SOIL DESICCATION CRACKING

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Jan-2019

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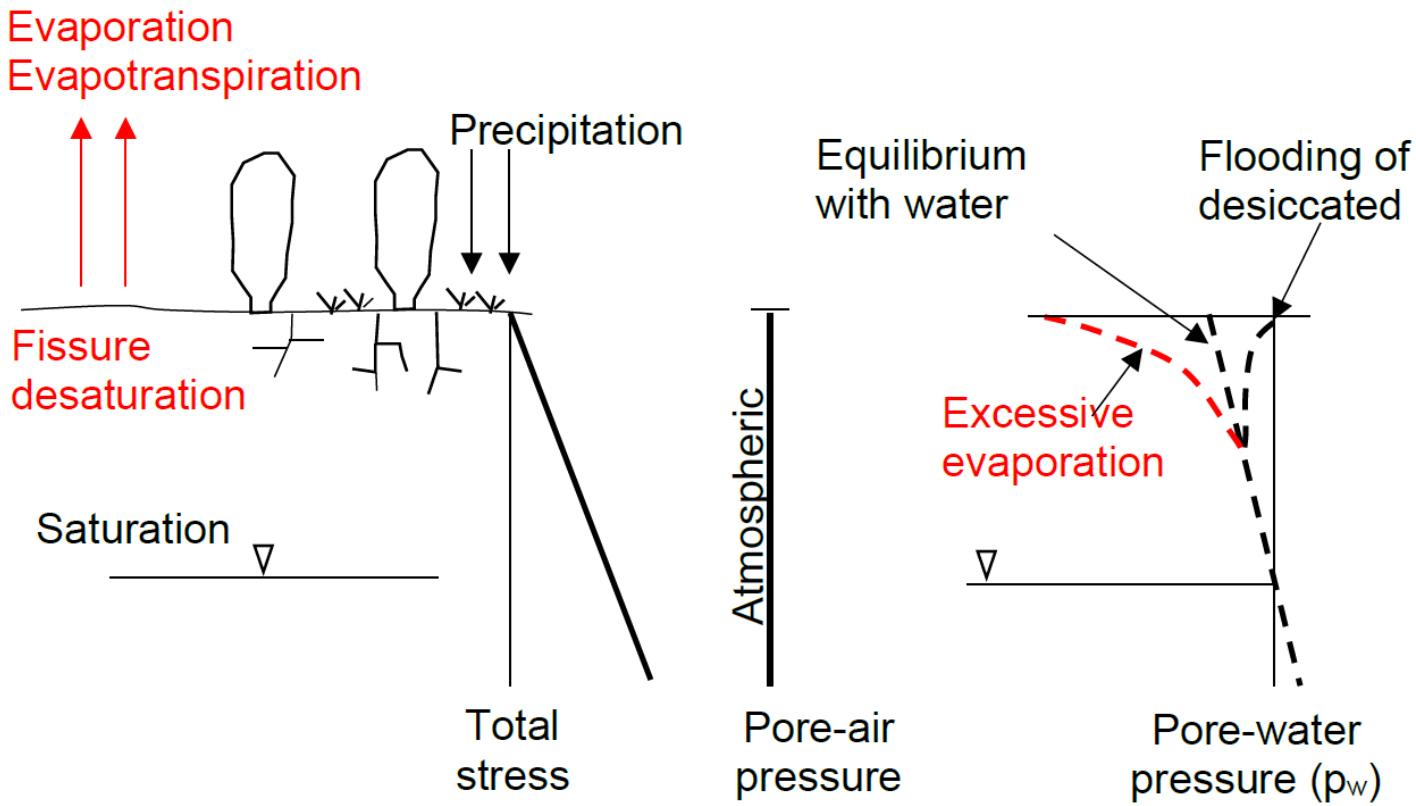
Introduction

