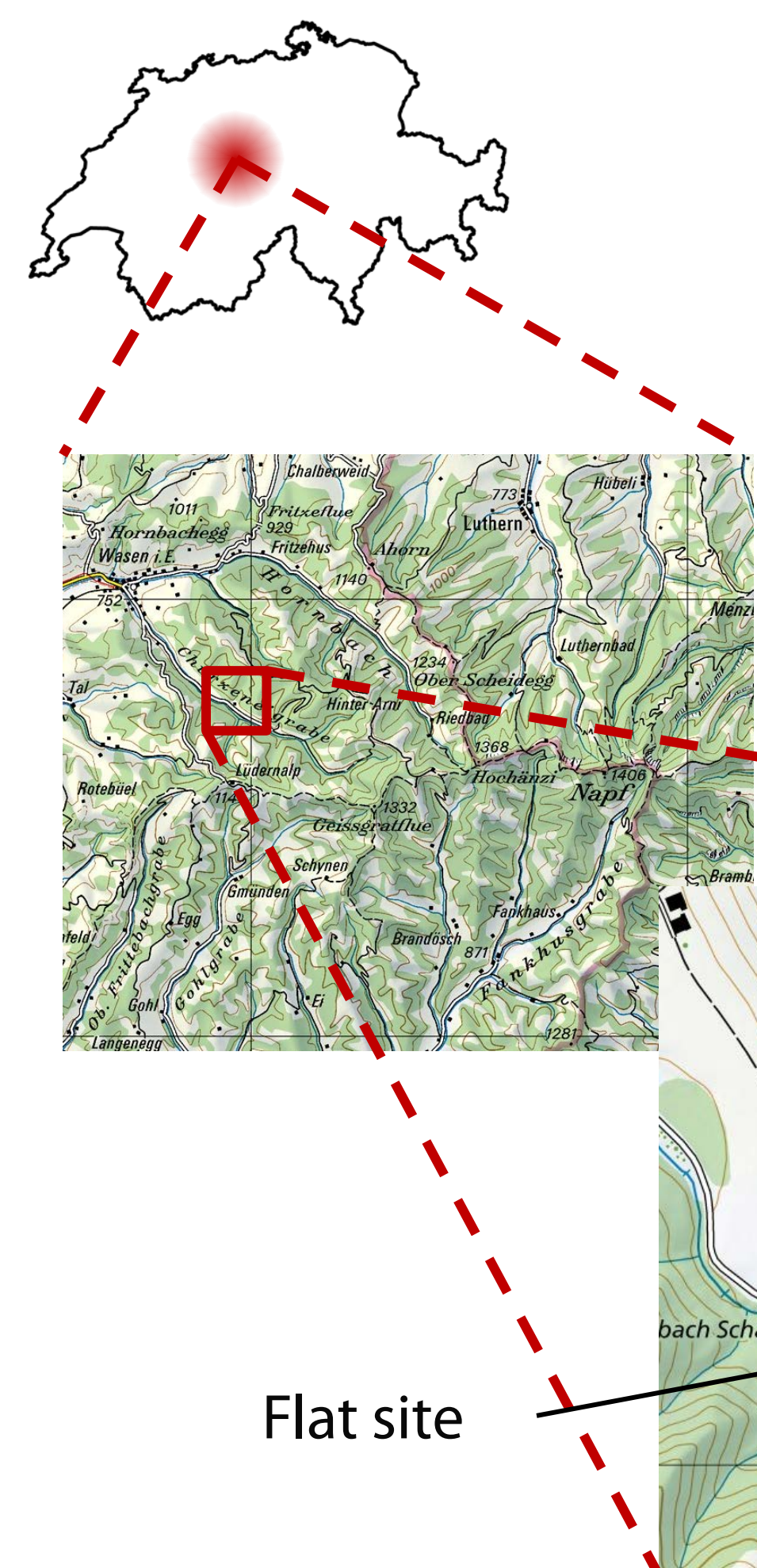


# Soil hydrological monitoring for regional landslide early warning

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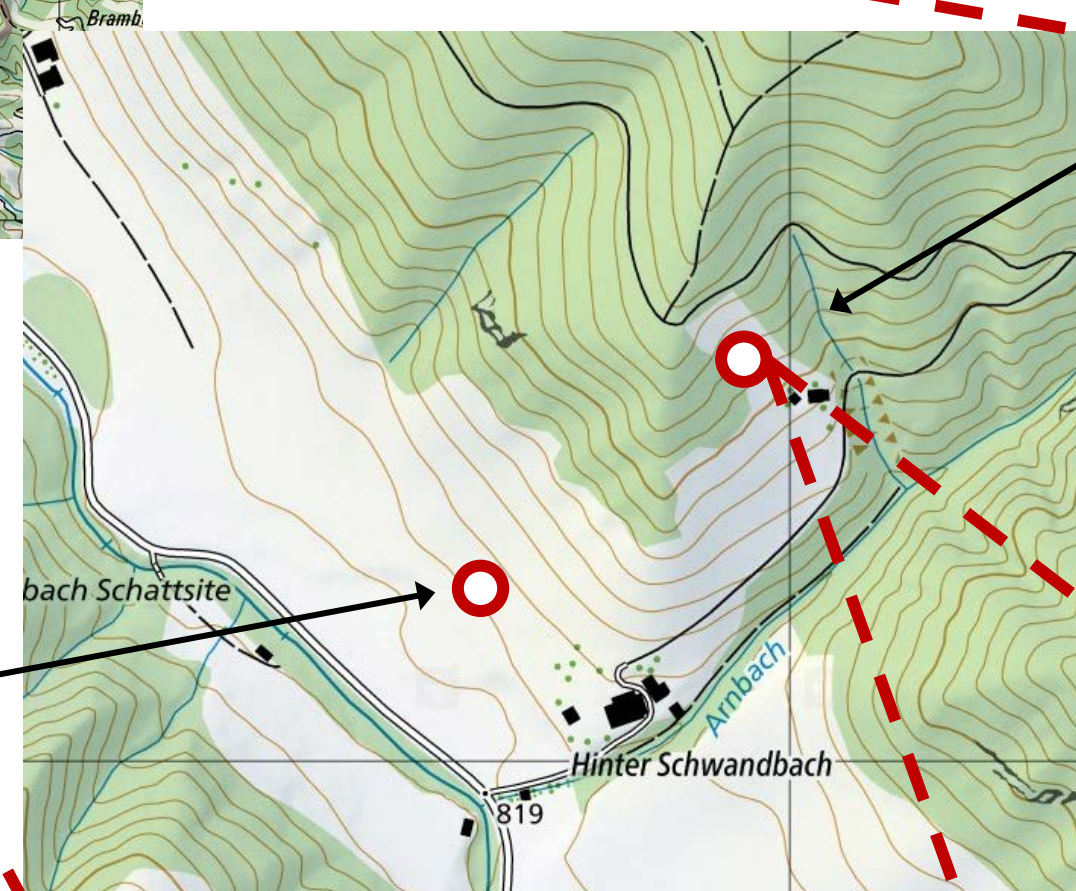
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## Churzeneigraben (Wasen i.E., Napf area)

- 820 masl
- Precip. 1400 mm/year
- Quaternary depositions on Nagelfluh (OSM)



Sloped site (30°)

Flat site

## Motivation

- Forecast goodness of landslide early warning systems (LEWS) can be improved by including soil hydrological data (Mirus et al., 2018).
- Existing soil moisture data in Switzerland contains information on the imminent landslide danger (Wicki et al., in preparation).

This study aims to assess the...

