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On the rainfall retrieval with the 183-WSL algorithm over Northern Europe

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The algorithm 183-WSL (Laviola and Levizzani 2008) exploits variations in emitted radiation within the water vapor absorption band at 183.31 GHz due to the extinction by rain drops for the estimation of rainfall rates over ocean and land surfaces. The 183-WSL retrieval scheme infers rain types on the basis of signal extinction associated to the presence of different hydrometeor states. Icy hydrometeors, which generally scatter more at high frequencies, are linked to higher rain rates. At the same time the signal depression due to absorption by liquid rain drops, which is typically lower than the scattering signal by ice crystals, is suitable to derive the lighter rain rates. Previous comparisons with other techniques have demonstrated the robustness of the 183-WSL results with respect to different precipitating events mainly at mid-latitudes. The present challenge of our research is to validate the 183-WSL algorithm results at higher latitudes.
Some case studies are proposed located over Northern Europe covering different seasonal rain events. Precipitation formed at latitudes higher than 50 degrees is layered within the first kilometers of the atmosphere and generally structured as large stratified clouds with icy particles aloft. Rain rates associated with these stratiform systems are normally light and persistent and the formation of snowflake aggregates is quite common. On the other hand, during the summer season large scale systems and long time precipitation can generate floods and intense run-off. The goal of this work is to emphasize the capability of the 183-WSL algorithm to discern multi-seasonal different rain types when compared with rain rates derived from radar networks considered as ground truth. Moreover, a suite of microphysical parameters will be retrieved from the Meteosat Second Generation (MSG) Spinning Enhanced Visible and InfraRed Imager (SEVIRI) and employed to characterize the observed precipitation and better understand the retrieval results within the water vapor opaque frequencies.