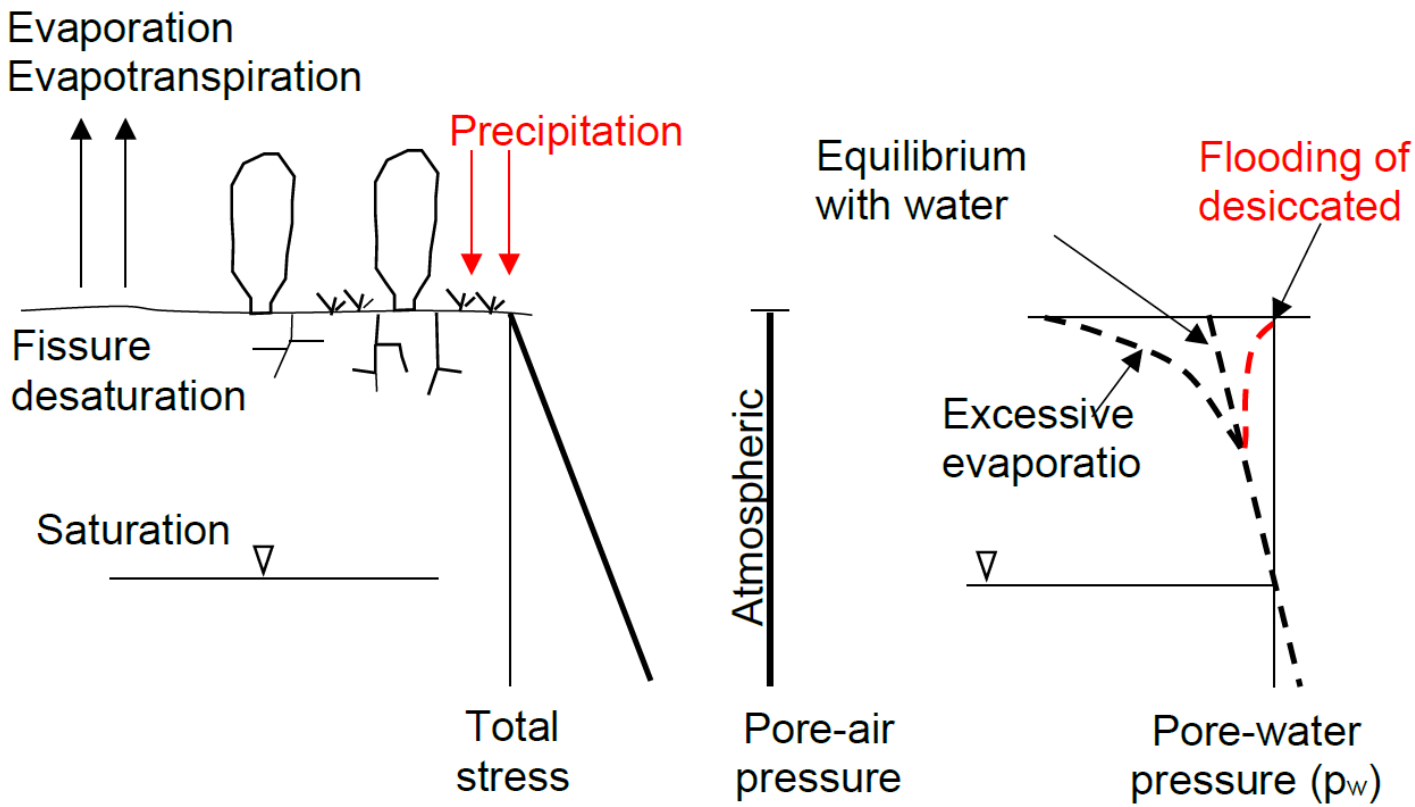
Soil-atmosphere interface



(Fredlund et al. 2012)

Introduction

Soil-atmosphere interface



(Fredlund et al. 2012)

Soil deterioration

- Reduce strength

(Trabelsi et al. 2012)

