

ARM

Atmospheric Radiation Measurement Program



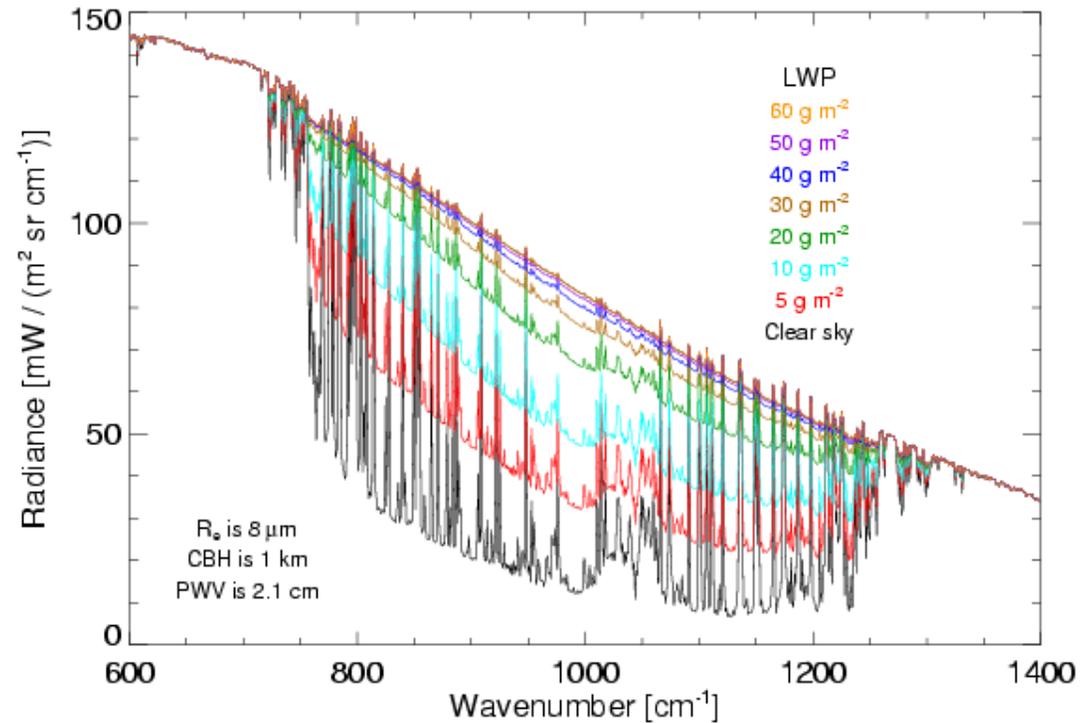
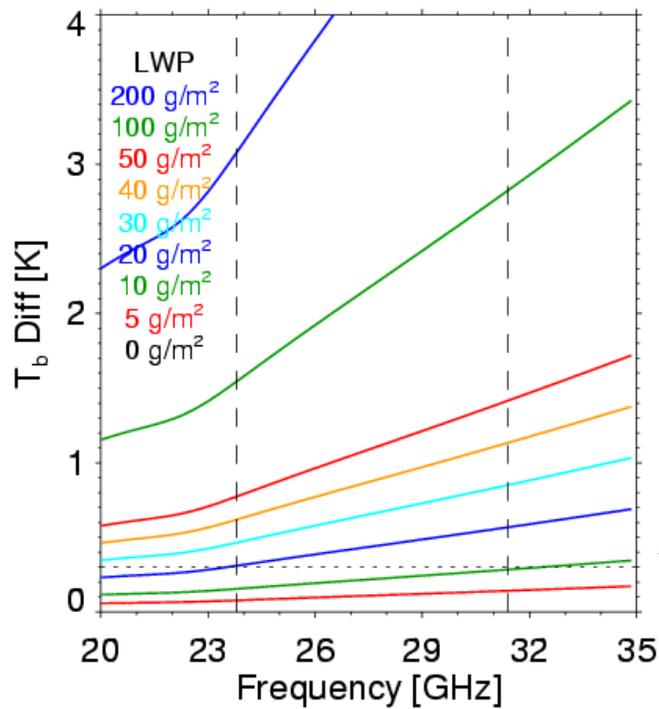
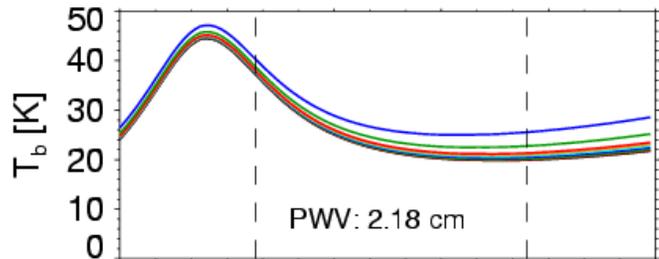
Combined AERI + MWR Retrievals of Liquid Water Path