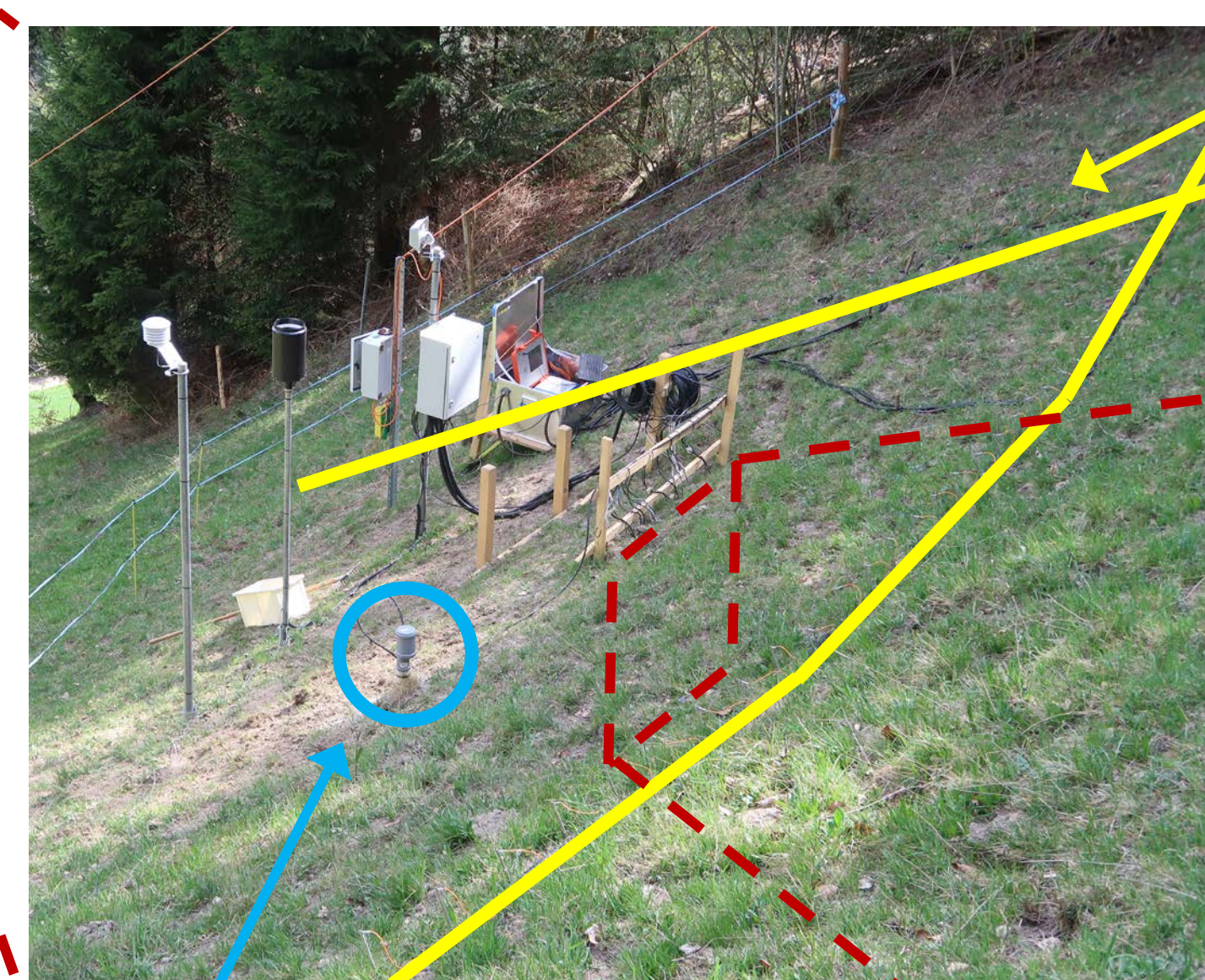
... representativeness of **flat monitoring sites** for...

... sensitivity of **different sensor techniques** to detect...

... critical hydrological conditions in hillslopes.

## Approach

- Set-up of a soil wetness monitoring system at a landslide prone **sloped** and a **flat** site.
- Characterization of the **temporal soil wetness variability**.
- Assessment of the potential to identify **critically saturated conditions**.



