



Remote sensing of snow temperature and emissivity using AATSR

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We present a method to quantify the radiative temperature of a snow covered surface using bi-directional measurements at $11\mu\text{m}$, $12\mu\text{m}$ as provided by AATSR. The retrieval is based on a 1d-Var algorithm, with a radiative transfer model as a forward operator. It uses the total column amount of water vapor retrieved by MERIS as additional information and assumptions as follows:

1. the emissivity of snow at $11\mu\text{m}$ is almost constant with a value of 0.990 ± 0.005 . This assumption is reasonable as long as the viewing zenith is smaller than 40° .
2. the surface temperature is correlated to the atmospheric profile of temperature. This assumption is of course in many situations not valid, but the $11\mu\text{m}$ and $12\mu\text{m}$ bands are almost transparent for cold and dry atmospheres and therewith the poorly known profile of atmospheric temperature results in a small error. Parallel to the snow temperature, the bi-directional emissivity at $12\mu\text{m}$ is estimated which can later be used to discriminate between different types of snow and ice.