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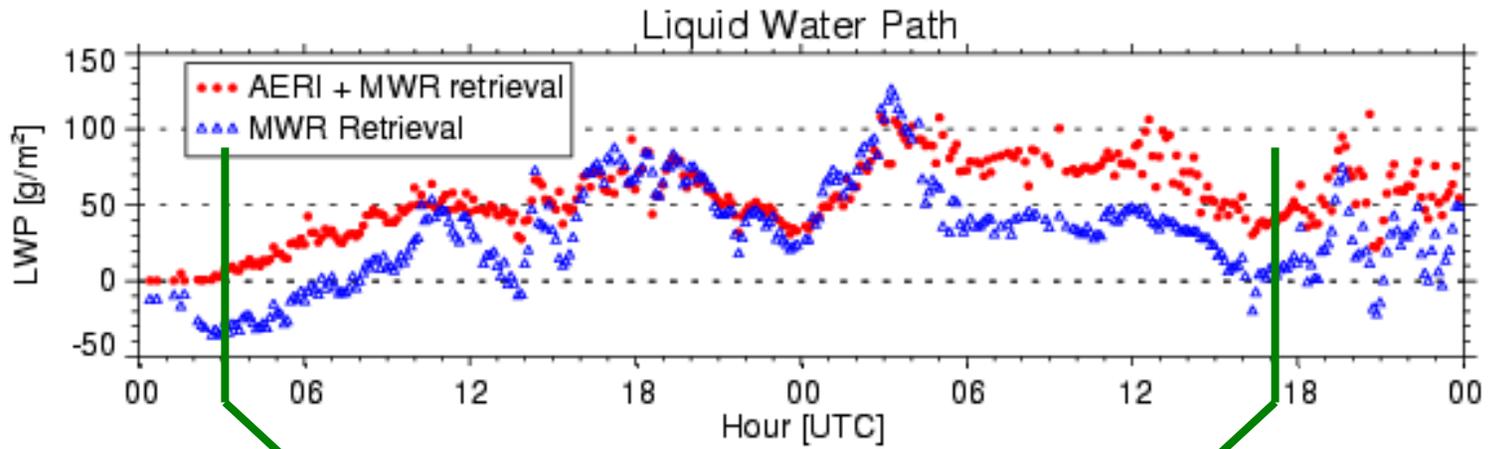
Sensitivity to LWP in Infrared and Microwave Spectral Regions



