

Study of Snow Water Equivalence Inversion Technique with Experimental Data

Lingmei Jiang^{1,2}, Jiancheng Shi¹

¹University of California, USA

²Beijing Normal University, China

Remote sensing of snow cover is important for climate change studies and successful water resource management. So our ability to monitor snow cover and volumetric storage water has great impact on assessing global climate changes and improving management of water supply. And estimating techniques of snow water equivalence (SWE) are common inputs to water resource management and flood forecasting. In this paper simulating emission database is established based on the dense medium radiative transfer theory (DMRT), covering the most possible natural snow properties - a range of snow densities and grain sizes and underground dielectric and roughness properties - frozen/nonfrozen, a range of soil moisture, and roughness properties.

We used first-order scattering radiative transfer model as our basic inversion model. We characterize the relationship of the underground surface emission signals at the different frequencies and polarizations under AMSR-E sensor considerations to reduce the number of unknowns to describe the underground surface emission signals in the inversion model. The surface emission signals are highly correlated at different frequencies as long as the sensor looks at the same surface (same soil moisture, texture, and roughness properties). And we expect that snow characters such as extinction coefficient, volume albedo are also correlated at different frequencies and polarization. From these relationships we can obtain snow depth at the homogeneity snow pixel. To test the inversion approach, PSR Multi-band Polarimetric Imaging during CLPX 2002 with the corresponding snow pits measurements was used. The accuracies showed that this inversion technique estimated snow depth very well in this area. In future this technique will be improved and implemented with AMSR-E data. And we still need to study mixed pixel problem to improve current snow depth retrieval accuracy.