



CONAE MICROWAVE RADIOMETER COUNTS TO TB ALGORITHM V7.0 AND ON ORBIT VALIDATION



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ABSTRACT

The Central Florida Remote Sensing Lab (CFRSL), in collaboration with CONAE, have developed two improved algorithms to convert the radiometric counts to brightness temperature (Tb) for production of MWR level-1 science data. This poster presents a description of these algorithms and shows results for MWR Cal/Val activities during the past 15 months. Version 6.0 provides corrections to the previous MWR Tb algorithm (V5.0S) that remove a small nonlinearity in the radiometer transfer function. This algorithm is based upon: 1) a reanalysis of pre-launch thermal vacuum radiometric calibration testing to derive the antenna switch matrix loss coefficients, and 2) on orbit inter-satellite cross calibrations (XCAL) with the Naval Research Lab's WindSat radiometer. Results are presented that demonstrate excellent radiometric stability for a 12 month data set over both oceans and land. Also a second version (V7.0) of MWR counts to Tb algorithm is presented. This algorithm is essentially V6.0 that has been normalized to WindSat as a radiometric transfer standard. By using the CFRSL XCAL double-difference technique, small radiometric biases between channels have been removed as well as systematic radiometric calibration drift over the entire MWR time series (~ 3 years). Comparisons between V6.0 and V7.0 are presented relative to WindSat.

MWR HISTORY

- MWR on-orbit commissioning Aug 29th, 2011
- Cal/Val campaign Sept, 2011 – Jan 2012
- Counts to Tb V5.0 - March 2012
- Used 6 month of MWR on-orbit collocation with WindSat
- Ocean Tb's exhibited small and acceptable Tb biases
- Anomalous Tb's near Land/water boundaries
- Counts to Tb V5.0S – April 2012
- CONAE implements “Smear” correction algorithm
- Discovery of small Tb non-linearity
- Counts to Tb V6.0 beta – September 2013
- Corrects non-linearity and other problems with V5.0S
- V6.0 Validation & V7.0 beta – February 2014
- Legacy Data Release – December 2015

V7.0 ATTRIBUTES

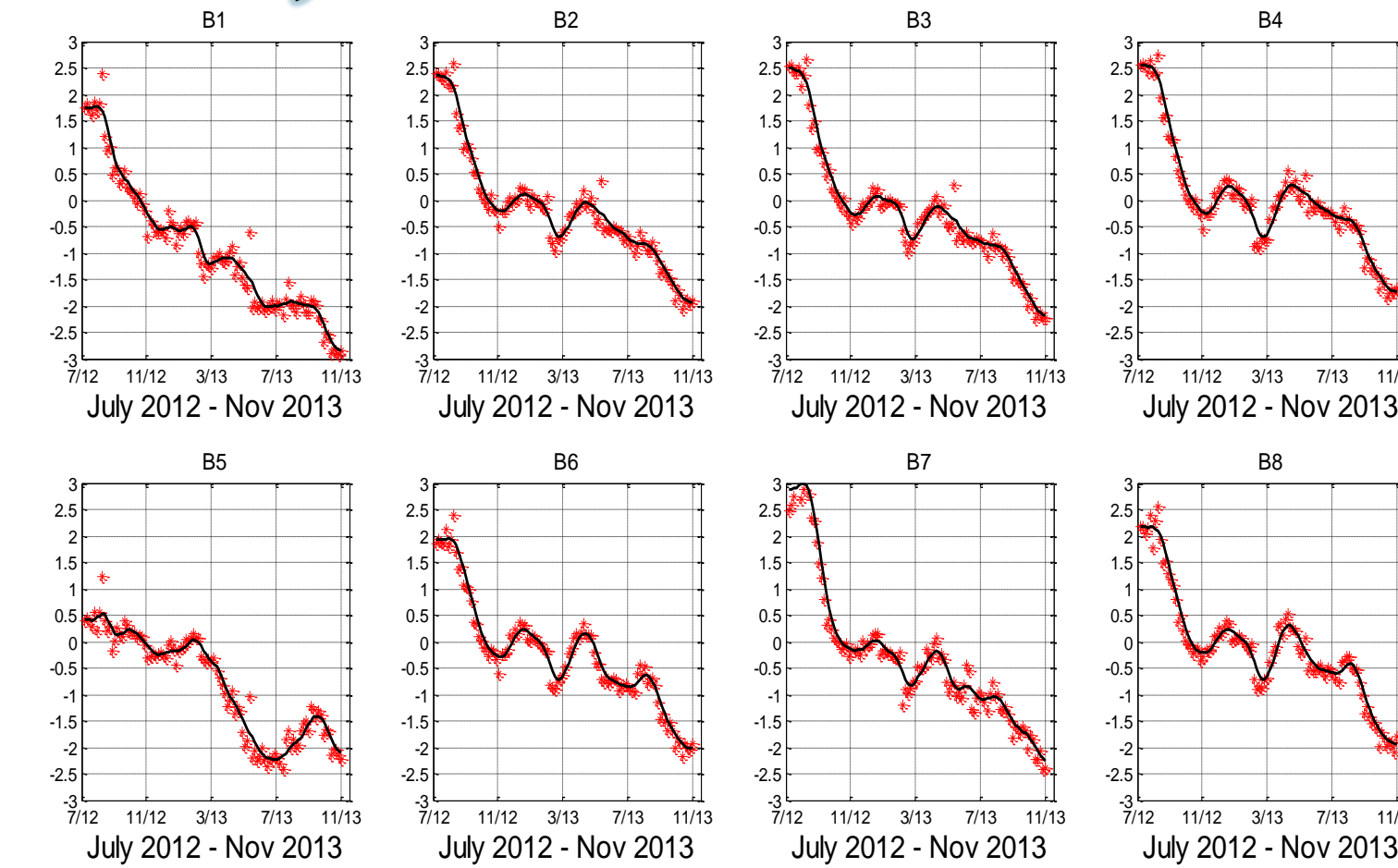
- Builds on V6.0
 - Based upon rigorous radiative transfer theory
 - Empirical coefficients determined from
 - Pre-launch T/V tests
 - Post-launch APC with WindSat Data
 - Deep space calibrations
 - Noise diode injected Tb
- Normalization to WindSat radiometric calibration
 - Introduces a small time-variable Tb bias adjustment by antenna beam
 - Tb calibration consistent with XCAL standard
 - Based upon 5-day “Double Difference” XCAL for entire MWR time series
 - Used to produce MWR L-2 geophysical retrievals
- Recommended Tb data product for AQ science users