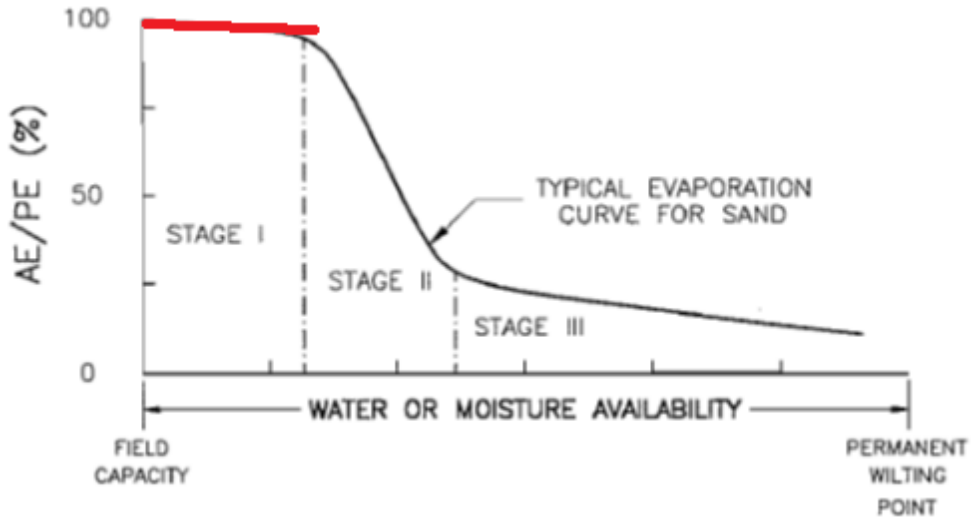
Soil deterioration

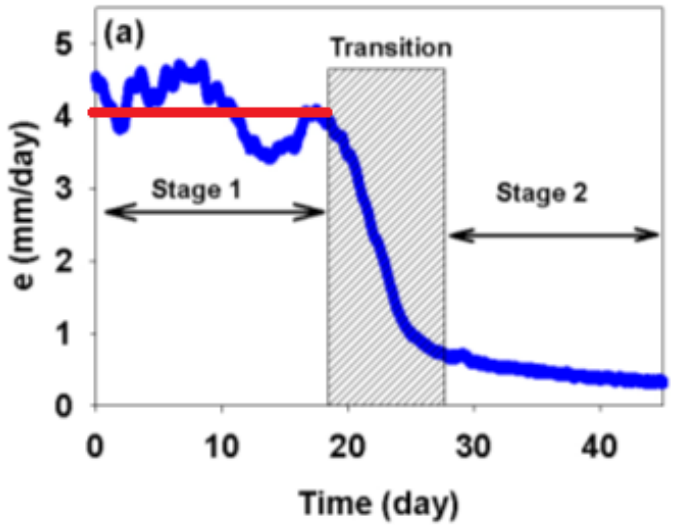
- Reduce strength
- Increase infiltration

(Trabelsi et al. 2012)

Evaporation

- Constant evaporation rate
  Enough supply of water to the surface
- Falling rate
- Slow evaporation rate

