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GDM

# Interpretation of cyclic wetting and drying direct shear tests results

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## Importance of drought before rainfall in landslide events

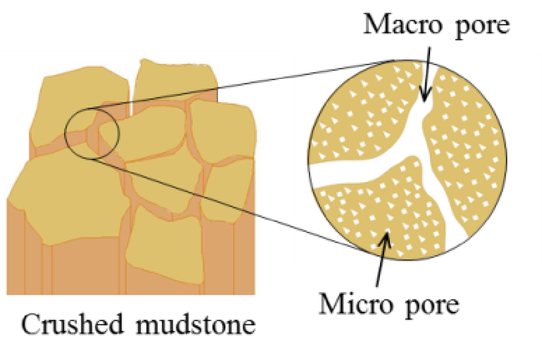
The **slaking process** involves the rupture of bonds of aggregates or particles and thus the material degradation, due to swelling and shrinking associated **with repeated wetting and drying cycles**. The occurrence of extreme weather events such as heavy rainfalls and severe droughts will undeniably result in a higher incidence of natural disasters such as landslides. Assessing the effects of wetting and drying cycles is of prime importance in the failure of slopes or embankments composed of slakable geomaterials.

## Interpretation of cyclic wetting and drying direct shear tests results

**Direct shear tests with 3 cycles of W/D** are carried out on the crushed mudstones having slaking index 1 under the stress ratio $R$ =0.5 with $\sigma_v$ = 50 kPa, followed by monotonic shear loading (0.2 mm/min under constant $\sigma_v$).

The **drying-induced slaking behavior** is found to be significant:

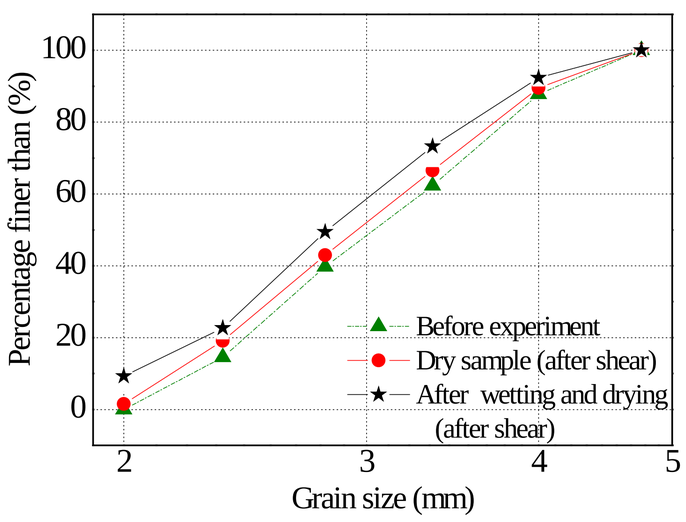
- Large creep behavior during drying process is seen, when w < 2.5%
- About 25 % peak shear strength is reduced after 3 cycles of W/D
- Creep curves consist of two curvilinear parts. This can be explained by the concept of **macro and micro-pores** (Braudeau et al., 2004).




Macro and micro-pores system (Braudeau et al., 2004)

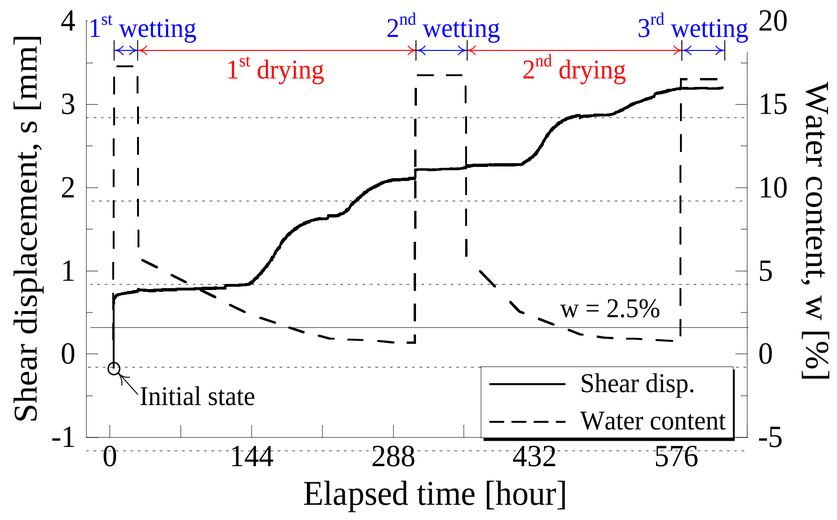
1st curve: Water leaves macro-pores without air intake causing their shrinkage