Temporary ground water level  
Piezometer

## Electrical resistivity

ERT profile lines (only at sloped site)

## Matric suction

Tensiometer (T8, METER)

## Vol. soil water content

Soil moisture probe (5TE, METER)

## A) Sample event

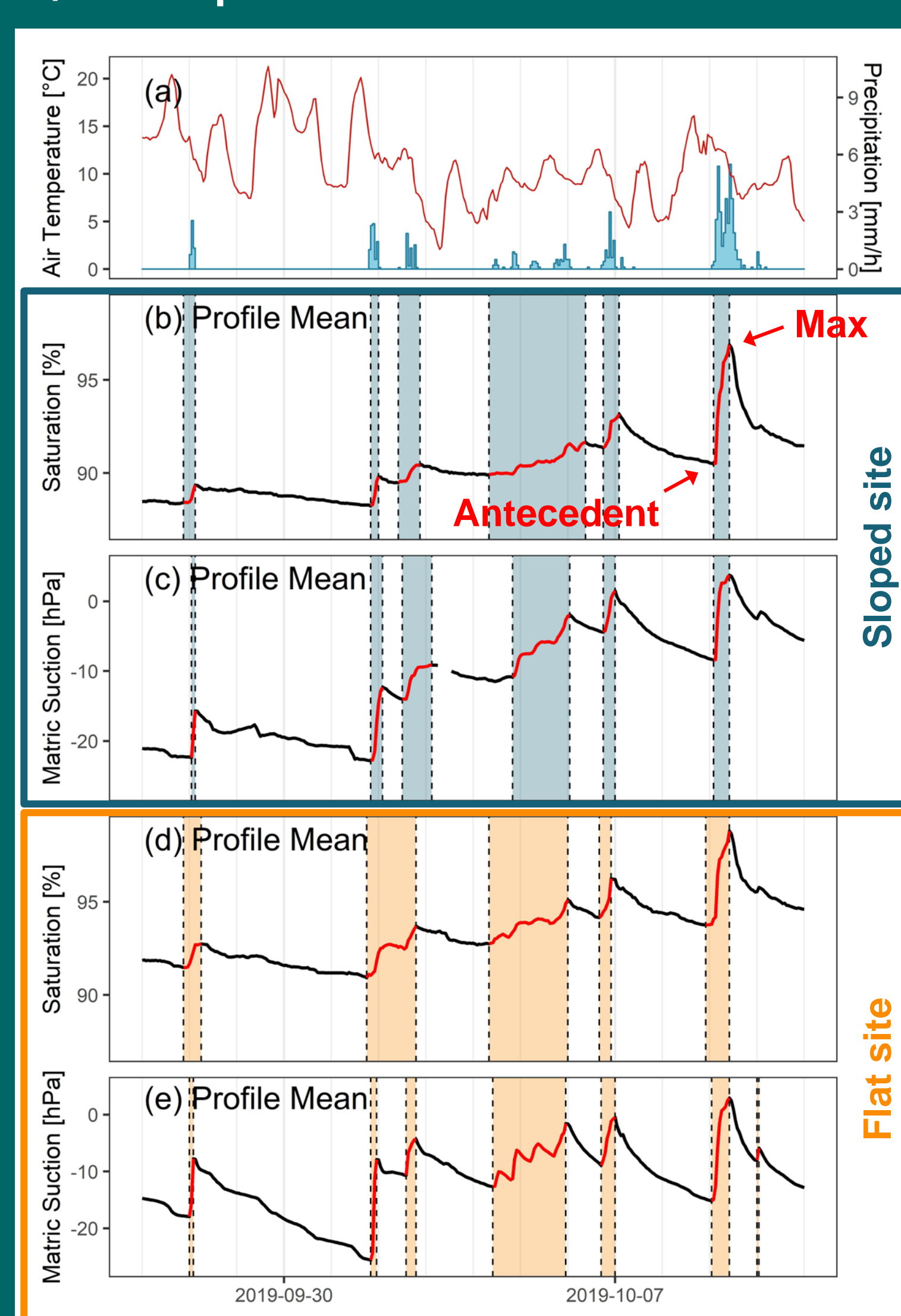


Fig. 1: Temporal evolution of air temperature and precipitation (a), as well as profile mean saturation and matric suction at the sloped (b-c) and flat site (d-e). Red lines and the shaded areas denote specific infiltration events.