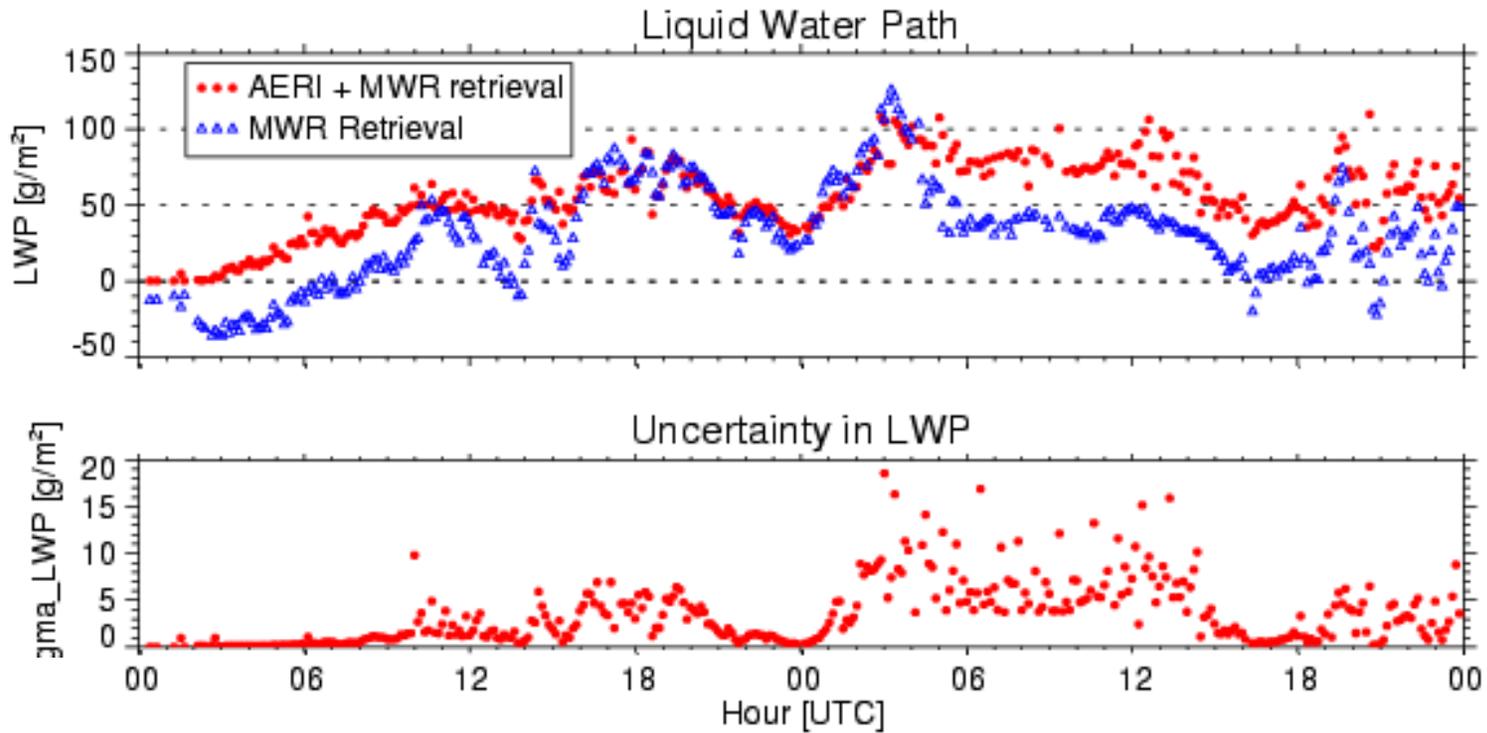
← Calibration uncertainty of MWR

Sensitivity of the AERI and MWR are very complementary!