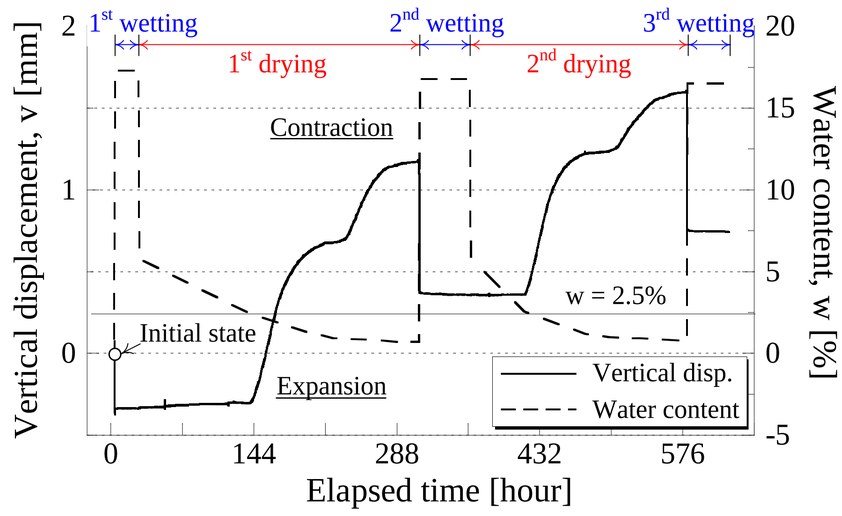
2nd curve: When macro-pores empty out, micro-pores shrink, lose water content, are replaced by air Particle sliding occur during shrinkage



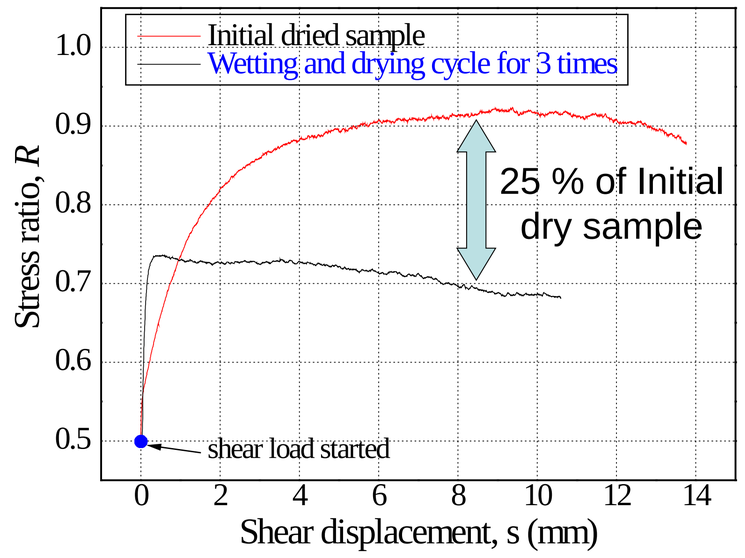

Grain size distribution before and after experiment

- **Particle crushing** during W/D cycles are likely to be the reason of the soil degradation: about 3% more particle crushing was retrieved for tests with cyclic W/D compared to that of the dry condition test




Time histories of *w*, *s* and *v* under 3 cyclic W/D for R= 0.5




Effect of slaking on stress-strain characteristics

**The effect and history of dry days before landslide-inducing precipitation should be thoroughly monitored**