

Lakes as snowfall sensors: a breakthrough for constraining SWE in satellite and model products

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Take-home message:

- Lakes make it is easy to measure the SWE of falling snow.
- The measurement is unbiased, and its uncertainty is known.
- Measurements are cheap and near real time.
- The sensing surface is the entire lake area, e.g., the km scale of satellite and model grids.
- There are many thousands of Arctic and alpine lakes worldwide.

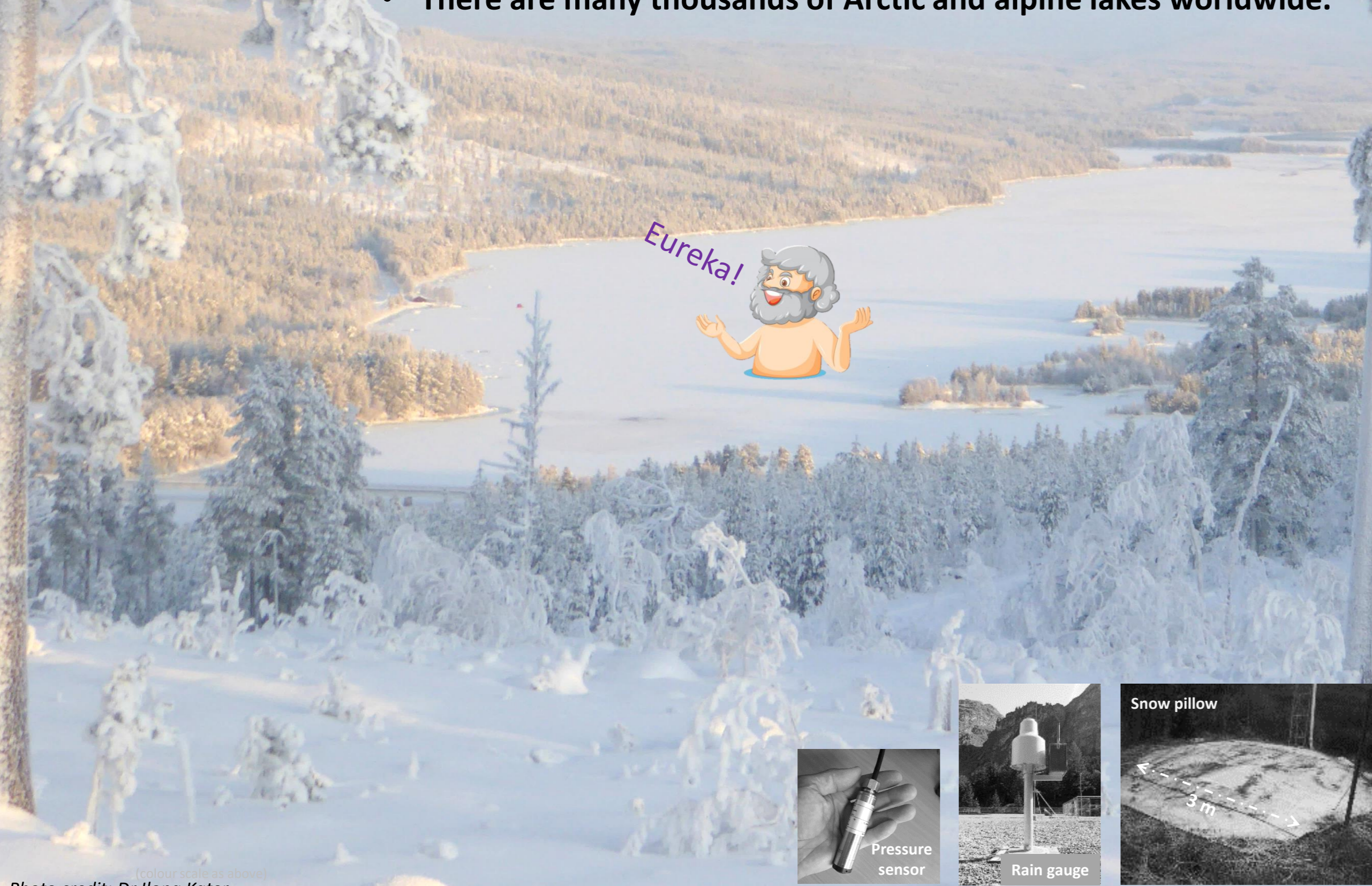
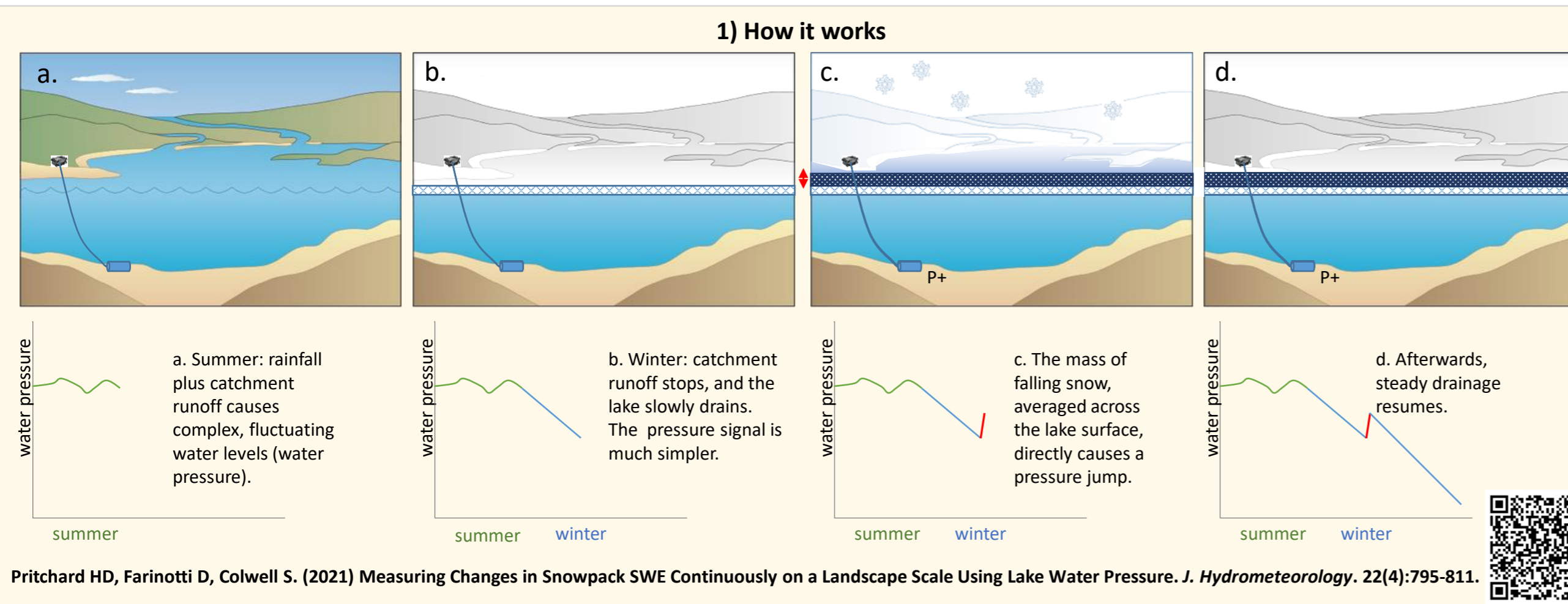
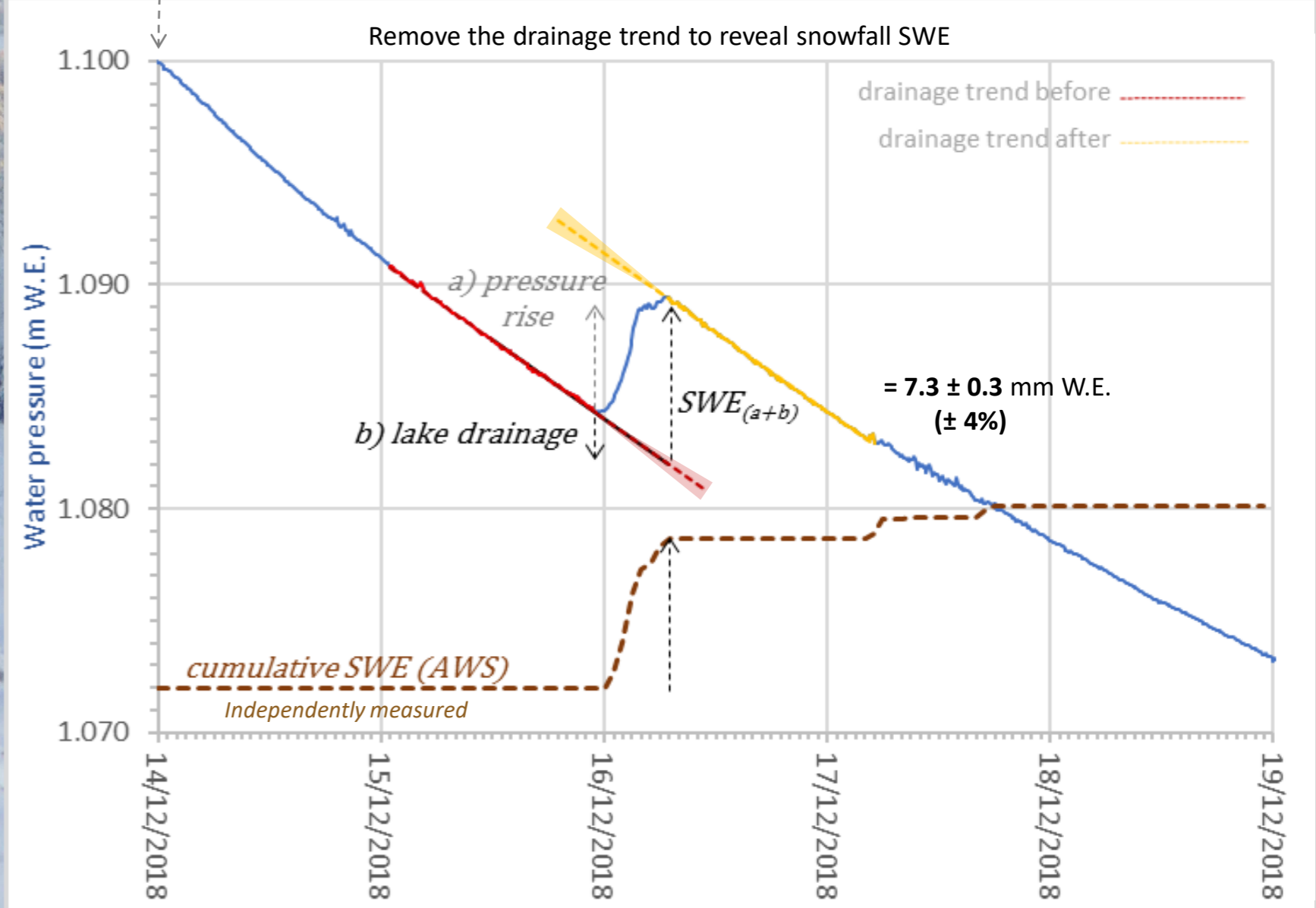
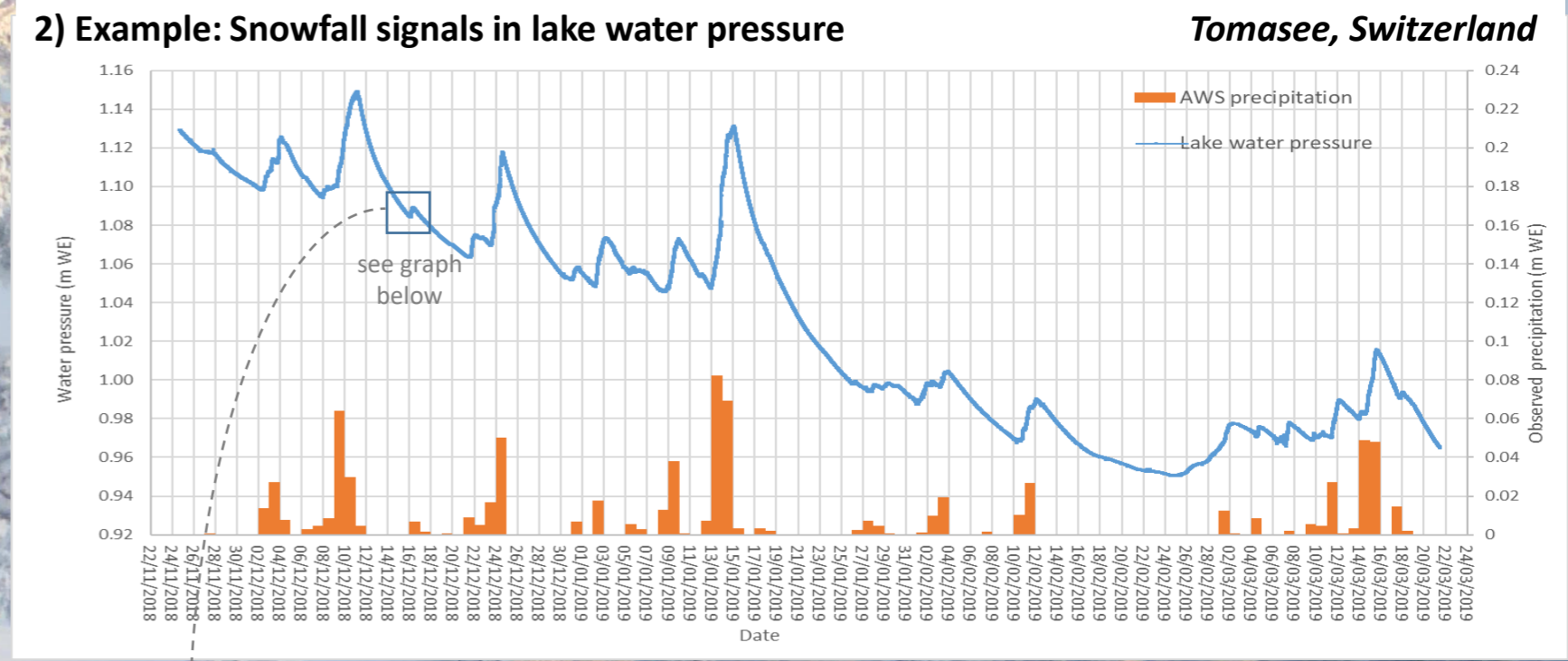
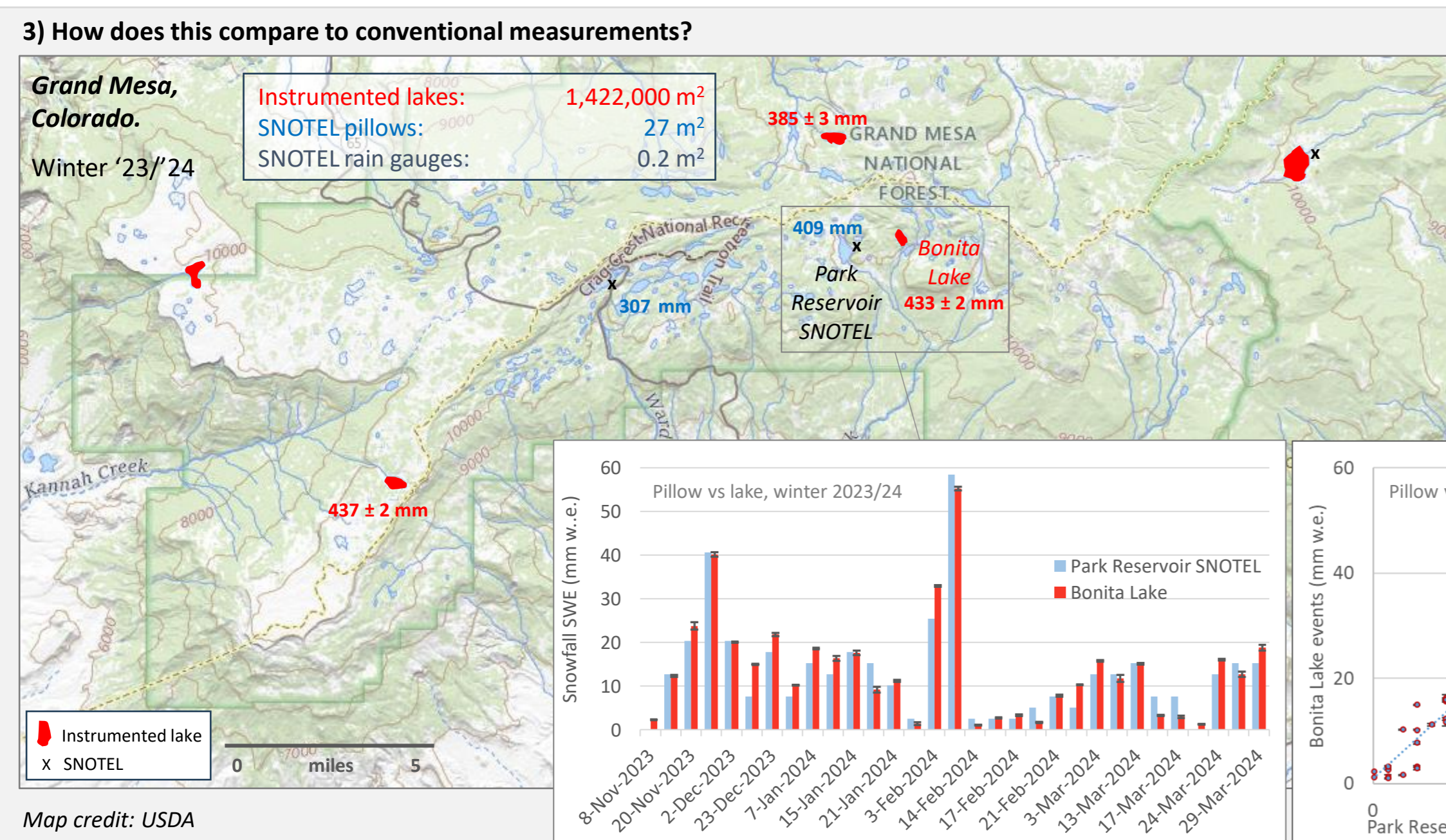


