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Snow Depth estimation over North Western Indian Himalaya using AMSR-E

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This paper presents the estimation of snow depth over North Western Indian Himalaya using the 18.7H and 36.5H GHz channels of Advanced Microwave Scanning Radiometer-EOS (AMSR-E). For a terrain with complex topography such as mountains, the microwave radiation from the snow pack interacts with the terrain and suitable corrections due to the prevailing topography are to be taken into account for the accurate estimation of snow depth. However for AMSR-E whose best spatial resolution is 5.5 kms, all topographic undulations get averaged and any attempt at topographic correction seems futile. However Microwave Emission Model of Layered Snowpacks (MEMLS) has been used along with AMSR-E to understand the difference in the snow pack emitted and sensor received signals due to the prevailing topography. The study shows that the Brightness Temperature of AMSR-E and MEMLS are comparable at 18.7 GHz with some differences in their values at 36.5 GHz. AMSR-E has been used to retrieve snow depth over the western Himalayas at higher altitudes, in the absence of any vegetation after recalibrating the Chang et al. (1987) algorithm to suit the terrain and snow conditions of the Indian Himalayas. The retrieved snow depth is then compared with ground observations. Data from December to February 2003 to 2006 has been used for the study for snow depths less than 1m. This study shows that the technique works for snow depths from 5 to 60 cms.