CONCLUSION

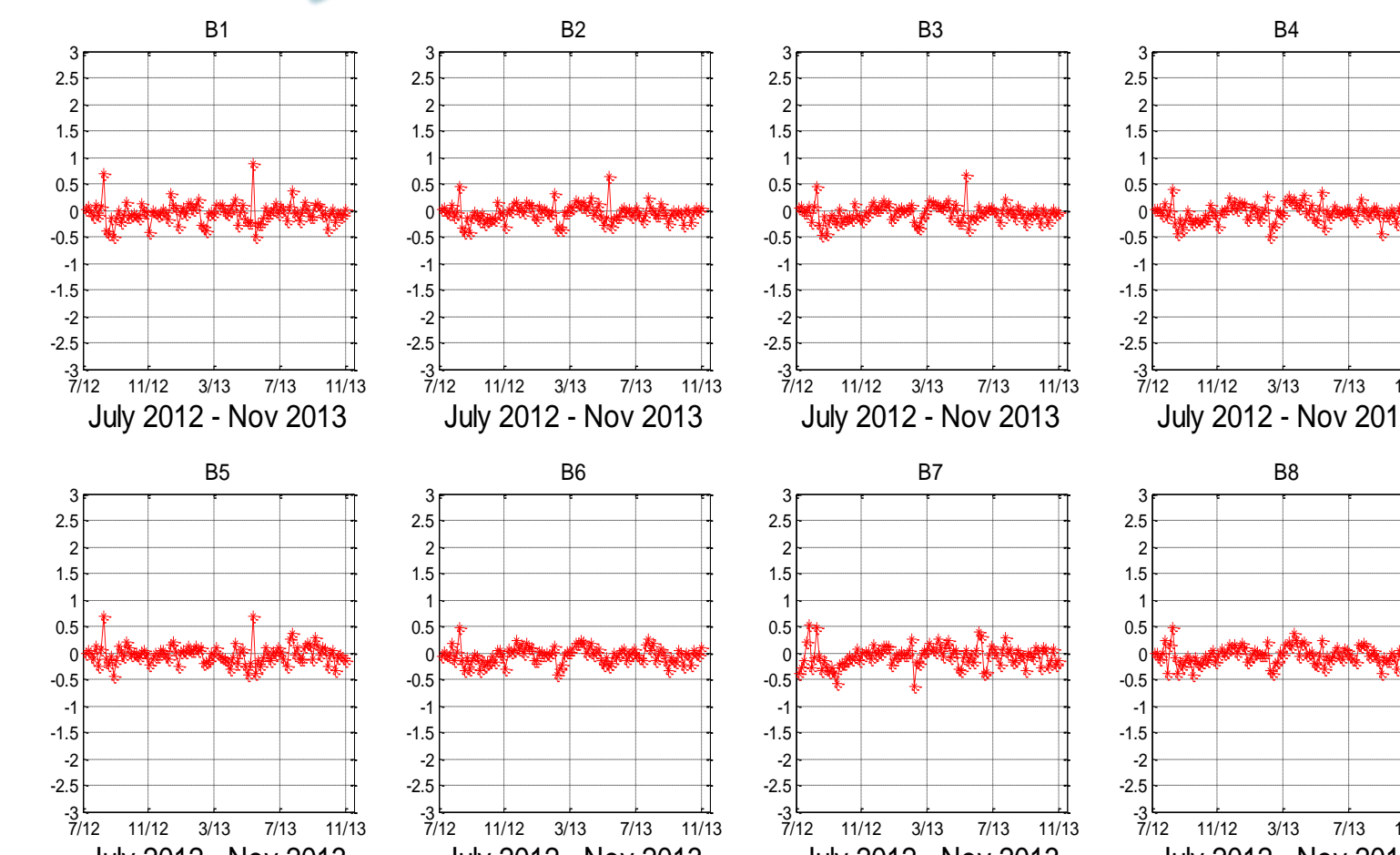
- Improved MWR counts to Tb algorithm V7.0 developed
- V7.0 builds on V6, and incorporates
 - Adjustment to match WindSat radiometric standard
 - Near-zero inter-beam Tb biases that are stable ($\pm 0.1 - 0.2$ K) over the entire data time series
- Final archive V7.0 Tb dataset available on PODAAC