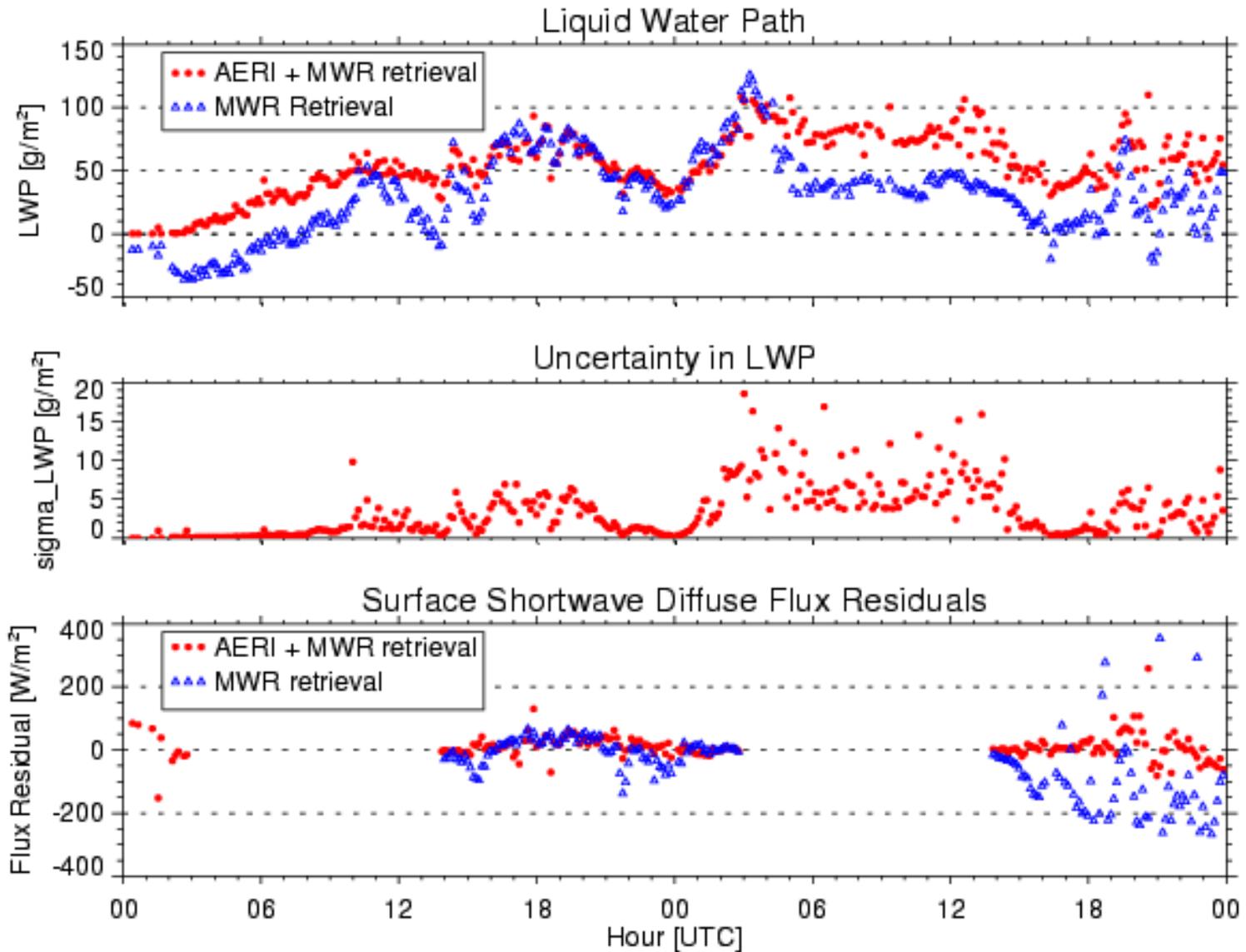
Example from Pt. Reyes



Example from Pt. Reyes

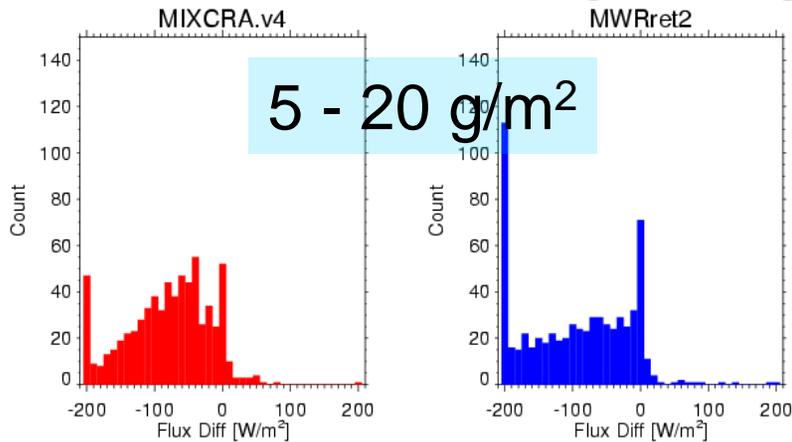


Example from Pt. Reyes



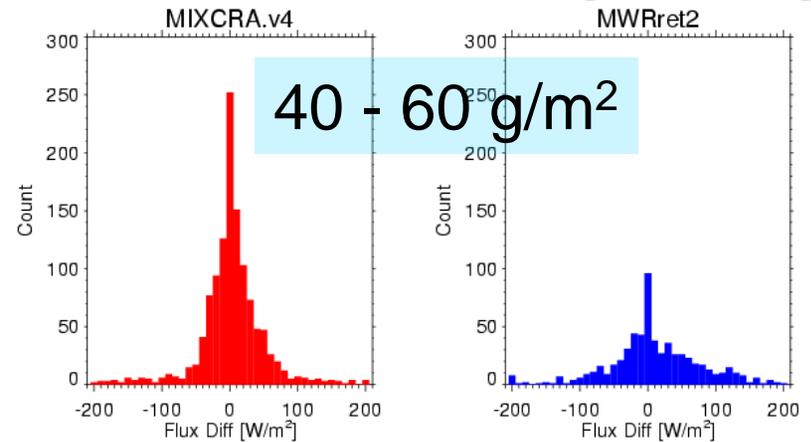
SW Surface Flux Closure Statistics

July - August 2005, Pt. Reyes



