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Intensification of extreme precipitation - ancient archives predict the future?

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Changes in the frequency or intensity of extreme weather and climate events have profound impact on both human society and the natural environment. Rising concentrations of greenhouse gases may already be influencing the intensity of rainfall. Yet, such extreme weather events remain ambiguous to predict, or even determine whether linked to global warming or short-term variability, showing that these climate processes and their drivers are not yet well understood. Extreme precipitation events, where most of the average annual precipitation falls during a few high-intensity events, are in current climate conditions most frequent in the monsoonal and the bordering subtropical zones, linked to the seasonal migration of the Inter-Tropical Convergence Zone. A recent review of modern and ancient monsoonal and subtropical river systems shows that such rivers display distinct sedimentary characteristics as a function of frequent extreme precipitation induced high-magnitude floods. More than 80% of water discharge and almost 100% of sediment load is transmitted during such events, as only the flood discharge is the efficient discharge, able to transport sediment. As a result such river deposits are an archive of high-magnitude floods and thus an archive of extreme precipitation events that induced the floods. Analyses of river deposits from some past greenhouse climates indicate long-term intensification of extreme precipitation and poleward expansion of monsoon-like precipitation patterns. These data suggest Hadley Cell expansion as a response to global warming, and support the hypothesis that current intensification of extreme precipitation is indeed linked to the anthropogenic global warming.

Biography

Piret Plink-Björklund has completed her PhD from Göteborg University and Postdoctoral studies from University of Wyoming. She is Associate Professor at Colorado School of Mines and leads a research group of 10 PhD students focusing on precipitation signatures of past greenhouse climates and morphodynamics of sedimentary systems. She has published more than 35 papers in reputed journals, and has presented invited talks at numerous Universities, industries and international conferences.

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