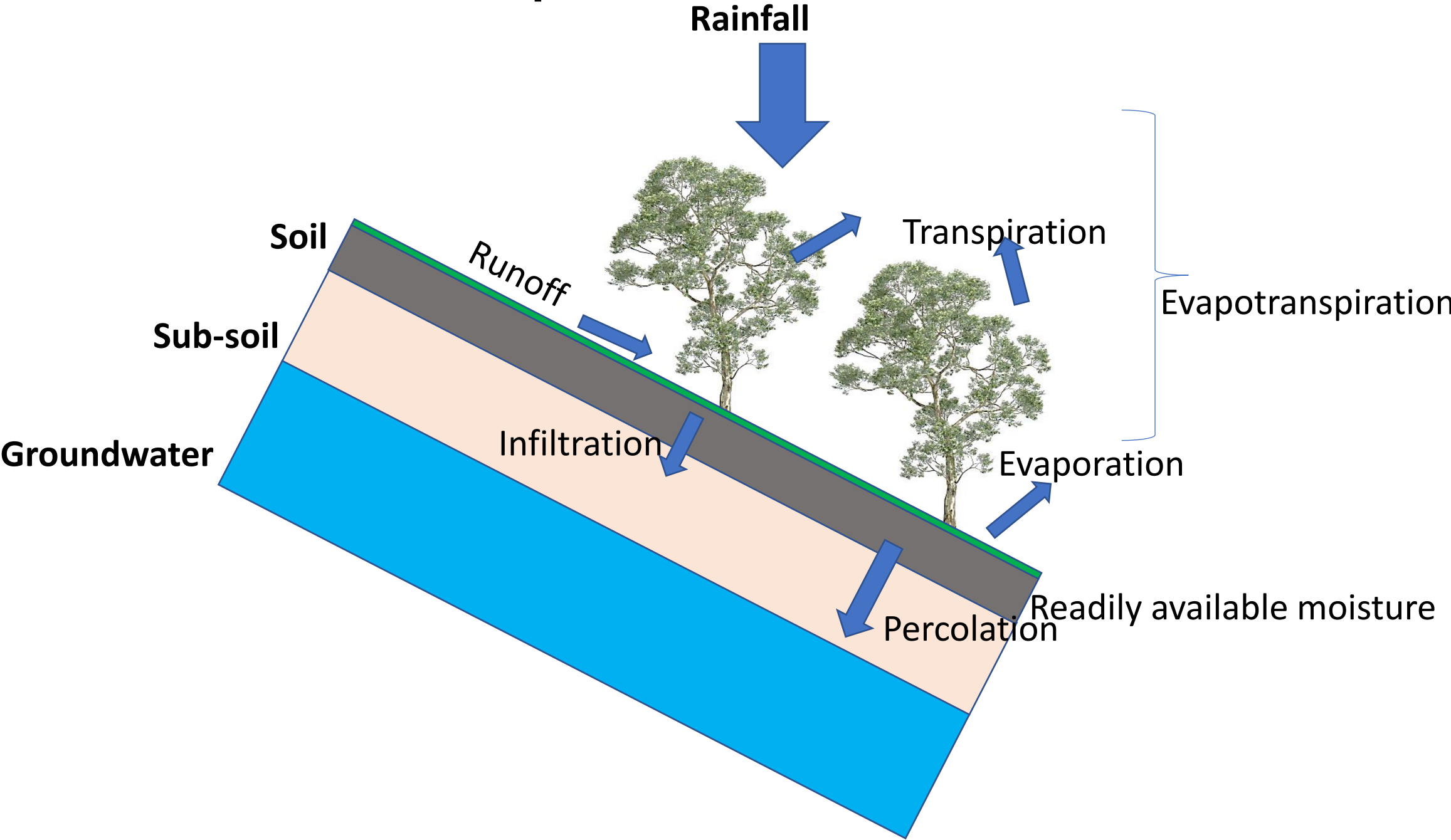
Landslides, soil moisture, and land use changes in the mountainous Northern-western provinces of Rwanda: field-based research in a tropical environment