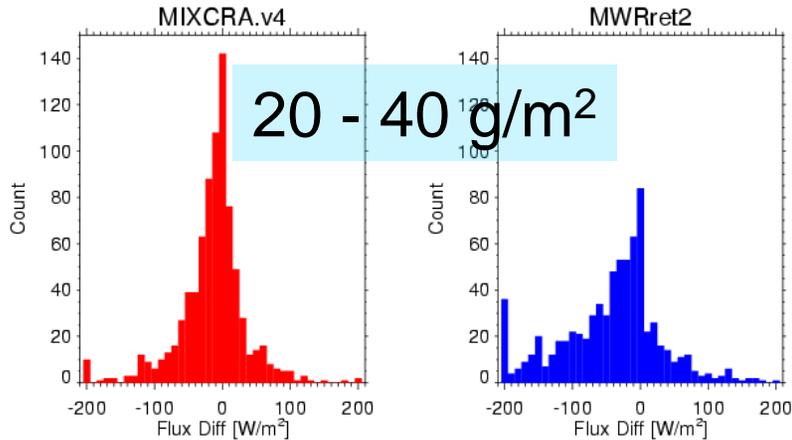
Median: -72.6 W/m²
 1st, 3rd Quartiles: -120.3, -36.9 W/m²
 Npts: 678

Median: -88.4 W/m²
 1st, 3rd Quartiles: -167.5, -26.8 W/m²
 Npts: 645



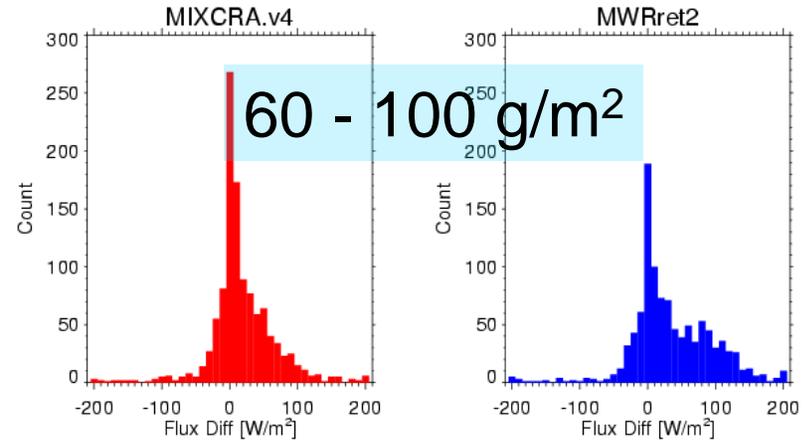
Median: 1.7 W/m²
 1st, 3rd Quartiles: -15.4, 21.4 W/m²
 Npts: 1212

