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L-band brightness temperatures measured in the Gulf of Biscay in 2010

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The L-band Cooperative Airborne Radiometer for Ocean and Land Studies (CAROLS) radiometer (Zribi et al., IGARSS 2008) flew in 2010 simultaneous to SMOS satellite for two airborne campaigns over the ocean.
The aim of CAROLS airborne campaigns over the ocean is to validate and improve forward models used in the SMOS data processing for the sea surface salinity retrieval and to validate SMOS brightness temperatures (Tb).
Two configurations of the instruments were used in 2010 campaigns: in May sea surface Tb were measured by one antenna looking at 33° on the right hand side of the aircraft and by a nadir antenna; in November the nadir antenna was exchanged with the STORM scatterometer. STORM scatterometer measures the backscatter coefficient of the sea surface in C-band which is influenced by capillarity waves and can be related to wind speed. It has the advantage of containing information on the sea surface roughness more precise than an atmospheric wind speed measurement and to be coincident in space and time with the radiometric measurement.
These flights followed three airborne campaigns with the same instrument in September 2007, November 2008 and May 2009.
Measurements are compared with simulations conducted with the Terrestrial Radiometry Analysis Package (TRAP) (Tenerelli et al., 2008) software run for CAROLS geometry and different observed geophysical conditions. Concomitant ship campaign and drifter deployments provide in situ ground truths for sea surface salinity and temperature (in May 2010, 31 to 35.7 psu and in November 2010, 33 to 35.7 psu). Wind speed and direction are either estimated from the QSCAT scatterometer or from the STORM scatterometer and complemented with in situ observation (up to 10 m/s in May and 15 m/s in November).
TRAP uses the physical modelling of atmospheric radiative transfer, sea surface emissivity and galactic glint used for the processing of the Soil Moisture and Ocean Salinity satellite data. In particular we test various modeling of sea surface roughness and foam emissivity used in recent processing of SMOS data. We also made an attempt to relate the emissivity in excess attributed to surface roughness to the STORM backscatter coefficient instead of modelling it using the wind information.
During these two campaigns of 2010, SMOS Tb are widely affected by RFI in the gulf of Biscay. In this presentation we will compare CAROLS Tb, Tb simulated using the SMOS forward model and SMOS Tb after various sortings of RFI.