RESULTS

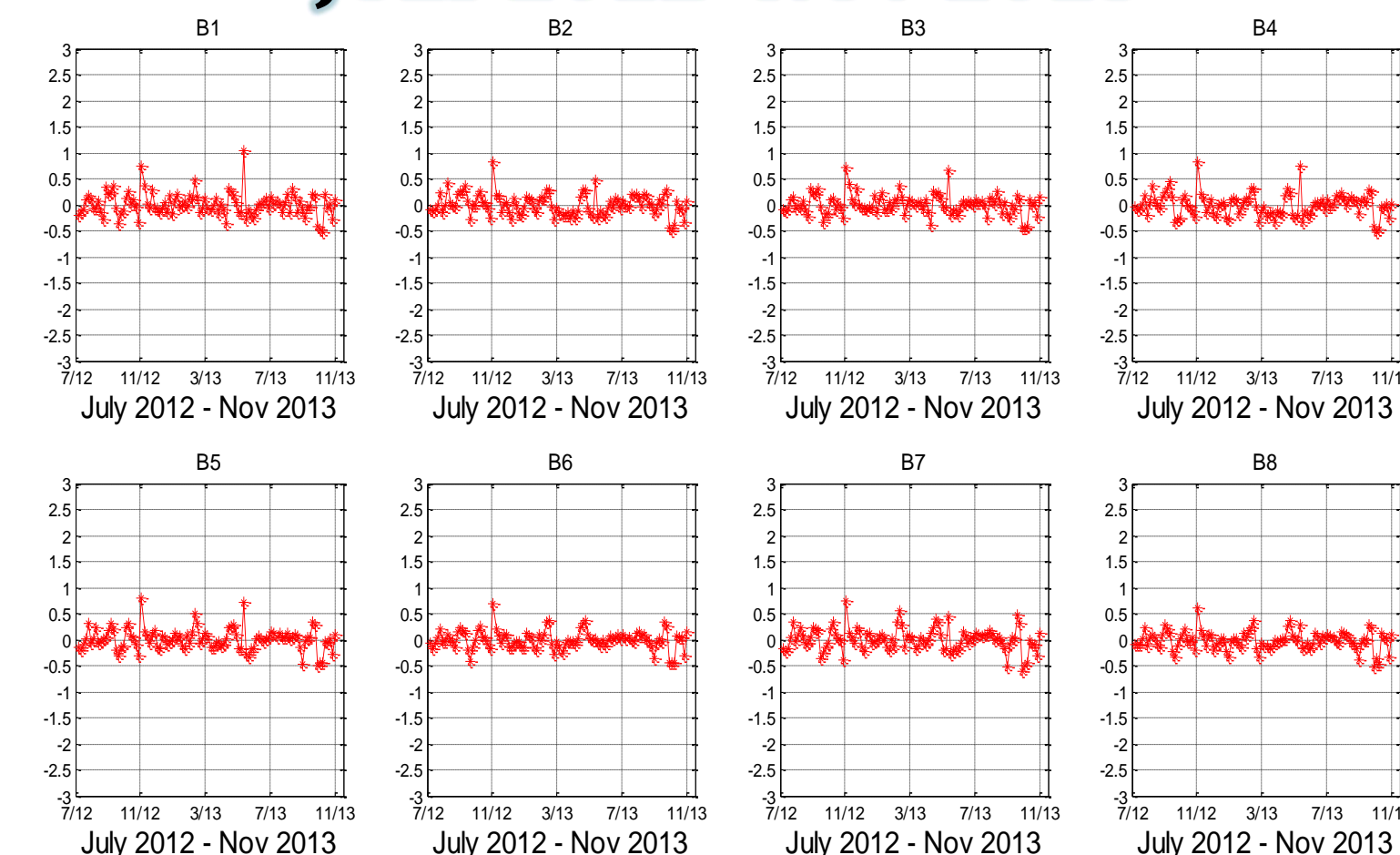
V6.0 23H, DD BIASES (MWR-WS) JULY 2012 – NOV 2013



