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Detection and mitigation of RFI influence within SMOS application for high latitudes

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The brightness temperature measured by the Microwave Imaging Radiometer by Aperture Synthesis (MIRAS) on board of European Space Agency Soil Moisture and Ocean Salinity (SMOS) satellite is used to retrieve salinity and soil moisture. A secondary goal of this mission is the cryospheric application to use the brightness temperature measured by SMOS to retrieve thin ice thickness. However, the data set is partly influenced by Radio Frequency Interference (RFI) which comes from radar, TV and radio transmissions at the protected L-band electromagnetic spectrum (1400-1427 Mhz) at which the SMOS radiometer operates. The detection of RFI sources and mitigation of RFI influence is a critical step for the further retrieval of salinity, soil moisture as well as thin ice thickness. In this study we systematically investigate the source regions of RFI at higher latitudes, their impact on brightness temperature of surrounding regions as well as the dependence of RFI contaminated brightness temperature on ascending and descending modes of the satellite and especially the incidence angles. The geographical locations of RFI sources at high latitudes are identified by the maximum values of brightness temperature at each grid point. For every snapshot the SMOS data are consecutively checked for possible influence of RFI. If a snapshot is contaminated by RFI it is taken out from the data processing. Brightness temperature data without RFI contamination are sorted by polarization and incidence angle at each grid point. The first Pseudo Stokes component as well as horizontally and vertically polarized brightness temperatures are then gridded into polarstereographic projection for further use. The effectiveness of the implemented RFI suppression is shown with several case studies. Statistical analysis of the variability of gridded brightness temperature in regions with different surface characteristics is carried out to choose appropriate targets for calibration and tie point estimation.