Supplement of

Evaluating the Utility of Active Microwave Observations as a Snow Mission Concept Using Observing System Simulation Experiments

Eunsang Cho et al.

Correspondence to: Eunsang Cho (eunsang.cho@nasa.gov)
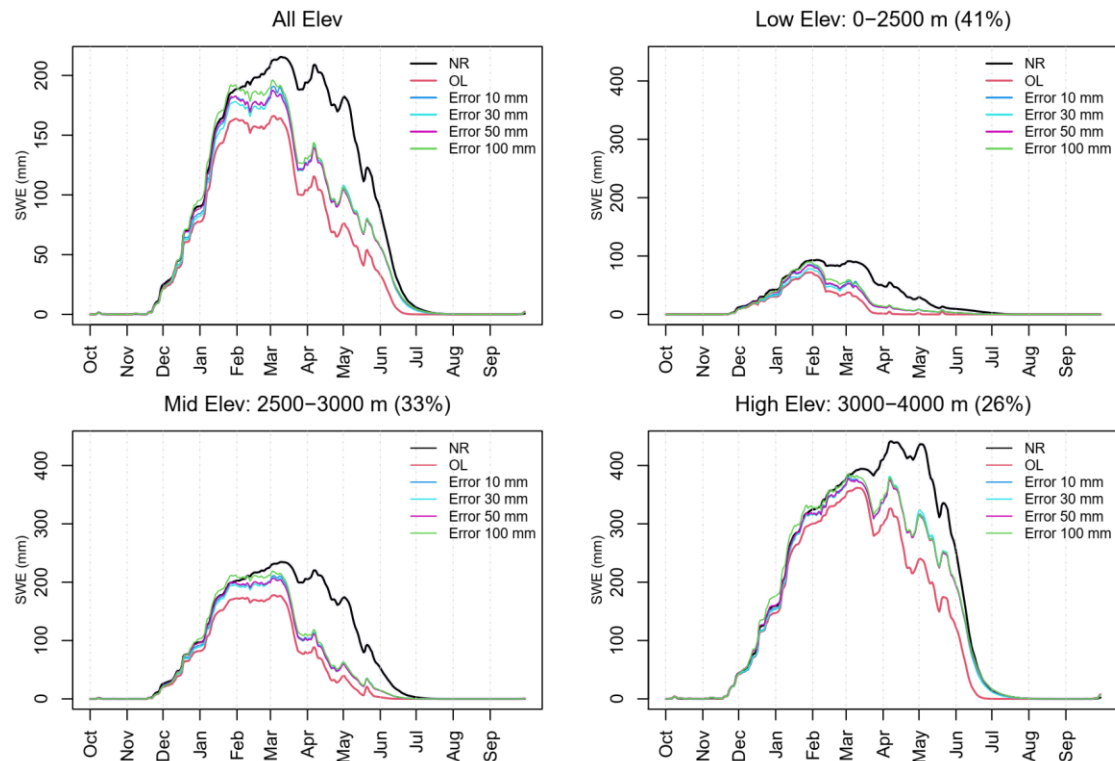
Figure S1. Domain-average SWE comparison between NR, OL, and DA experiments with different unbiased random error levels (10, 30, 50, and 100 mm of standard deviation) for the entire domain and subareas with three different elevation ranges. Note that the four DA scenarios have no deep snow and forest limits.
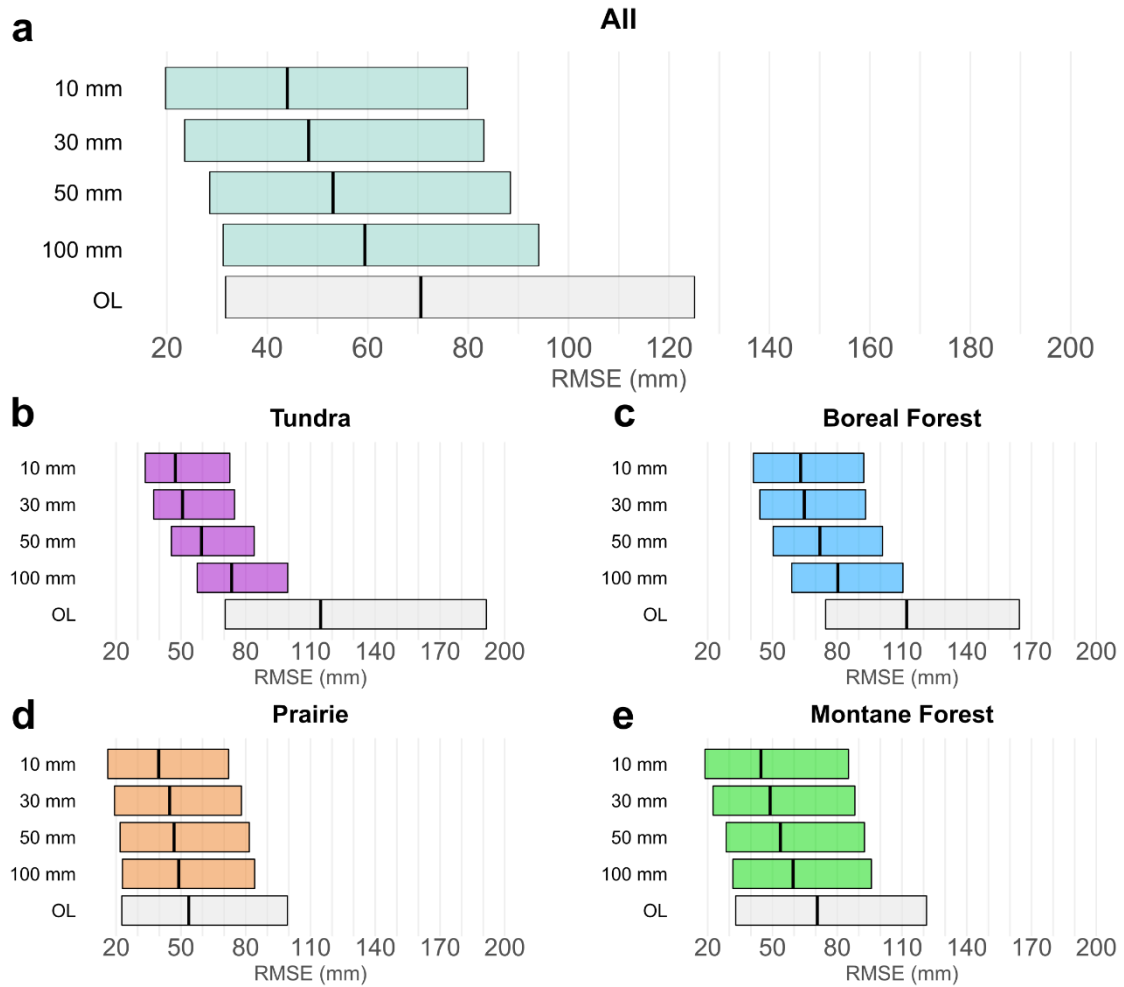
Figure S2. Boxplots of RMSE (mm) from all grid cells between four DA experiments with different unbiased random error levels (10, 30, 50, and 100 mm of standard deviation) and the Nature run (NR) relative to the open loop (OL) simulation for four seasonal snow classes, respectively. Note that the four DA scenarios have no deep snow and forest limits.

Figure S3. Maps of each Sturm's seasonal snow class with different TCF thresholds (0, 10, 20, 40, 60, and 80%).

Table S1. Perturbation parameters applied to Noah-MP prognostic state variables and meteorological forcing fields during the OL and DA scenarios

Variable	Types	Standard deviation	AR1*	Cross correlations		
Noah-MP variables				*SWE*	*SD*	
SWE	multiplicative	0.01	3 hr	–	0.9	
Snow depth (*SD*)	multiplicative	0.02	3 hr	0.9	–	
Forcing variables				*SW*	*LW*	*P*
Shortwave radiation (*SW*)	multiplicative	0.3	1 day	–	-0.5	-0.8
Longwave radiation (*LW*)	additive	50 W m^{-2}	1 day	-0.5	–	0.5
Precipitation (*P*)	multiplicative	0.5	1 day	-0.8	0.5	–

*AR1: first-order autoregressive temporal correlation