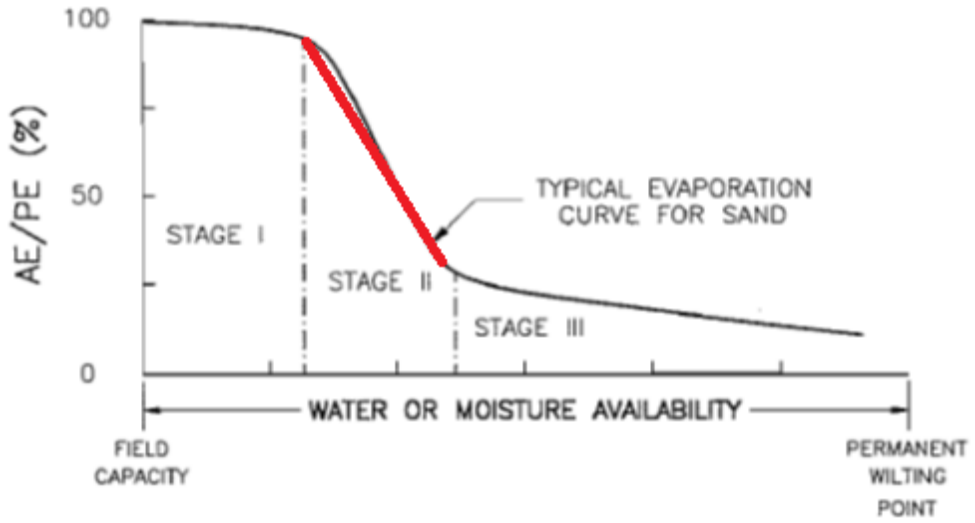


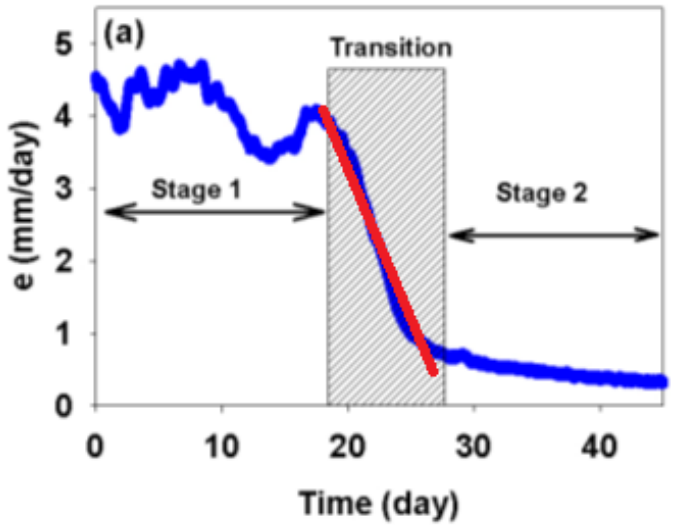


(Wilson et al. 1997, Shokri et al. 2008)

Evaporation

- Constant evaporation rate
- Falling rate
  Liquid phase discontinuous
- Slow evaporation rate