DISPLAY MATERIAL

Presenter: Pascal Sibomana

26th May 2022

Rainfall – soil moisture response

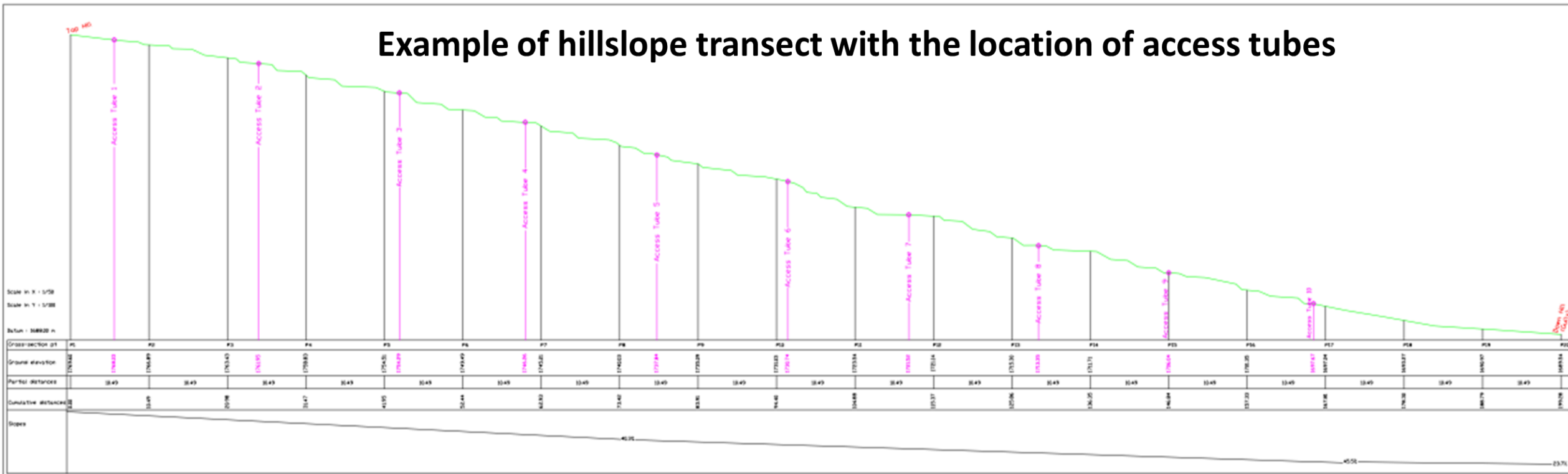


Installed equipment



- Spatial soil moisture content
- Temporal soil moisture content
- Groundwater fluctuation

