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Radio Frequency Interferences Investigation Using the Airborne L-band Full Polarimetric Radiometer CAROLS

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The CAROLS radiometer is a correlation radiometer based on direct sampling
and fully polarimetric (the 4 Stokes parameters are measured) which sensitivity and stability are better than 0.5 K. We used CAROLS data sets acquired during the airborne CAROLS campaigns done in 2008 and 2009 in the South West of France, to study Radio Frequency Interferences (RFI). In this paper, we propose to evaluate the capability of various algorithms to detect and mitigate RFI in airborne radiometric measurements. First we tested the commonly used Kurtosis parameter and we also used various criteria based on the Brightness Temperatures standard
deviation: using a simple threshold we masked data supposed to be disturbed. Finally, we tested new algorithms based on the 3rd and 4th Stokes parameters measurements. Based on the estimation of the mean brightness temperature on a large transect (approximately 30 minutes of measurements), we have shown that all algorithms have the capability to detect Radar pulsed signals. However, algorithms based on Kurtosis are not able to correctly mitigate RFI appearing like strong permanent emissions. We have shown that the combination of STD-based algorithms with Kurtosis measurements can signi[U+FB01]cantly improve the detection of RFI. The use of the 3rd and 4th Stokes parameters appears to be a quite good substitute to the Kurtosis algorithms.