Median: 2.2 W/m²
 1st, 3rd Quartiles: -22.9, 48.1 W/m²
 Npts: 622



Median: -8.5 W/m²
 1st, 3rd Quartiles: -32.3, 7.7 W/m²
 Npts: 821

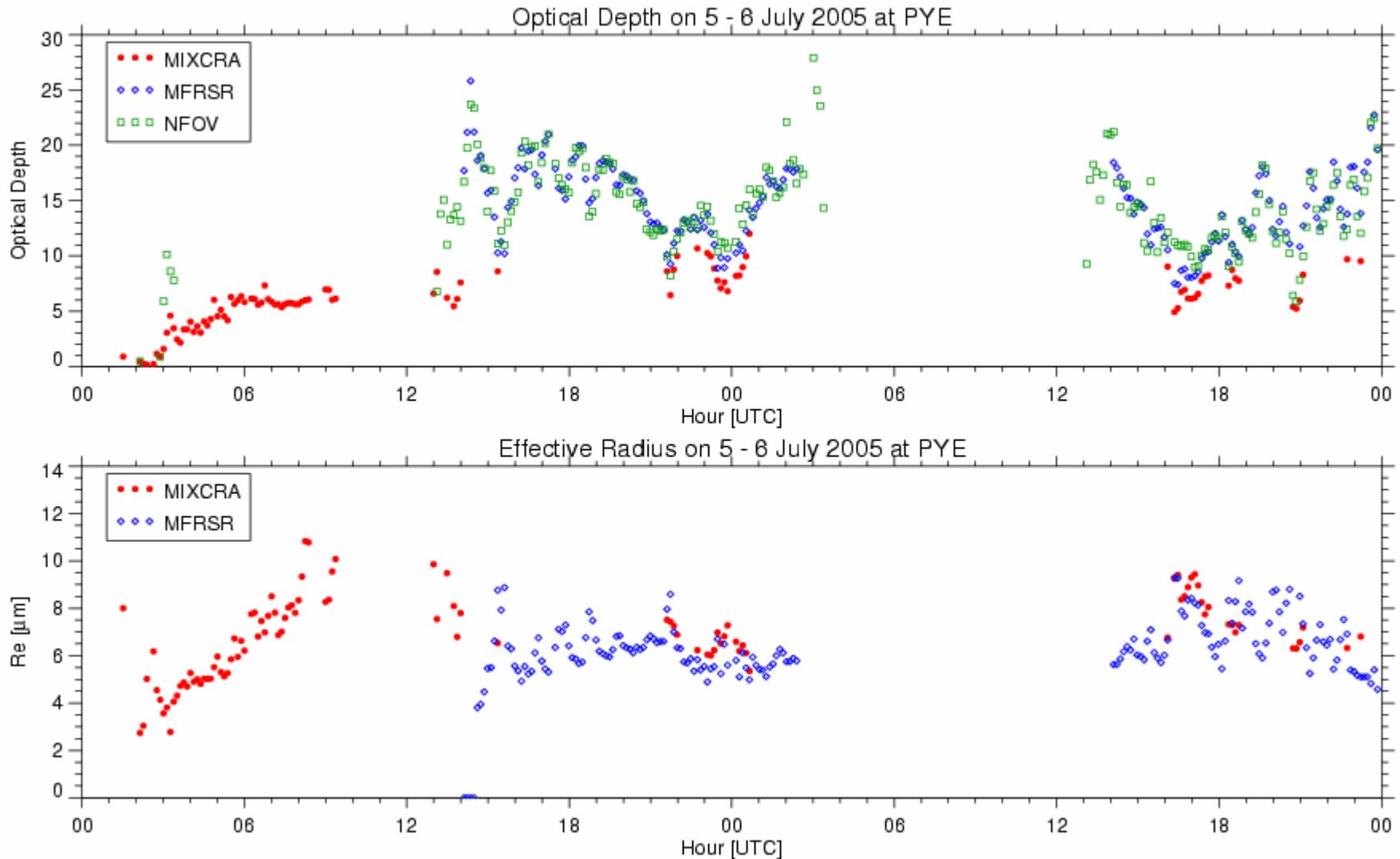
Median: -29.3 W/m²
 1st, 3rd Quartiles: -85.5, 0.7 W/m²
 Npts: 739