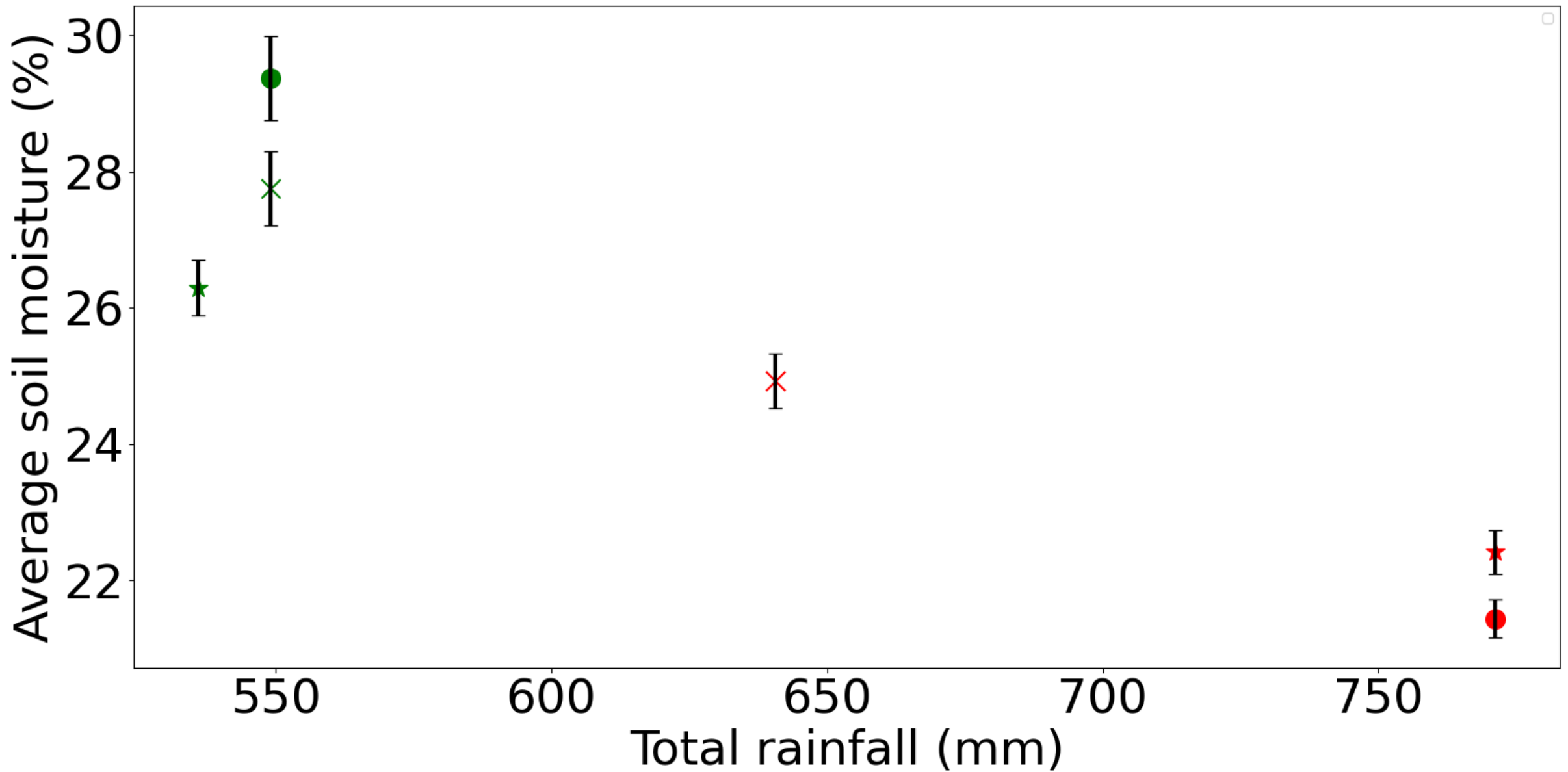
Example of hillslope transect with the location of access tubes



