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Does thermophoresis reduce aggregate stability?

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Thermophoresis is mass flow driven by a thermal gradient. As a result of Seebeck effect and Soret effect, colloids can move from the hot to the cold region or vice versa, depending on the electrolyte composition and on the particle size. This migration of colloids can weaken aggregates.

The effect of raindrop temperatures on runoff generation and erosion on clayey soil was investigated in sprinkling experiments with a laboratory rotating disk rain simulator. The experiments were applied to Rhodoxeralt (Terra Rossa) soil with two pre-prepared moisture contents: hygroscopic and field capacity. For each moisture content three rainfall temperatures were applied: 2, 20, and 35ºC. Erosion was generally lower in the pre-wetted soil than in the dry soil (12.5 and 24.4 g m^{-2} per 40 mm of rain,respectively). Whereas there was no significant effect of raindrop temperature on the dry soil the soil that was pre-moistened to field capacity was affected by rainwater temperature: runoff and erosion were high when the temperature difference between rainfall and soil surface was high, sediment yields were 13.9, 5.2, and 18.3 g m^{-2} per 40 mm of rain, for rain temperature of 2, 20, and 35 ºC, respectively. It is reasonable to conclude that thermophoresis caused by thermal gradients within the soil solution reduces the stability of aggregates and then increase the soil losses.