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## Development of drying crack networks in slurries with different thicknesses

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**Statement of the Problem:** As one of the dominant climate-related hazards all over the world, drought occurs more frequently and widely in recent years. Especially in the field of geotechnical engineering, such extreme condition could trigger intense shrinkage cracking of soils, leading to irrecoverable damage for both modern infrastructures and ancient earthen heritages. For a drying soil, previous researchers mainly focused on final morphology of crack pattern influenced by ambient temperature, RH and mineral types etc. However, the whole process of crack network development is far less investigated, particularly in a quantitative way.

**Material & Methodology:** Slurries with different initial thicknesses (2, 5, 10 and 15mm) were prepared in circular containers, from low-plastic silty clay with water content 45%. Specimens were exposed to air drying in a laboratory under controlled temperature  $20 \pm 1$  °C. During desiccation, the evolving crack networks were recorded regularly using a digital camera and further analyzed resorting to image processing technique. Three geometric parameters, i.e. CIF (crack intensity factor), total crack length (L) and average crack width (W), were quantified.

**Findings:** As water content dropped below the liquid limit 30%, cracks started to initiate on soil surface. Both L and W increased gradually in the following stage, however, the evolution trend was different among specimens. For 15mm slurry, L stopped increasing at air-entry water content (22%), while W kept growing until shrinkage limit (16%) was reached. In comparison, 2mm slurry was dominated by elongation of cracks, accompanied by only slight widening. In addition, CIF increased from 5.26% to 10.32% as thickness increased. Crack pattern cut extensively by small and narrow cracks transformed gradually into less fragmented one.

**Conclusion & Significance:** Thickness had a great impact on both development and final morphology of drying cracking networks. This provides some useful information for understanding the mechanisms in practical issues.

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