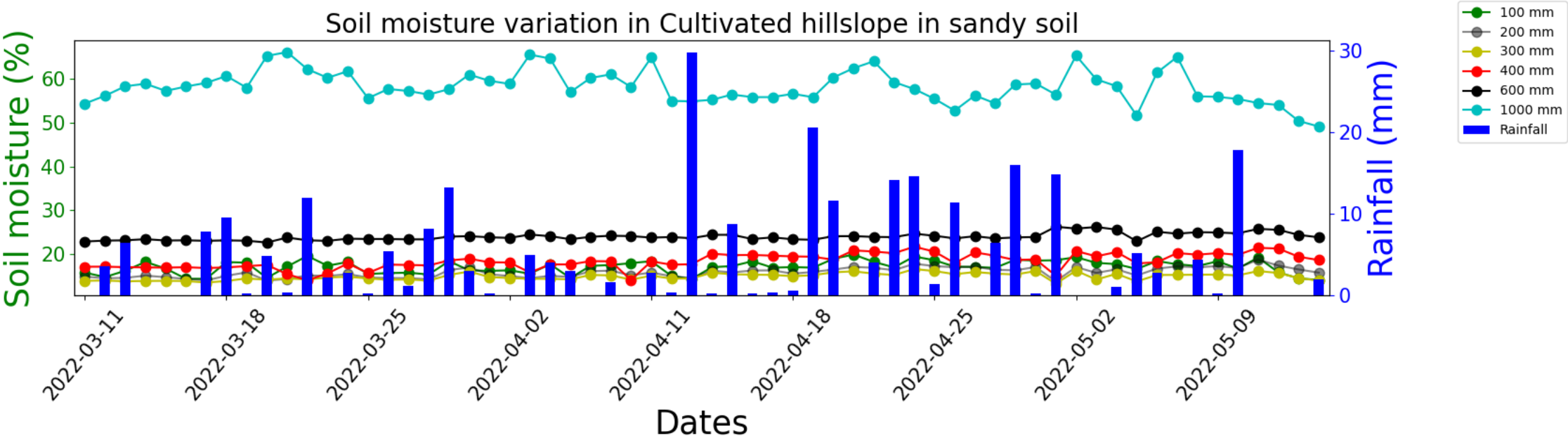
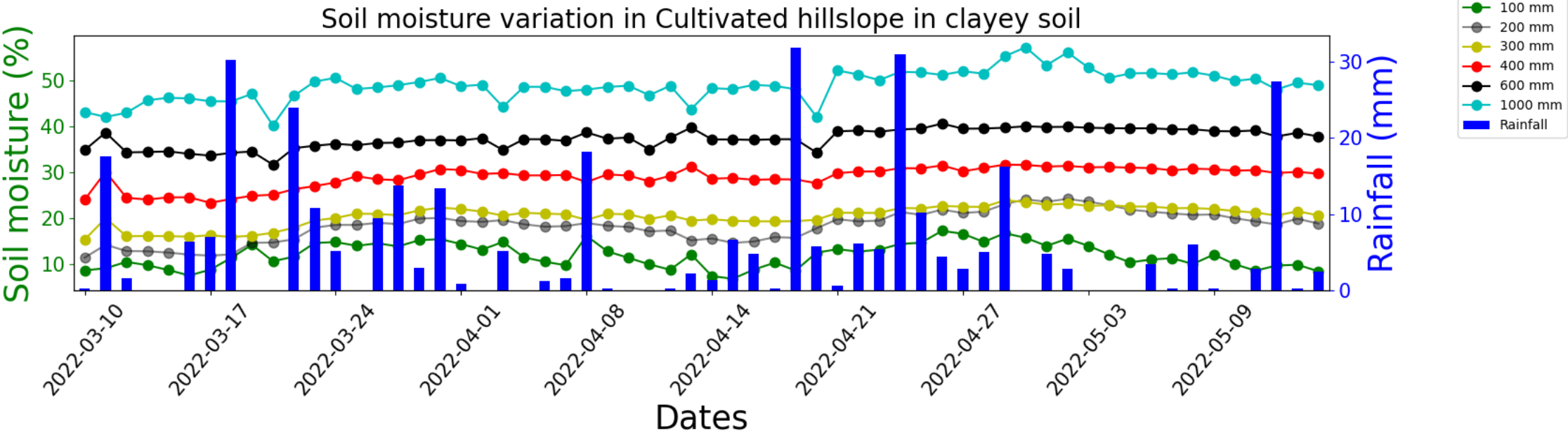
Data collection