Median: 8.2 W/m²
 1st, 3rd Quartiles: -0.2, 39.2 W/m²
 Npts: 1139

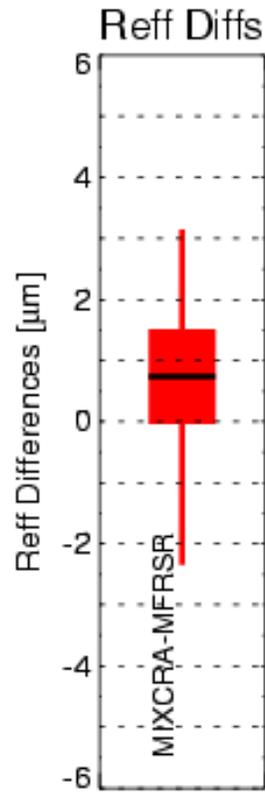
Median: 21.7 W/m²
 1st, 3rd Quartiles: 0.9, 75.4 W/m²
 Npts: 1057

Comparisons with Other Methods

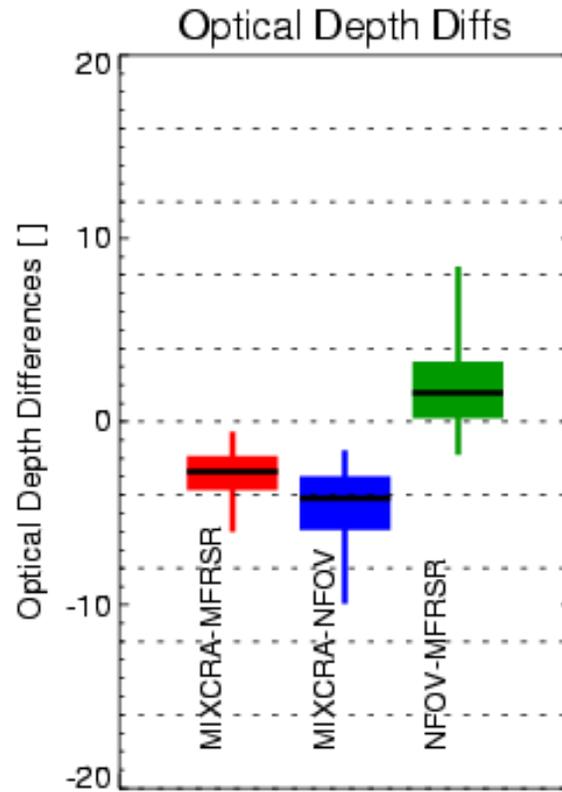


Contributions by Christine Chiu, Sasha Marshak, and Qilong Min...

Pt. Reyes Statistics for July-Aug



Num Points: 791
Correlation: 0.325



791	659	2404
0.704	0.354	0.935

Proposed “Solution” for Overcast Liquid Water Scenes

- Current MIXCRA provides:
 - LWP for entire range
 - Nighttime: r_e and τ when cloud is semi-transparent in IR
 - Daytime: r_e and for $LWP < \sim 60 \text{ g/m}^2$, which translates to $\tau < 9-15$ (depending on r_e)
- Min’s MFRSR provides daytime τ and r_e when $\tau > 5$, provided LWP is provided
- Combine Min’s algorithm and MIXCRA into a single retrieval algorithm using optimal-estimation to retrieve LWP, r_e , and τ simultaneously for all overcast liquid water conditions
 - Requires we understand the differences seen in Pt Reyes analysis
 - Broken and mixed-phase clouds will require different solutions