## B) Sloped vs. flat location

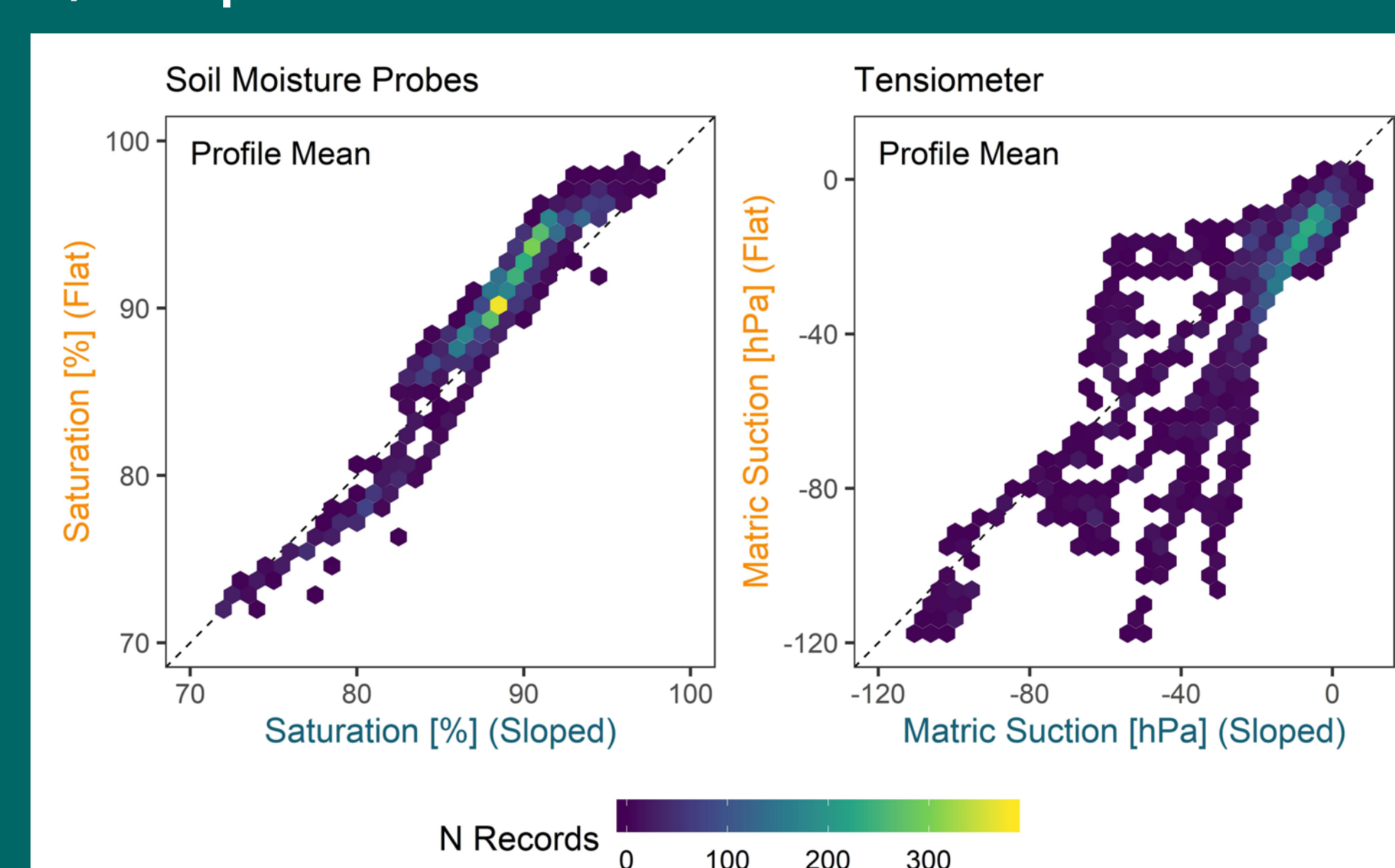


Fig. 2: Sloped vs. flat site saturation (left) and matric suction (right). The color denotes the number of records.