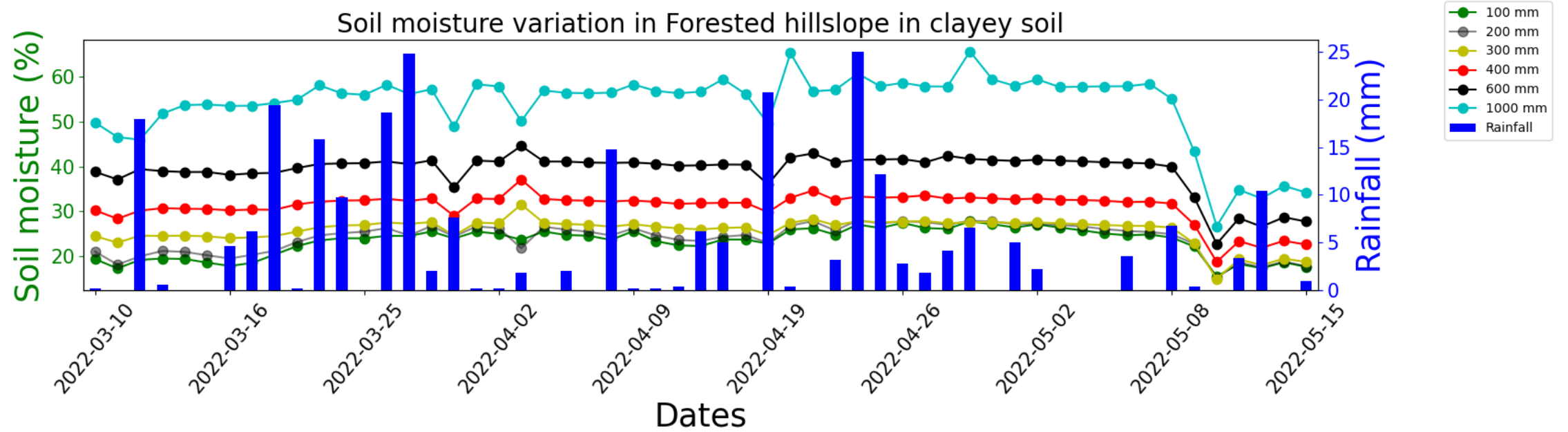
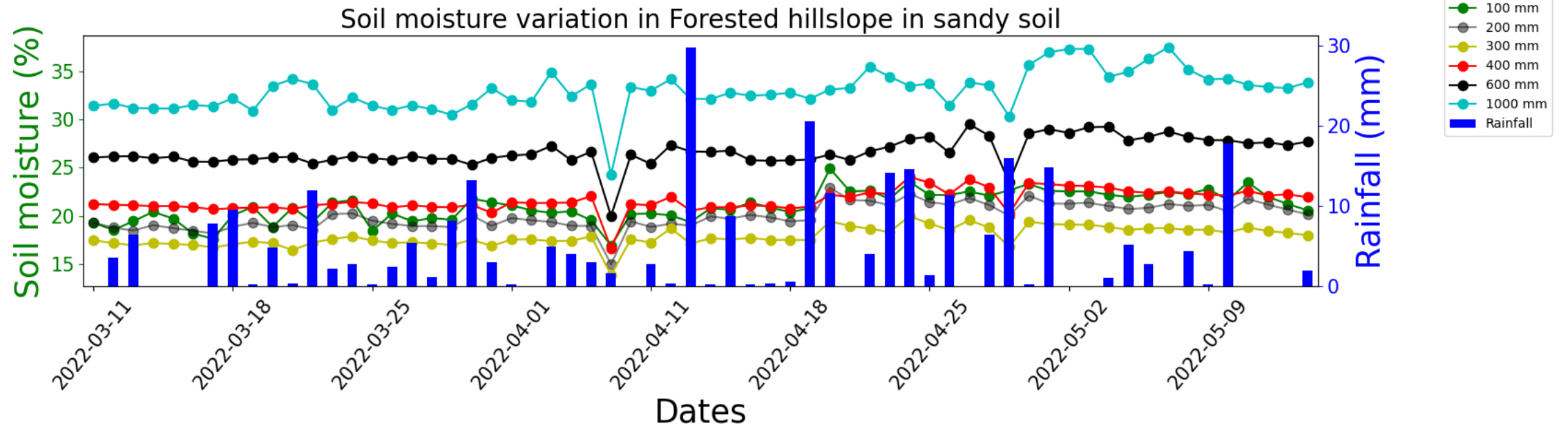
- Rainfall: automatic rain gages transmit data to a website platform
- Spatial soil moisture content; measured by PR 2/6 SDI-12, (more than 1,000 measurements are conducted per day).
- Temporal soil moisture content; measured by Ech20 10SH sensors (25,920 measurements per day)
- Groundwater fluctuation; recorded by T-Divers and collected via computer (144 measurements)