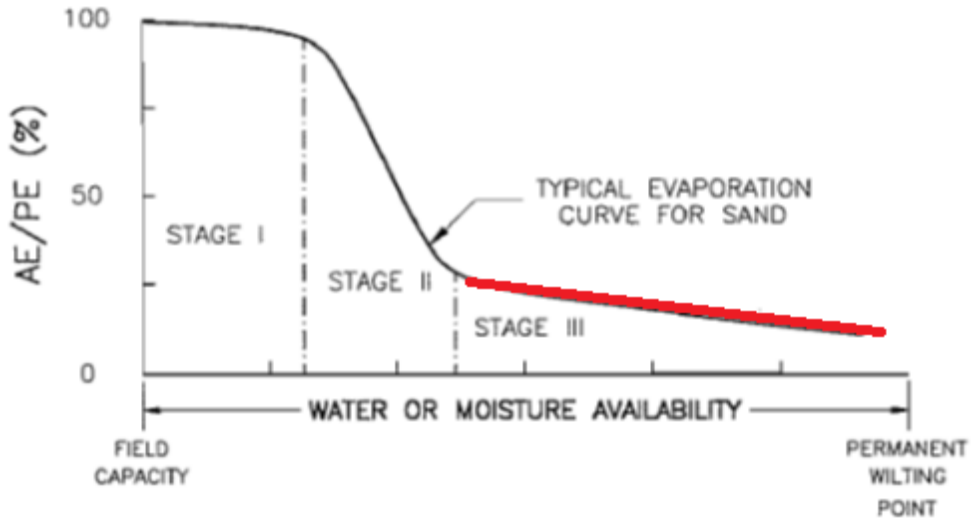


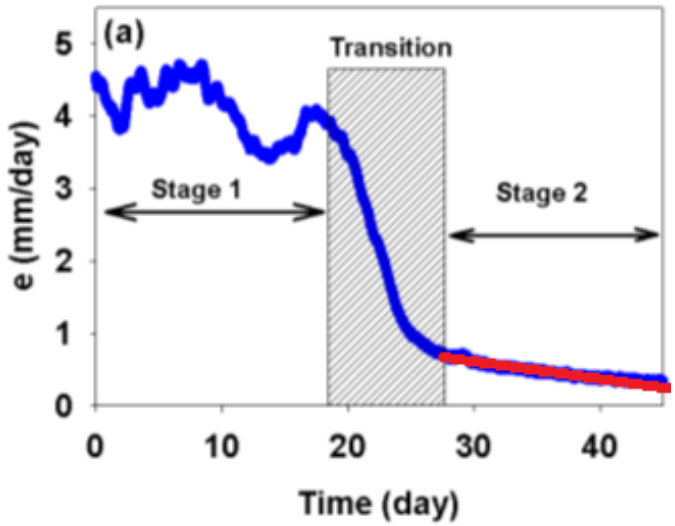


(Wilson et al. 1997, Shokri et al. 2008)

