The Arctic Rain on Snow Study

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When rain falls on an existing cover of snow, followed by low temperatures, or falls as freezing rain, it can leave a hard crust. These Arctic rain on snow (ROS) events can profoundly influence the physical environment, animals, and human livelihoods. Impacts can be immediate (e.g., on human travel, herding, or harvesting) or evolve or accumulate, leading, for example, to massive starvation-induced die offs of reindeer, caribou and musk oxen. The international Arctic Rain on Snow Study (AROSS) will detect and catalogue ROS events, and study their impacts, addressing human-environment relationships, associated meteorological conditions, and challenges in their detection. We offer a path forward to anticipate and mitigate impacts through knowledge co-production. Although ROS events can be detected, and their intensity and trends across the Arctic region evaluated by combining data from satellite remote sensing, atmospheric reanalyses and meteorological station records, information most germane to impacts, such as the thickness of ice layers, how ice layers form within a snowpack, and antecedent conditions that can amplify impacts, can only be obtained through collaboration with local and indigenous knowledge-holders.