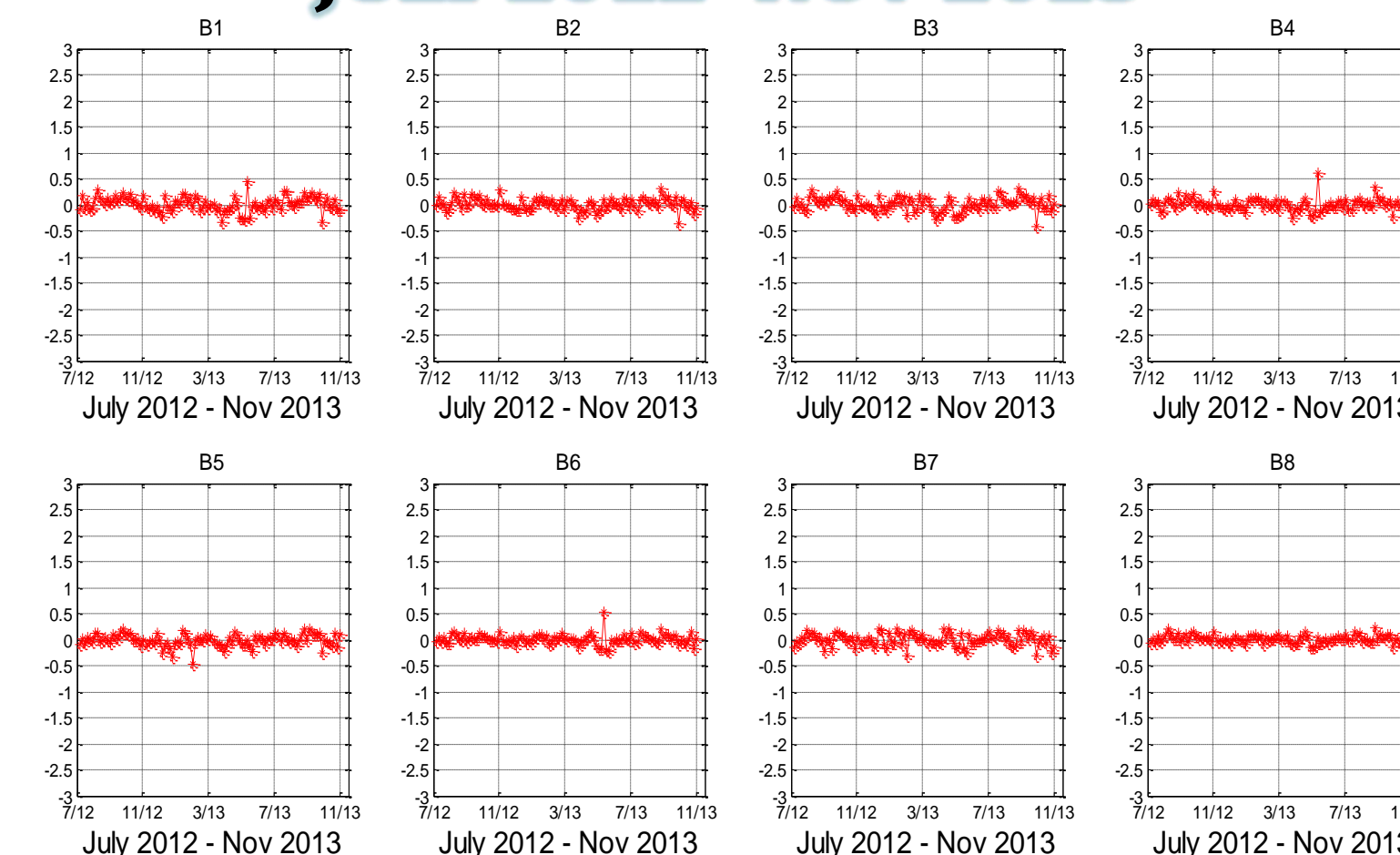
V7.0 DD ADJUSTED TO WINDSAT 23H JULY 2012- NOV 2013