Evaporation

- Constant evaporation rate
- Falling rate
- Slow evaporation rate
  Diffusion



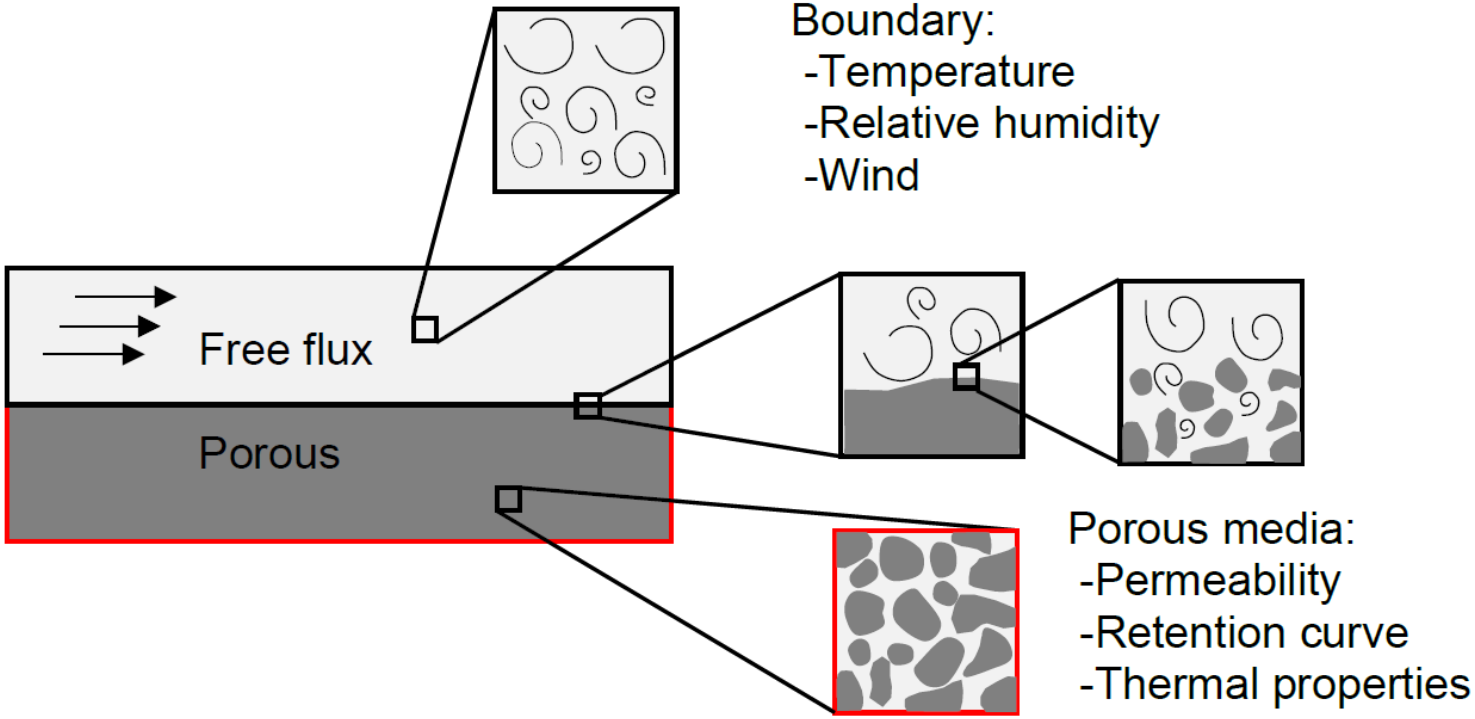


(Wilson et al. 1997, Shokri et al. 2008)

Evaporation

Modelling evaporation

1. Single domain
2. Two domains



Evaporation

Modelling evaporation

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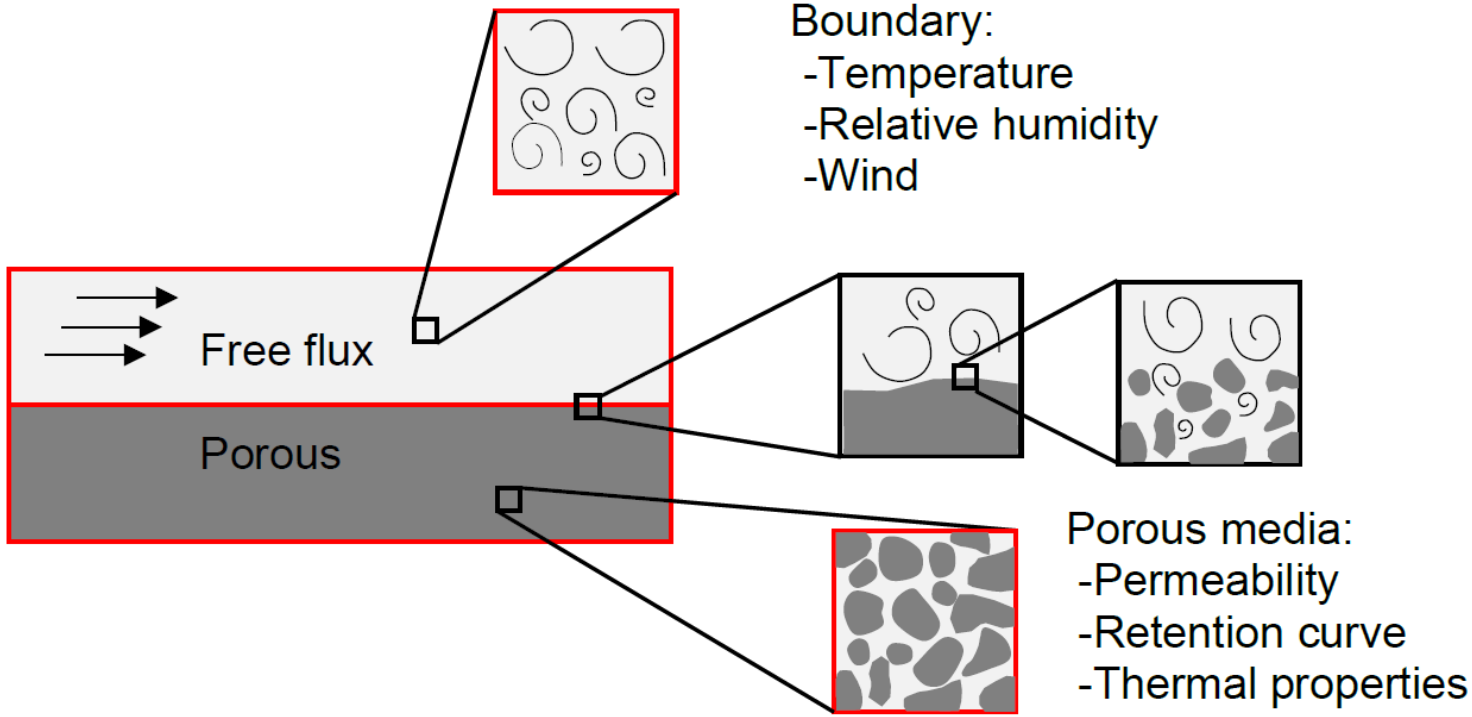


