Effects of clay mineral type on soil hydro-mechanical properties – *a global perspective*

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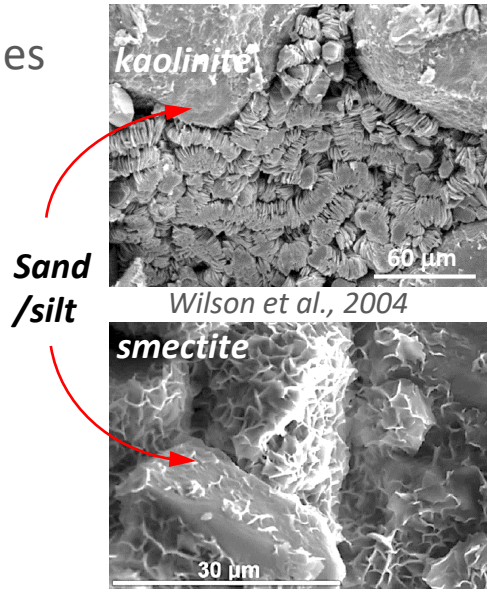
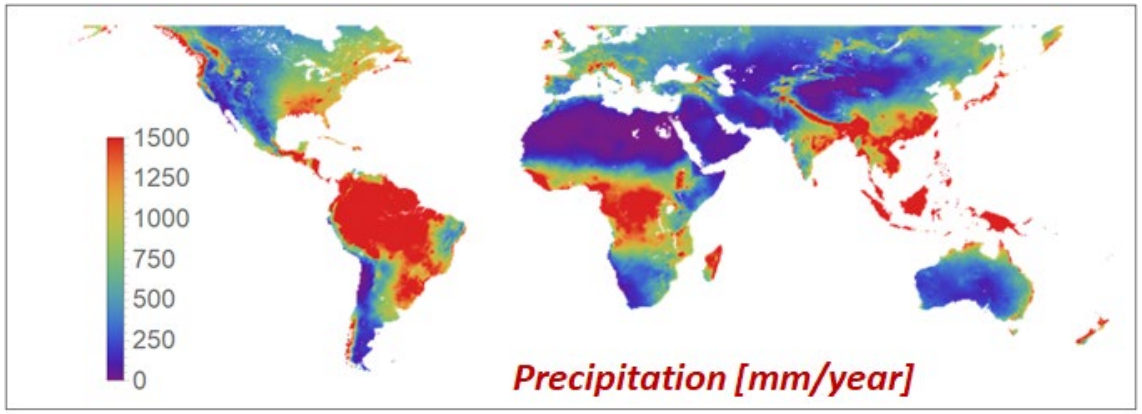
- Clay minerals dominate soil colloidal fraction, surface area and hydro-mechanical properties
- Clay minerals exhibit a wide range of microstructures and hydration responses (with 'end members' represented by the ubiquitous kaolinite and smectite)
- Present pedotransfer functions (PTFS) consider soil clay fraction in parameterization of hydraulic and mechanical properties, yet the type of clay mineral is often ignored
- **Objective:** to capitalize on recent global maps of main clay minerals and spatial segregation of kaolinite (tropics) to develop PTFs informed by clay mineral type



