

Characterizing the Structure of the Boundary Layer with the AERI and Doppler Lidar

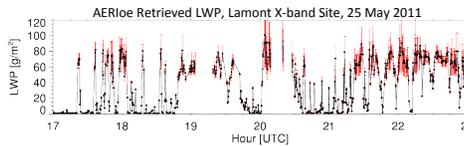
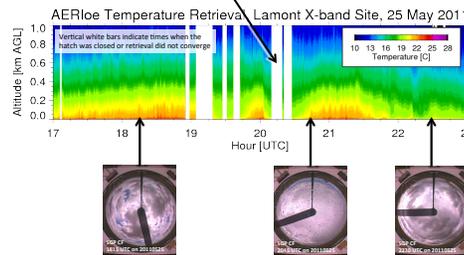
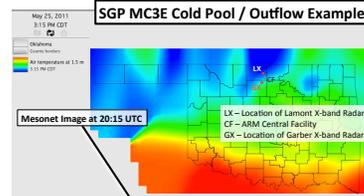
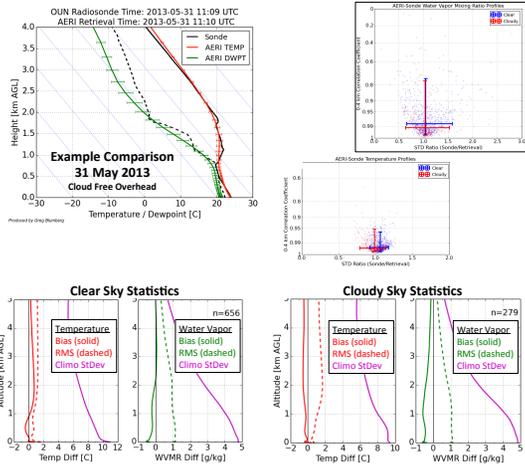
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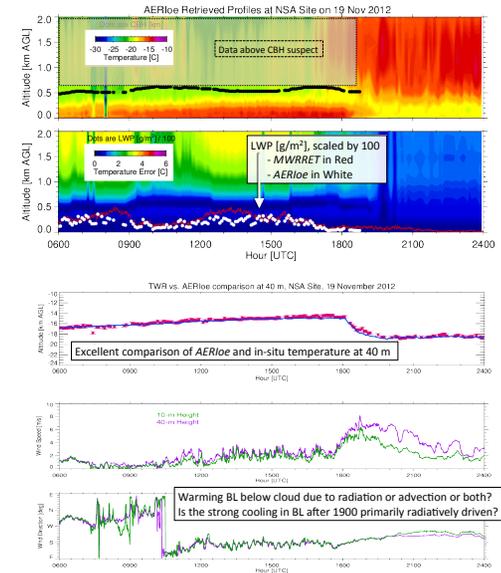
(1) Simultaneous Retrieval of Cloud Properties and Boundary Layer Thermodynamic Profiles

- Developed new optimal estimation based retrieval for the AERI (*AERIOe*)
- Simultaneously retrieves $T(z)$, $q(z)$, LWP, $R_{e,liq}$, τ_{aer} , $R_{e,ice}$ and CO_2 , CH_4 , N_2O
- Current observational inputs are AERI spectrum and CBH; MWR T_b obs coming soon
- Full uncertainty analysis and information content provided for each retrieval

Comparing the *AERIOe* Retrievals with Sondes



Rapid BL Temperature Structure Evolution, NSA Example



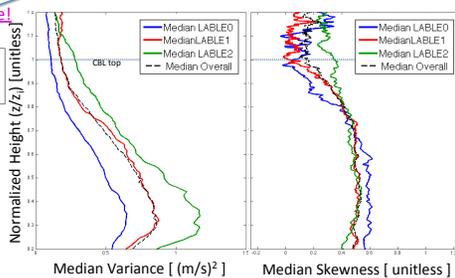
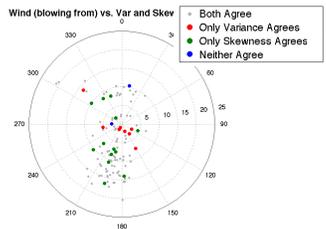
(2) "Uniformity" in Vertical Velocity Turbulence Profiles

- ARM's Doppler lidars (DLs) provide profiles of 2nd and 3rd order moments and skewness of w'
- Previous work demonstrated that significant differences can exist in 2nd moment on some days when two DLs are operating but separated by 300 m (distance from point "A" to "1" in map)
- How often does this occur? Why do the variance and/or skewness profiles differ when they do?



CBL Cases	Date	Both Agree	Var Agrees	Skew Agrees	Neither Agree	Total
LABLE-0	Nov 2010	14	1	0	0	15
LABLE-1	Sep-Nov 2012	50	7	8	2	67
LABLE-2	May-Jun 2013	26	0	5	0	31
Total		90	8	13	2	113

Only 80% agree!



(3) Evaluating a New Radiosonde Dry Bias Correction

- Radiosondes still workhorse for ARM/ASR, but have well-known dry bias in mid-trop in daytime
- New correction algorithm published by June Wang (JTECH 2013)
- How does this compare relative to original correction developed by Miloshevich (JGR 2009)?
- Compared sonde PWV to MWRRET, and H_2O mixing ratio to RL