Preliminary results: Average soil moisture vs cumulative rainfall



Preliminary results: Spatio-temporal variation of soil moisture





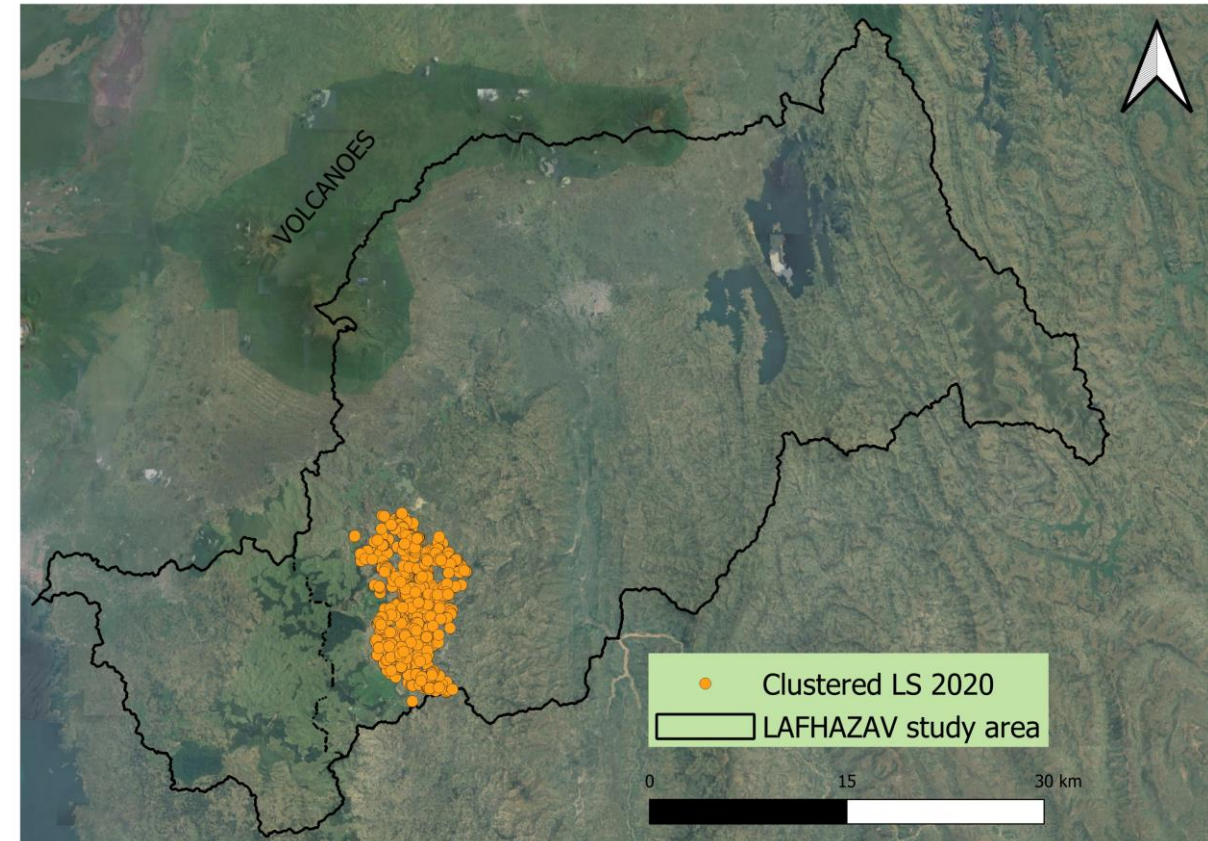
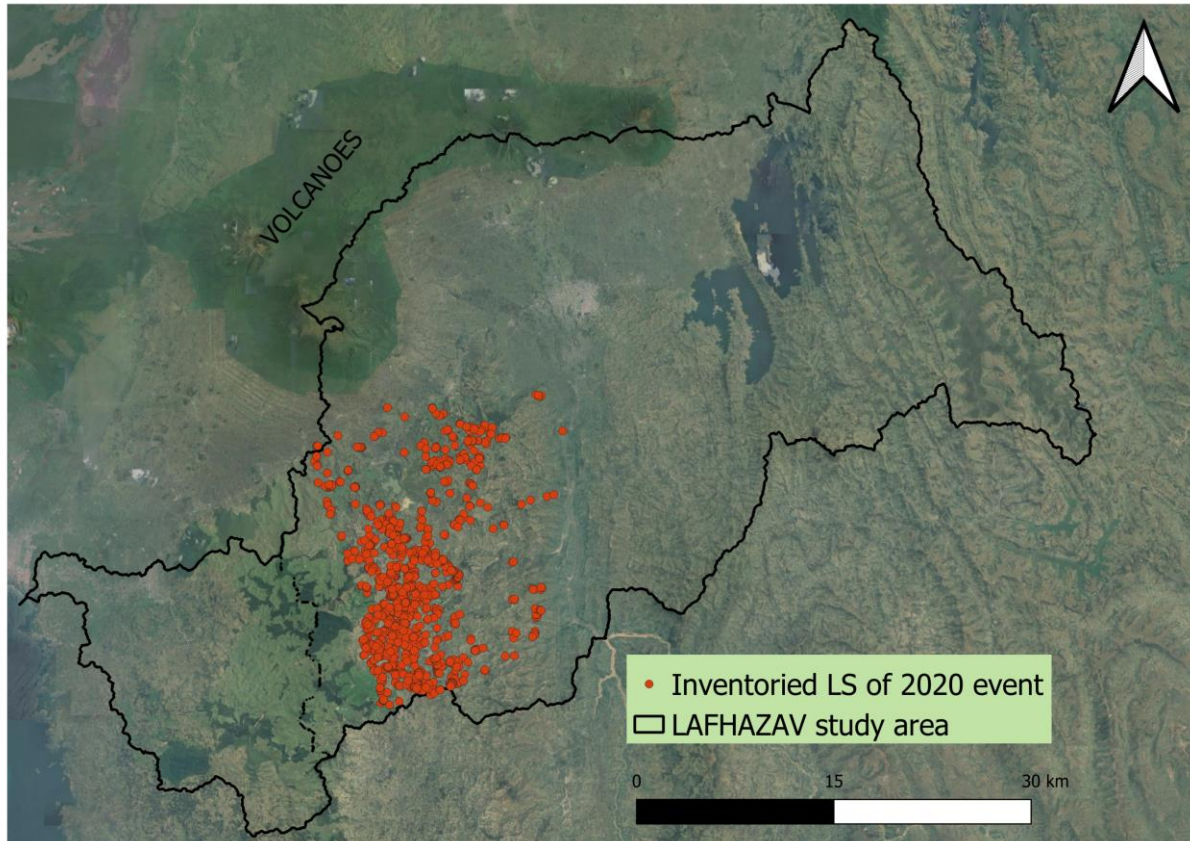
Variation of soil moisture with respect to the soil depth

