

## Retrieval of Snow Water Equivalent from SWESARR Measurements in Grand Mesa Colorado, SnowEx 2020

MICHAEL DURAND<sup>1</sup> AND BATUHAN OSMANOGLU<sup>2</sup>

### ABSTRACT

One critical question in applying radar measurements to estimate SWE is to assess how much prior information is needed to accurately perform the retrieval. We apply retrieval algorithms to SWESARR measurements of radar backscatter made in February 2020, as part of the SnowEx campaign. The algorithm removes background backscatter from a snow-off measurement in November. The algorithm uses a physically-based microwave radiative transfer model to relate the snow and backscatter properties, and iteratively computes the optimal estimates. Both one- and two-layer configurations are explored. The algorithm is Bayesian in that it uses *a priori* information on SWE, as well as on the microstructure correlation length. We explore three configurations: one in which no *a priori* information is used, one in which generic prior information is used, and a third where local prior information specific to Grand Mesa is used. We hypothesize that the two-layer model with local priors performs best, but that the two-layer model with generic priors still performs adequately. Demonstration that generic priors lead to adequate performance would strengthen the case that global SWE can be estimated from satellite measurements of Ku and X band radar.

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<sup>1</sup> School of Earth Sciences, The Ohio State University, Columbus, OH, USA

<sup>2</sup> NASA Goddard Space Flight Center, Greenbelt, MD, USA