Title:	Hydrological Monitoring of a Desiccated Slope
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Main Objective:	To quantify the spatial and temporal changes in infiltration through a desiccated slope.
Main Benefit:	To help identify indicators of deterioration within the hydrological regime of a desiccated slope.
References:	**1** - Yu Z., Eminue O.O., Stirling R., Davie C., & Glendinning S. (2021) Desiccation cracking at field scale on a vegetated infrastructure embankment. *Géotechnique Letters*, **11**(1), 1-21.

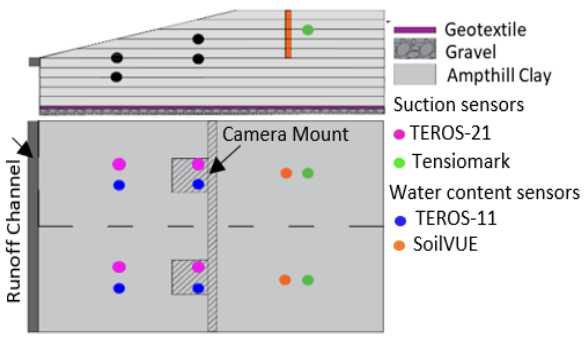
Background and description of the project

- Infiltration though desiccated slopes is a growing risk to their stability as future climate change projections promote crack formation and therefore their vulnerability to infiltration[1].
- Infiltration through cracked soils is highly complex and there is a need to understand how it evolves temporally and spatially with exposure to numerous dry-wet cycles.
- Presented here are initial results from long-term hydrological monitoring of a highly instrumented, large, outdoor slope constructed in a lysimeter which has been subject to desiccation.

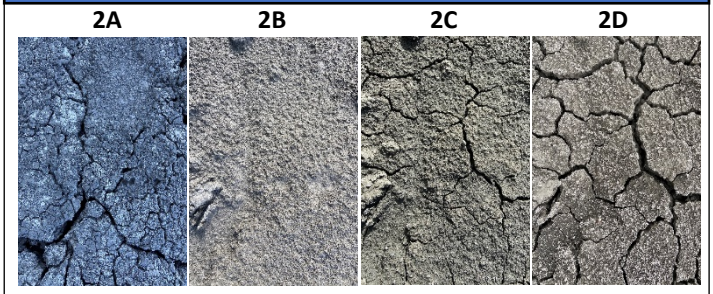
Factors that influenced the design of the monitoring project

- It was important to ensure the project design was representative of real-world infrastructure embankments:
  - I. Use of highly plastic, cohesive material that is prone to desiccation but also commonly used in UK embankments (Ampthill Clay).
  - II. Compacted to specifications (wet of optimum)
  - III. Representative slope geometry (flat crest, 1:2 slope)
  - IV. Outdoor location of slope to ensure exposure to realistic environmental conditions.
  - V. Detailed enough instrumentation to capture changes in slope hydrology over time without influencing slope integrity.

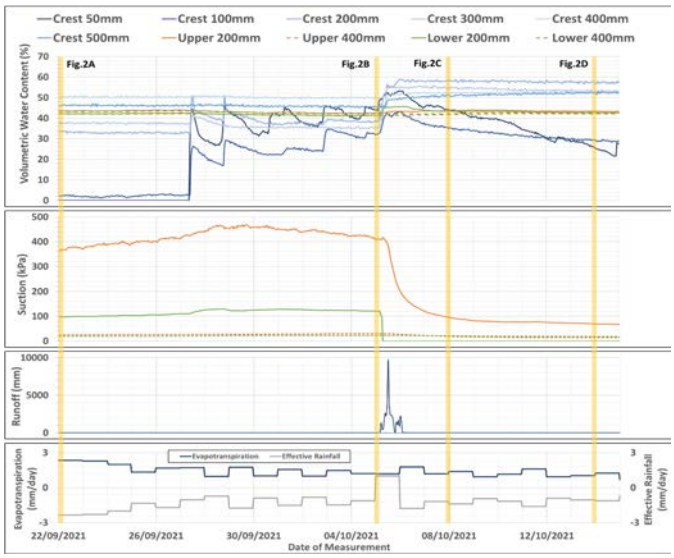
Scope of the instrumentation used



Sample of test results



Transition from a non-polygonal 1st generation crack pattern (A) to a 2nd generation polygonal pattern (C&D) occurred during a dry-wet-dry cycle. Cracks fully heal inbetween (B).



Slope instrumentation firstly illustrates evaporative drying (high suction, low water content, no runoff) before a marked increase in water content, suction loss and high runoff/effective rainfall associated with a wetting event. Different baseline conditions can be observed at the onset of the 1st versus the 2nd generation crack pattern.

Most significant information derived

1. Deterioration due to cracking and changes in volumetric water content and suction can be quantified through the slope profile.
2. Shallower soil depths, where cracking occurs, are most sensitive to changing environmental conditions.
3. Changes in moisture gradients, caused by infiltration through cracks, can possibly change position of subsequent cracks when initiating from a healed state.
4. Importance of recording antecedent conditions and cracked state to estimate slope failure risk during wetting events.