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Is snow more destructive agent than rain from the perspective of land degradation?

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Badlands, between researcher also known as natural field laboratories, present areas formed in a wide range of lithologies and different climate conditions. Complex mineralogical and physico-chemical sediment composition make them suitable for numerous laboratory experiments that can replicate changes that occur in the field.

As climate is one of the most significant factors in badlands forming and since climate changes are one of the biggest environmental concerns nowadays in this research badlands material was exposed to different conditions with the aim to monitor changes caused by extreme climate.

Three samples of badlands from China were organized in twelve sets and treated with rain, acid rain, ice (presenting snow) and acid ice (frozen acid rain). Six sets were treated with rain and acid rain of different intensity and under high and low temperatures during fifteen cycles, while the other six were treated with ice and acid ice during fifteen cycles, dried at 50°C for three cycles and then treated with ice and acid ice for additional five cycles. All of the samples were photographed after each cycle to follow physical change occurring on the sample surface. Leachate was collected and volume, electrical conductivity, pH and ion concentration were measured.

Generally parameters did not oscillate much neither between samples, nor between treatments except electrical conductivity that was higher in the samples treated with ice and acid ice. Physical changes that occurred during the experiment present the main difference. In all of the samples high temperature caused the most noticeable decay, in samples treated with rain, sediment decay was minimal, while in samples treated with ice a noticeable decay occurred.

This experiment confirmed that high temperature/drought has great impact on land degradation, but interestingly pointed out that ice/snow and its thawing have greater impact on degradation than rain and its intensity. These kind of result opens up a new perspective on climate impact on forming and badlands evolution that should be further examined.