## C) Saturation vs. matric suction

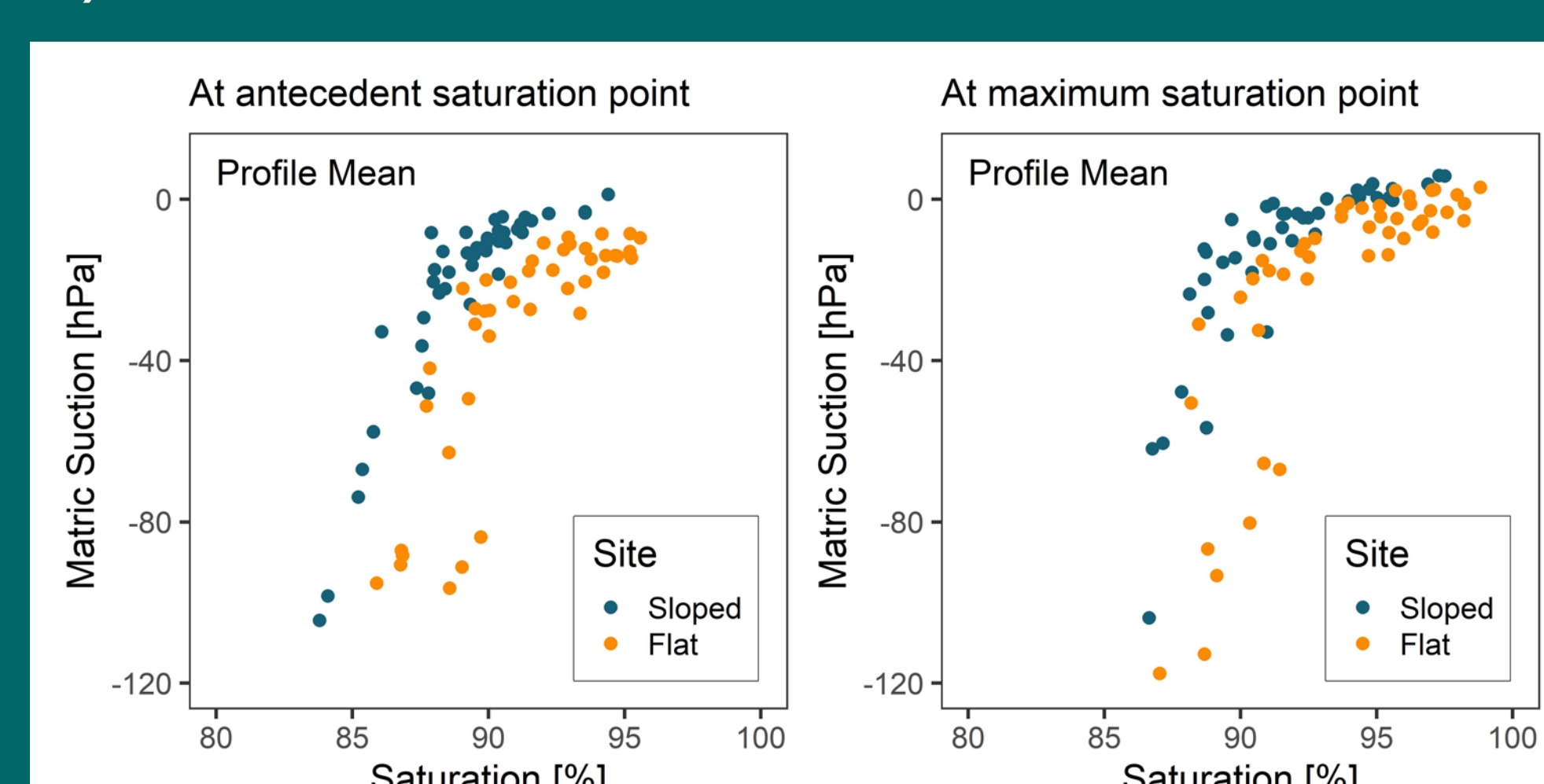


Fig. 3: Saturation vs. matric suction of each infiltration event for the event properties antecedent (left) and max (right).

- 1) Temporal variation is similar at the sloped and flat location. Values converge at saturated conditions.
- 2) Tensiometer measurements can help to further distinguish the degree of saturation mainly for antecedent conditions.