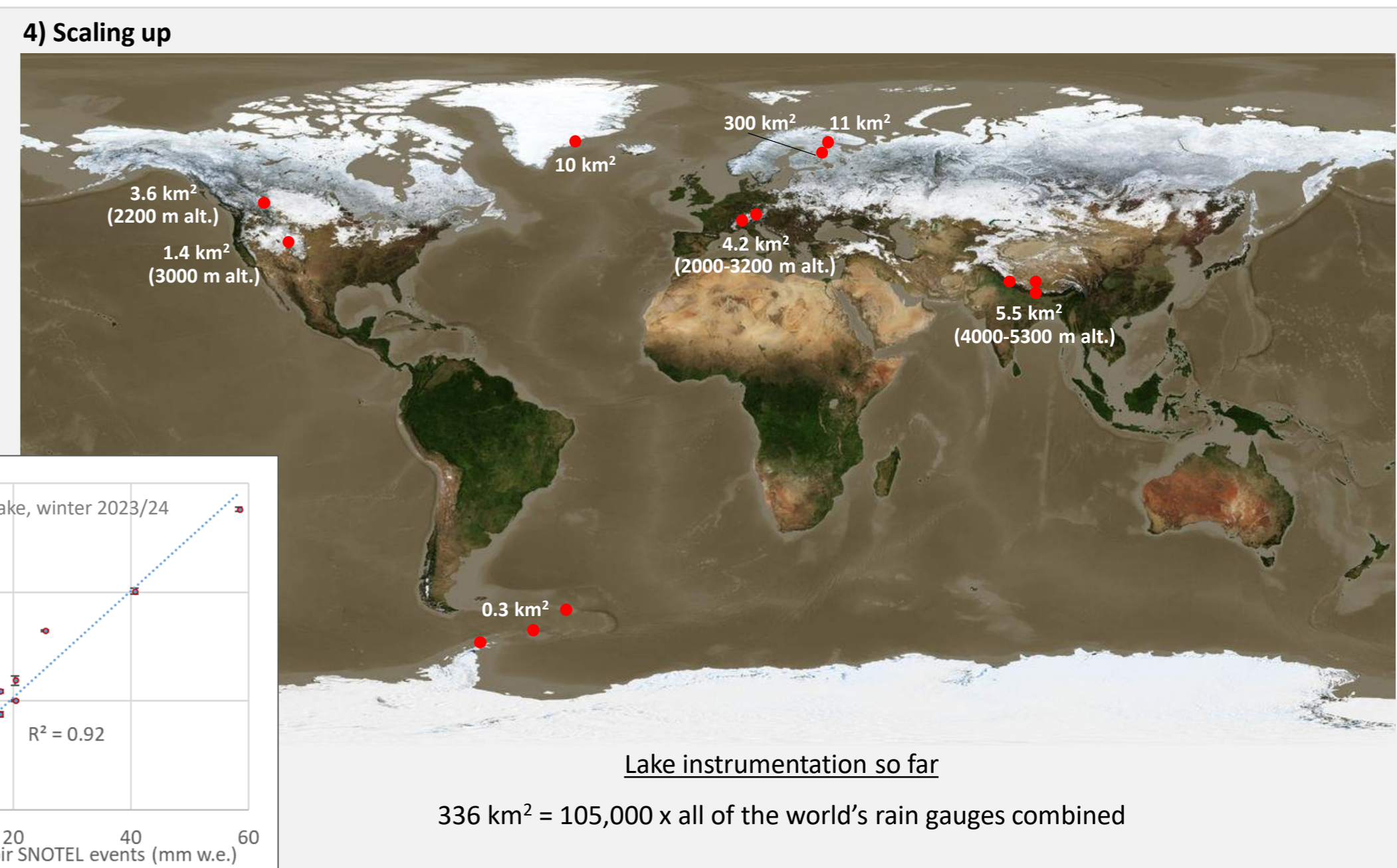
Photo credit: Dr Ilona Kater



Pritchard HD, Farinotti D, Colwell S. (2021) Measuring Changes in Snowpack SWE Continuously on a Landscape Scale Using Lake Water Pressure. *J. Hydrometeorology*. 22(4):795-811.



Map credit: USDA



Conclusion: Using lakes, we have succeeded in monitoring the water content of falling snow:
 1. with high frequency, minimal bias, and with precision at least as good as conventional methods, AND...
 2. covering areas many orders of magnitude larger than conventional instruments.
 This makes our measurements the first to be directly comparable model grid cells and satellite products, removing a major source of potential model bias.