Wilson et al., 2004



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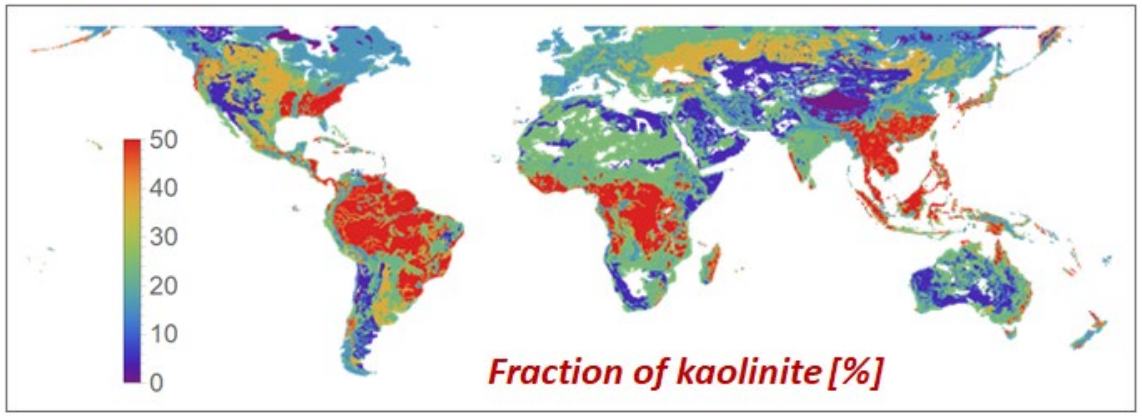
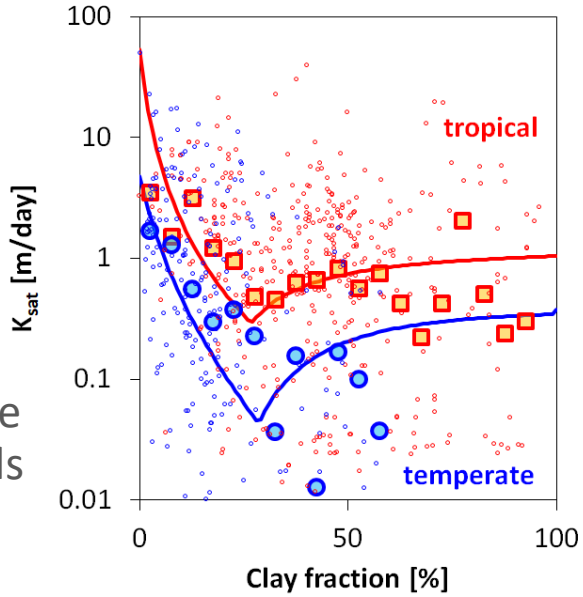
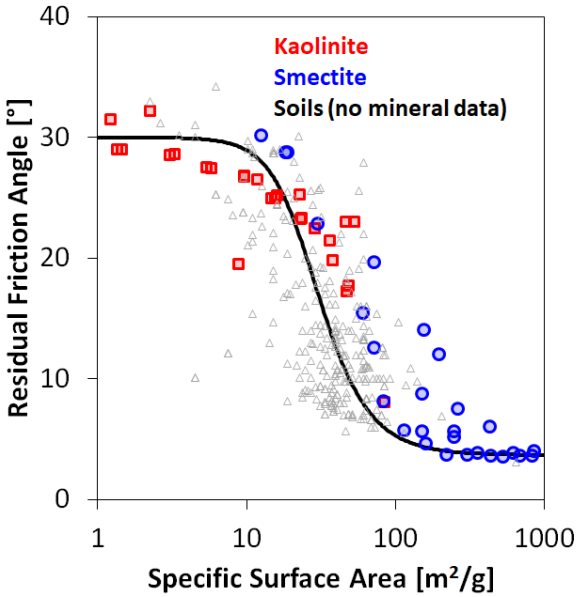


Ito and Wagai, 2017

Preliminary results

- Difference in the microstructures of clay minerals affect various soil hydraulic parameters
- Tropical soils dominated by kaolinite clay exhibit higher saturated conductivity K_{sat} and air entry value $1/\alpha$
- Soils containing swelling smectite exhibit lower friction angle values than angular sand particles or stable kaolinite tactoids





- For tropical regions (*Brazil*), PTFs that ignore clay type yield narrow K_{sat} distributions (truncating high values)
- The underestimation of K_{sat} in LSM affects infiltration/runoff predictions
- Consideration of structure-forming vegetation would enhance differences with higher K_{sat} values for the tropics