

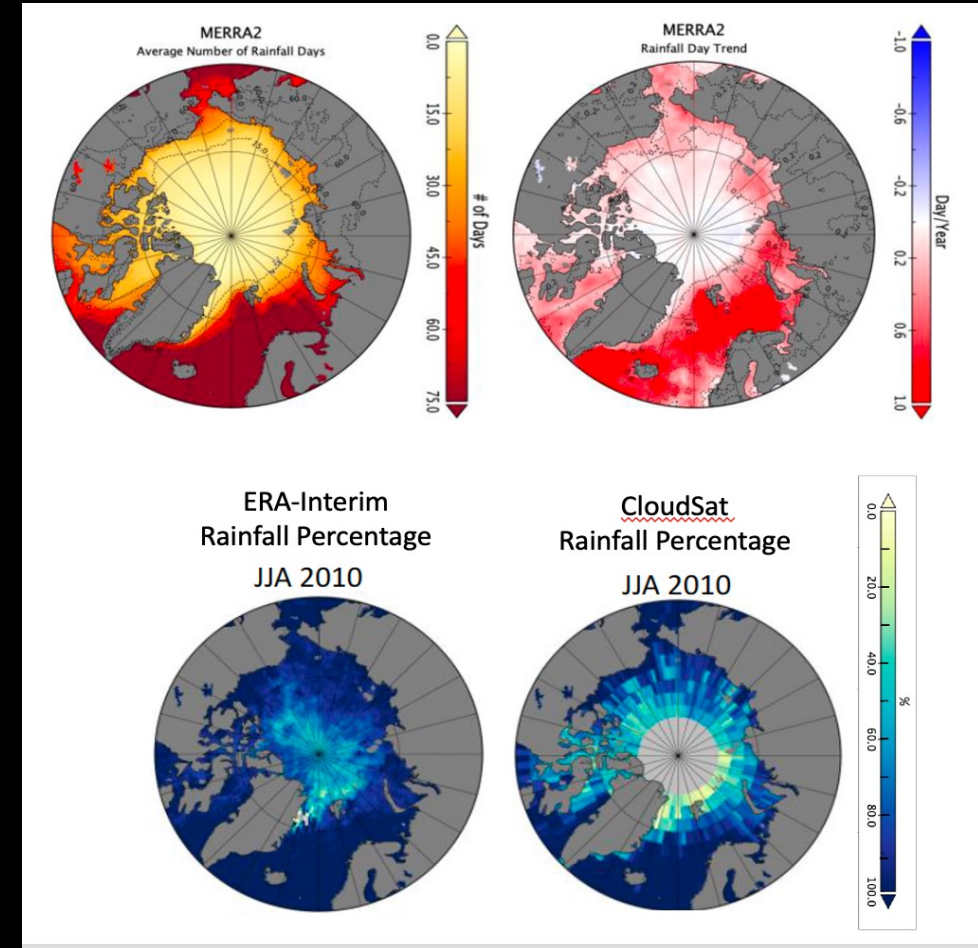
Rainy Days in the Arctic

The Arctic is warming faster than anywhere on Earth and higher temperatures favor more precipitation falling as rain. This precipitation change will have profound impacts on the hydrologic cycle, energy balance, and snow and sea ice mass budgets.

We found that both the number of rainfall days and the length of the rain season have increased and are linked to the number of days with above freezing temperatures and a lengthening of the warm season.

Not all models agree: some produce **significantly** more rainfall days than CloudSat observations indicate. We found that a more simplistic cloud microphysics scheme drove at least one climate model to overestimate the occurrence of rain.

Given that the Arctic exists already near the rain-snow temperature boundary and is experiencing unparalleled warming, the need for improved model physics is key to understanding the future evolution of the Arctic.



Boisvert, L. N. (615), Webster, M. A., Parker, C. L. (UMD/615), & Forbes, R. M. (2023). Rainy days in the Arctic. *Journal of Climate*, 1-48. <https://doi.org/10.1175/JCLI-D-22-0428.1>

Top: MERRA-2 average number of rainfall days and the trend in the number of rainfall days per year between 1980-2016.

Bottom: Comparison of ERA-Interim rainfall percentage in June-August 2010 compared to CloudSat observations.