Cracking

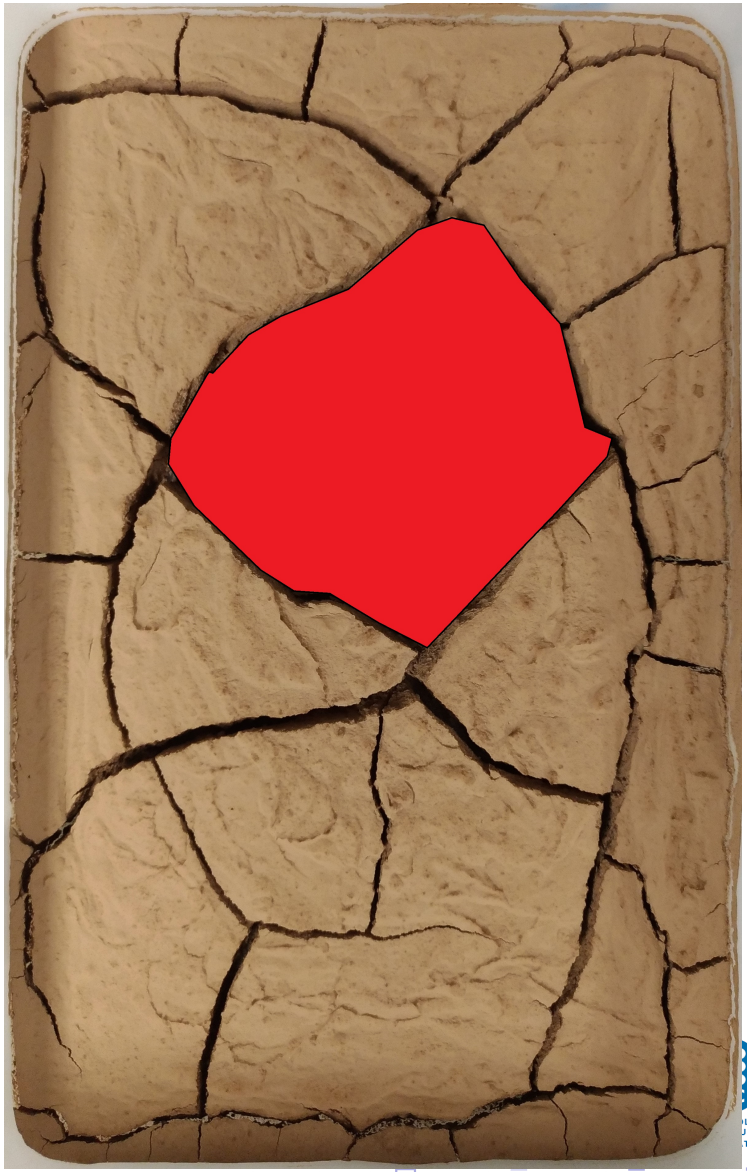
1. Flaws (heterogeneity)
2. Stress field