	Coefficient of Variation	
Depth (mm)	Cultivated hillslope in clay soil	Ccultivated hillslope in sandy soil
100	0.368	0.338
200	0.46	0.49
300	0.507	0.35
400	0.28	0.47
600	0.136	0.21
1000	0.192	0.31
	Terraced hillslope in clay soil	Terraced hillslope in sandy soil
100	0.439	0.32
200	0.38	0.48
300	0.2	0.48
400	0.2	0.35
600	0.067	0.26
1000	0.097	0.13
	Forest hillslope in clay soil	Forest hillslope in sandy soil
100	0.317	0.287
200	0.29	0.3
300	0.497	0.486
400	0.32	0.368
600	0.182	0.28
1000	0.082	0.26

Data collection

- Heterogeneity of soil moisture content
- Higher variation in sandy soil, except the first 100 mm deep of each hillslope and at the depth of 300 mm in cultivated hillslope.

Effect of Terraces on Landslides occurrence



Total area: 379 km²

808 LS in cluster

$$Odds\ ratio = \frac{p_1 / (1 - p_1)}{p_2 / (1 - p_2)} = \frac{p_1 \times (1 - p_1)}{p_2 \times (1 - p_1)}$$

1234 inventoried landslides

62% of LS occurred in terraces

OR: 2.39