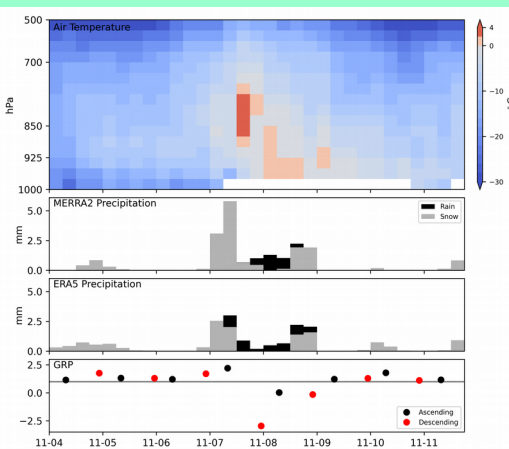


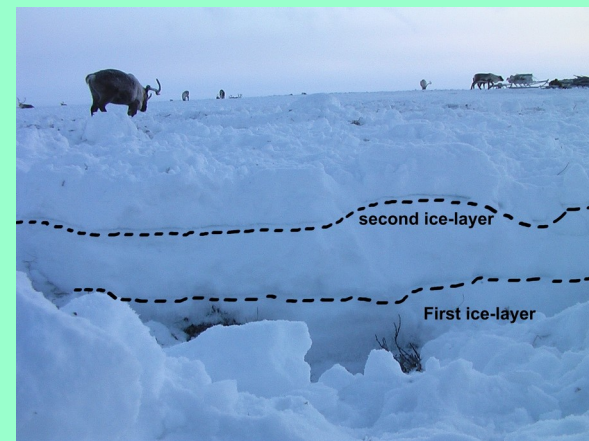
Arctic Rain on Snow Study

Bridging Observations to Understand Environmental and Livelihood Impacts

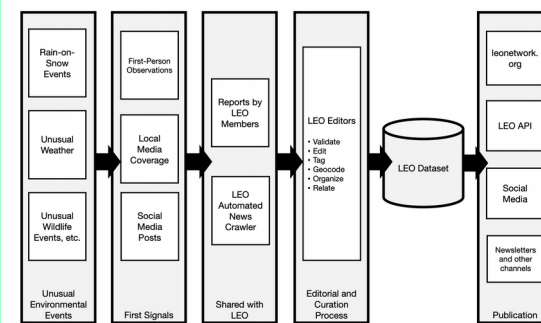
When rain falls on an existing cover of snow, followed by low temperatures, or falls as freezing rain, it can create a hard ice crust. Rain on snow events (ROS) can have severe immediate impacts on human travel, herding, and harvesting; or evolve or accumulate, leading to massive starvation-induced die-offs of reindeer, caribou and musk oxen. The Arctic Rain on Snow Study is developing techniques to detect these events using remote sensing and reanalysis products, understand associated meteorological conditions, and observe and investigate the impacts of events on the environment and livelihoods. We offer a path to anticipate and mitigate impacts through knowledge co-production.



Reanalysis products, satellite data, and station observations can be used with machine learning to detect ROS. The figure shows upper air temperature from ERA5, precipitation amount and phase from MERRA2 and ERA5, and the ratio of V and H polarization gradients for 18 GHz and 39 GHz, an indicator of liquid water, for an event on the Yamal Peninsular in November 2013.



Ice layers that form from ROS can have a devastating impact. Ice layers prevent foraging of lichens beneath the snow, and can lead to starvation and die-off of large herbivores, with concomitant socio-economic impacts. Photo credit: Florian Stammer.



The Local Environmental Observing (LEO) network collects and shares reports of environmental events.

To obtain knowledge and information about events, snow condition and impacts requires collaboration and knowledge co-production with community members and indigenous knowledge holders.



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<https://nsidc.org/rain-on-snow>