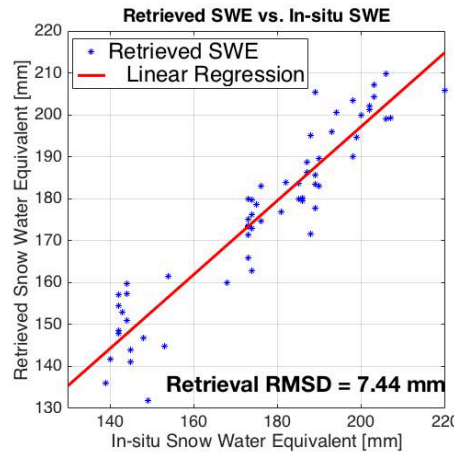
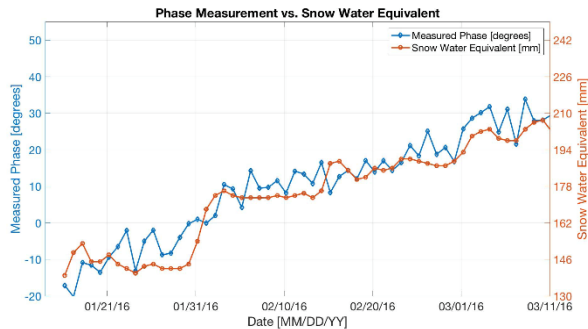


Remote Sensing of Snow Water Equivalent Using P-Band Coherent Reflection (Rashmi Shah)

Snow Water Equivalent: Winter 2016



Time history of the phase measurement computed from the data collected between 5 A.M. and 6 A.M. between January 16, 2016 and March 11, 2016 along with time history of the in situ snow water equivalent (SWE) (left). Scatter plot during the same time period for in situ SWE and retrieved SWE. The correlation between retrieved and in situ SWE was found to be 0.94 and the root-mean-square-deviation (RMSD) with linear regression was found to be 7.5 mm (right).

Problem: Retrieving snow water equivalent (SWE) using a P-band (250-270 MHz) reflected signals of opportunity (SoOp) phase measurements.

Finding: Snow water equivalent was found to be linearly proportional to the phase of the reflected P-band signals of opportunity. This retrieval was done on snow with frozen soil underneath. The retrieval agreed with the modeled phase which used *in situ* measurement. The retrieved SWE the root-mean-square-deviation of 7.5 mm was within the *in situ* error bound of 8.1 mm.

Significance: This is a novel method to measure snow water equivalent accurately and inexpensively since this method used communication satellites as transmitters in bistatic geometry and therefore uses only a passive receiver. SWE can be used to quantify the amount of water in snowpack.

Shah, R., Xu, X., Yueh, S., Chae, C. S., Elder, K., Starr, B., & Kim, Y. (2017). Remote Sensing of Snow Water Equivalent Using P-Band Coherent Reflection. *IEEE Geoscience and Remote Sensing Letters*, 14(3), 309-313. doi: 10.1109/LGRS.2016.2636664
 URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7812647&isnumber=7862865>