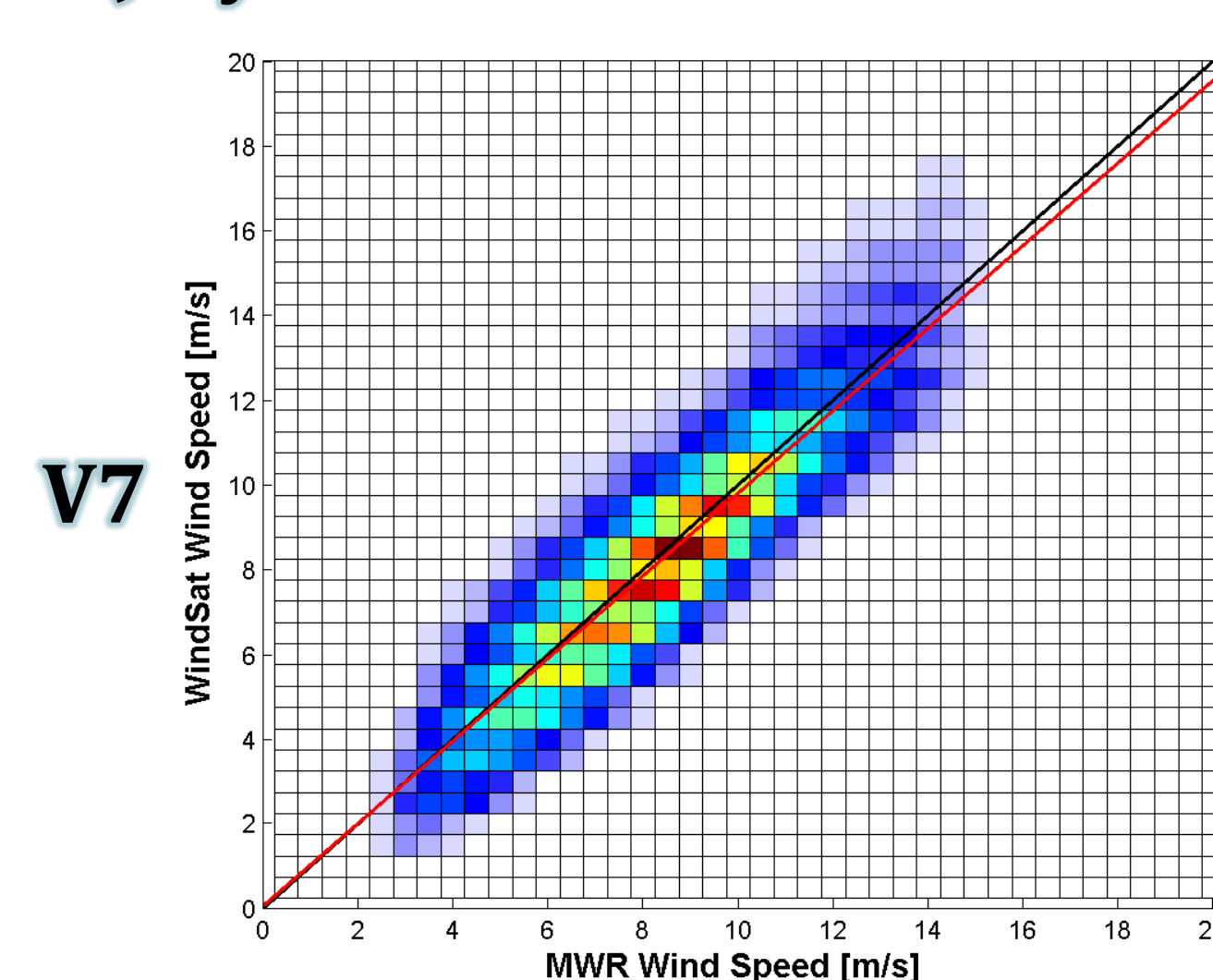
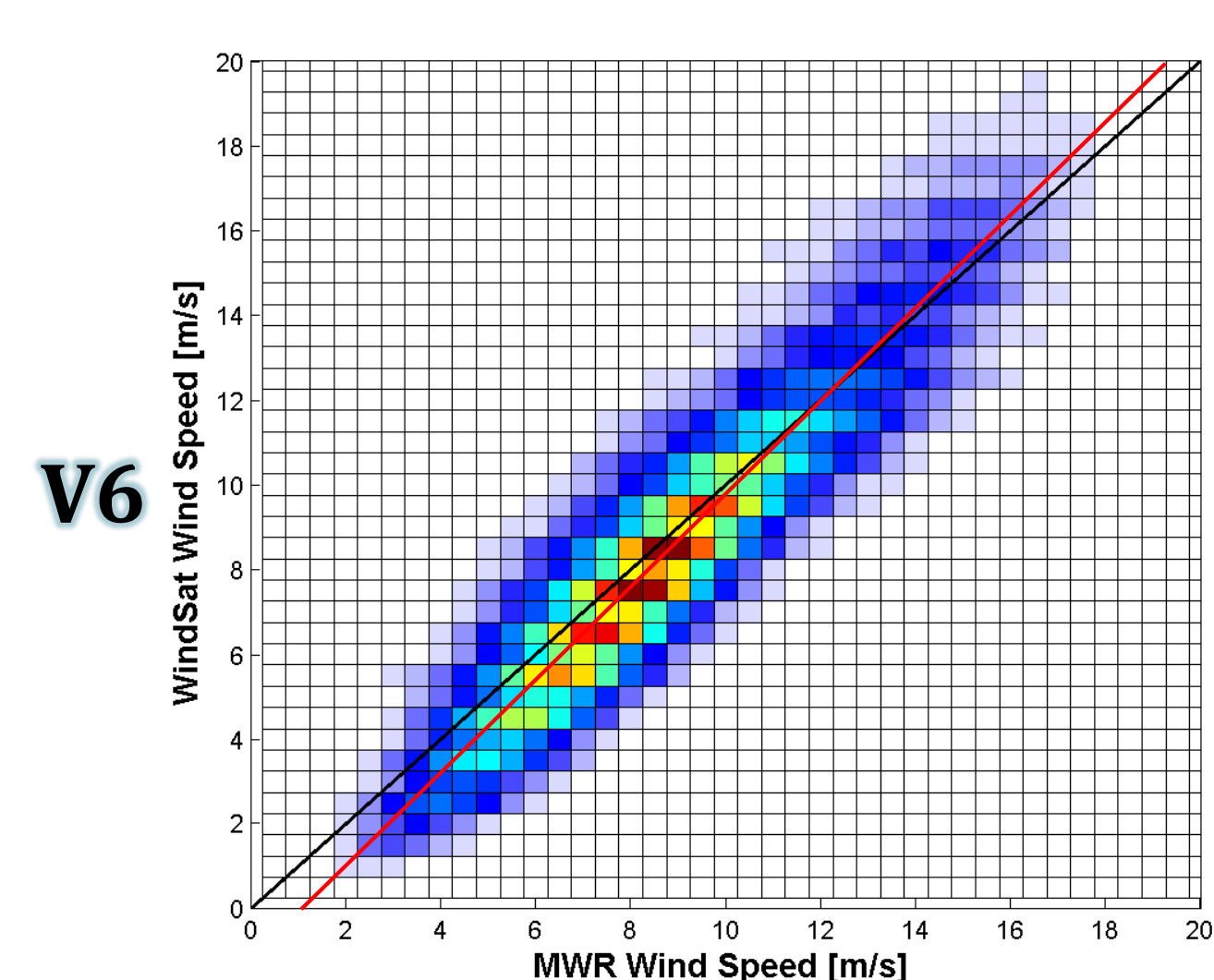
V7.0 DD ADJUSTED TO WINDSAT 37H JULY 2012- NOV 2013



V7.0 DD ADJUSTED TO WINDSAT 37V JULY 2012- NOV 2013



WIND SPEED RETRIEVALS - July 2012- EVEN BEAMS



OVER LAND TB CROSS-CALIBRATION - MWR VS WINDSAT - JAN TO APR, 2012

