Use of high frequency radiometer and altimeter on board AMSU-B, AMSR-E and Altika/SARAL for observations of the Antarctic ice sheet surface.

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Snow surface properties quickly evolved according to local weather conditions, therefore are climate change indicator. These snow surface properties such as grain size, density, accumulation rate etc... are very important for evaluation and monitoring of the impact of global warming on the polar ice sheet. In order to retrieve these snow-pack properties, we explore the high frequency microwave radiometer variable(Brightness Temperature (Tb)) on the Antarctic ice sheet on-board AMSU-B , AMSR-E in combination with the ALTIKA altimeter (37GHz) wave-form parameters (Backscatter coefficient, Trailing edge Slope(TeS) and Leading edge Width(LeW)). We compare the radiometer brightness temperature to calculations with the DMRT- ML radiative transfer model which simulates brightness temperature in vertical and horizontal polarizations. With some assumptions, this combination allows a good retrieval of snowpack properties. We showed positive trend of the grains size on the Antarctic plateau especially at Dome C during the two last decades. This work will provide a higher accuracy of the estimation of snowpack surfaces properties and contribute to monitoring the ice sheet surface mass balance, well constraining of meteorological and glaciological models.