Cracking

1. Number of nodes

Cracking

1. Number of nodes
2. Number of cells



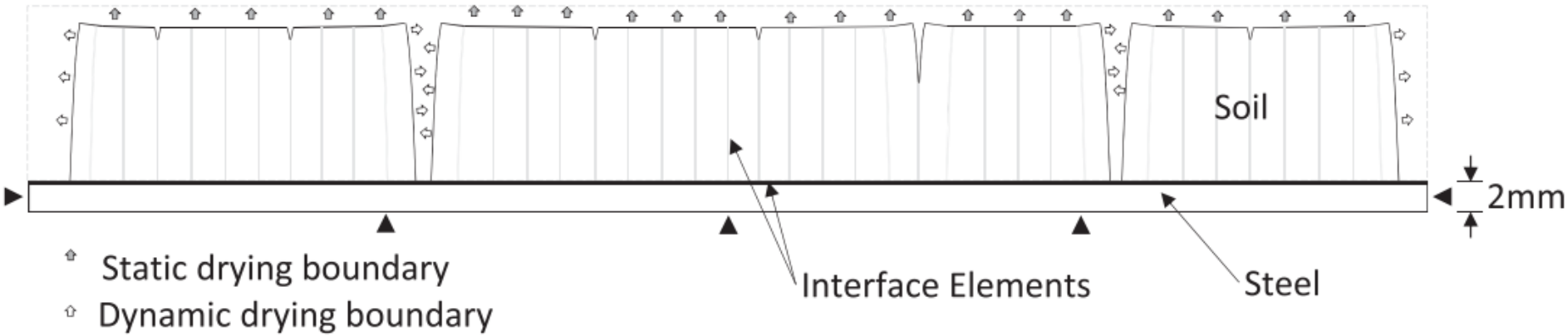
Cracking

1. Number of nodes
2. Number of cells
3. Average width and length of cracks
4. Cracked area

Numerical Modelling

FEM and FDM

- Interface elements
- Drying boundary

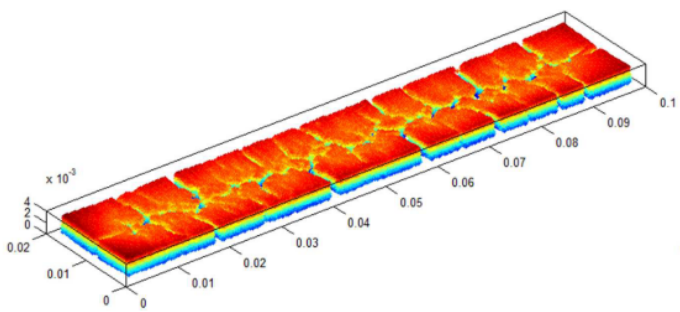


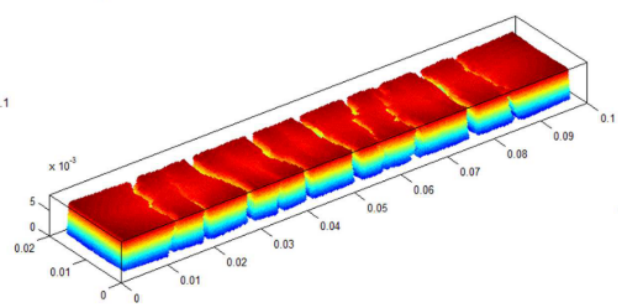
(Stirling et al. 2017)

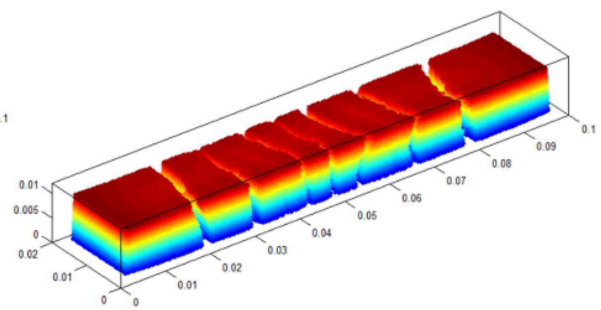
Numerical Modelling

SPH

- No interface element







(Bui et al. 2015)

Conclusions

1. There is lack evaporation models in water transport that incorporate mechanical coupling.

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2. Digital image has become a fundamental tool to asses cracking network structure and cracking evolution.

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1. There is lack evaporation models in water transport that incorporate mechanical coupling.
2. Digital image has become a fundamental tool to asses cracking network structure and cracking evolution.
3. The SPH method is a promising alternative to FEM and FDM.

Future investigations

1. Incorporate mechanical coupling to two domain approach.

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1. Incorporate mechanical coupling to two domain approach.
2. Incorporate additional tools to evaluate depth cracking.