



Texas Commission on Environmental Quality

HGB Meteorological Model Performance Evaluation: PBL, k_v and Cloud Cover

Southeast Texas Photochemical Modeling Technical Committee

June 20, 2007

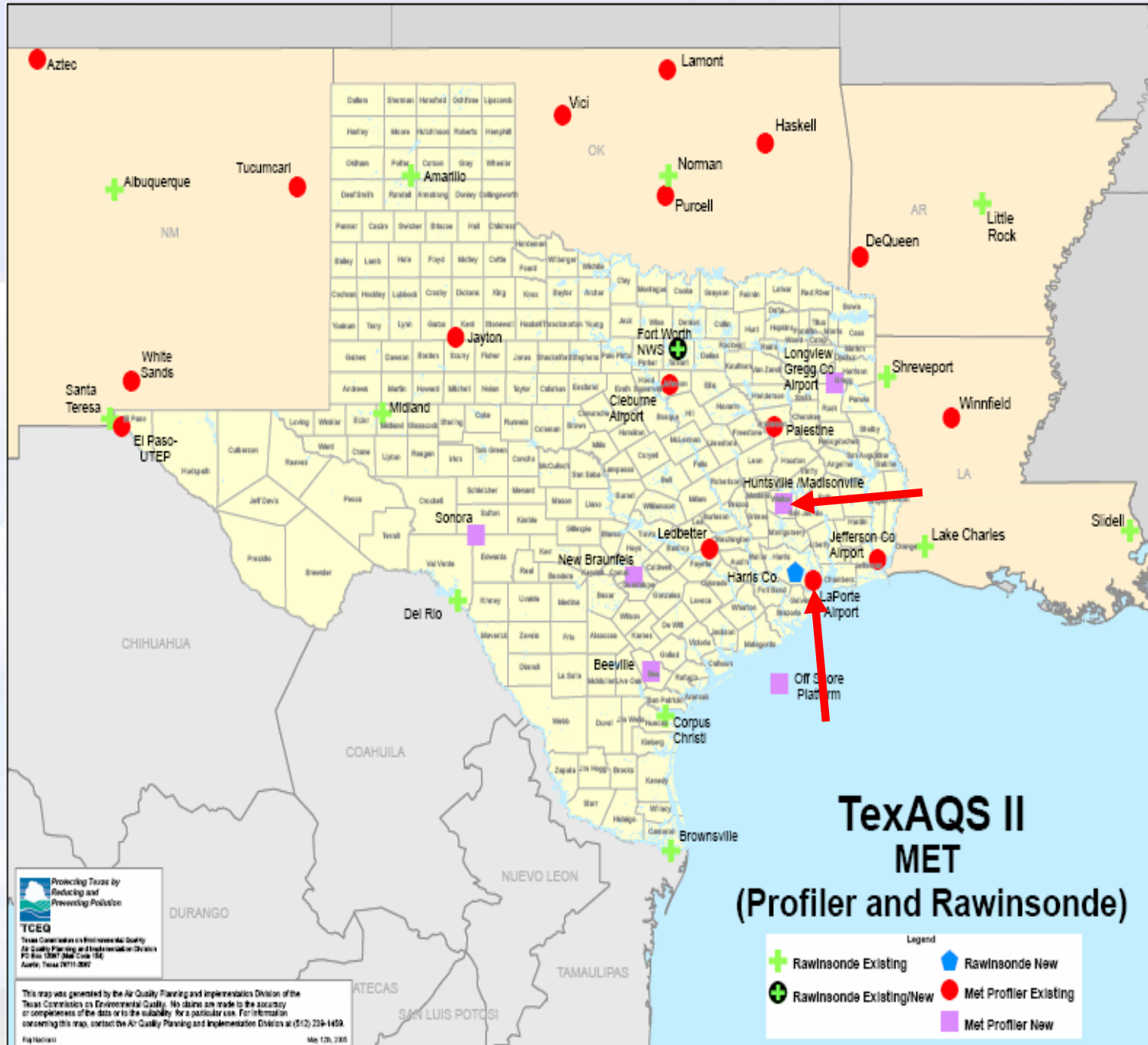
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TCEQ Air Quality Division

June 20, 2007



Modeled k_v and PBL Depth vs. Observed PBL Depth

- **Vertical diffusivity (k_v) is used by CAMx to mix between vertical layers of the model.**
 - **Derived from MM5 output by the MM5CAMx program.**
- **Planetary Boundary Layer (PBL) depth shown here is derived from the k_v s.**
- **“Observed” PBL depth used in this comparison was estimated from radar profiler data.**




 Protecting Texas by
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TCEQ
 Texas Commission on Environmental Quality
 Air Quality Planning and Implementation Division
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 Map Number: MA 126, 2005

TexAQS II MET (Profiler and Rawinsonde)

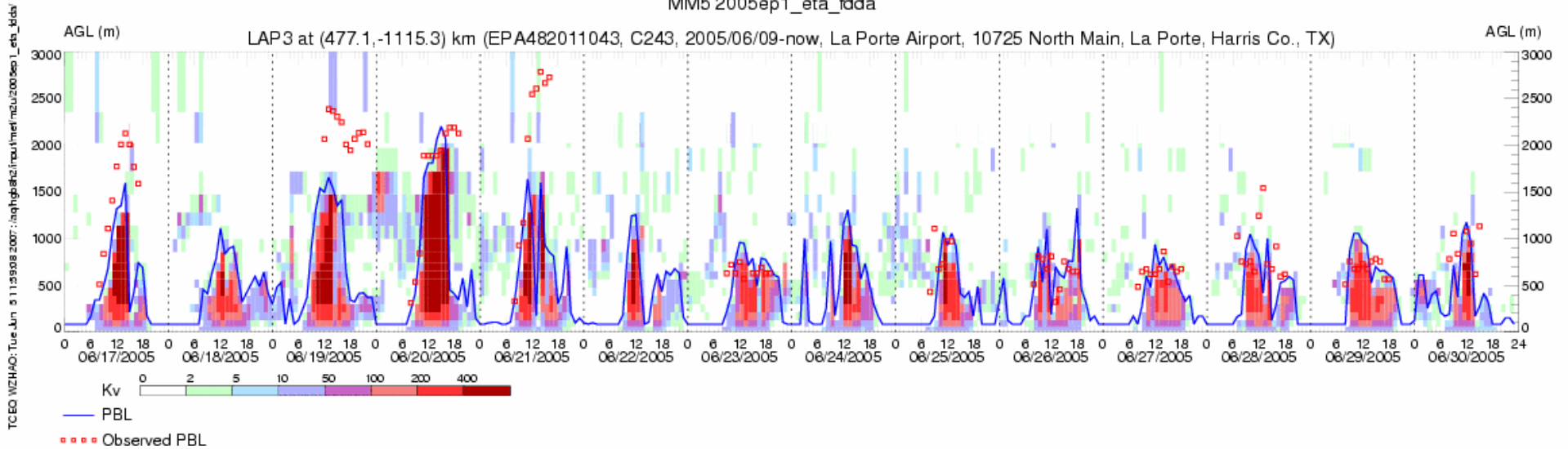
- Legend
- + Rawinsonde Existing
 - ◆ Rawinsonde New
 - + Rawinsonde Existing/New
 - Met Profiler Existing
 - Met Profiler New



k_v & PBL Depth, 6/17/05-6/30/05

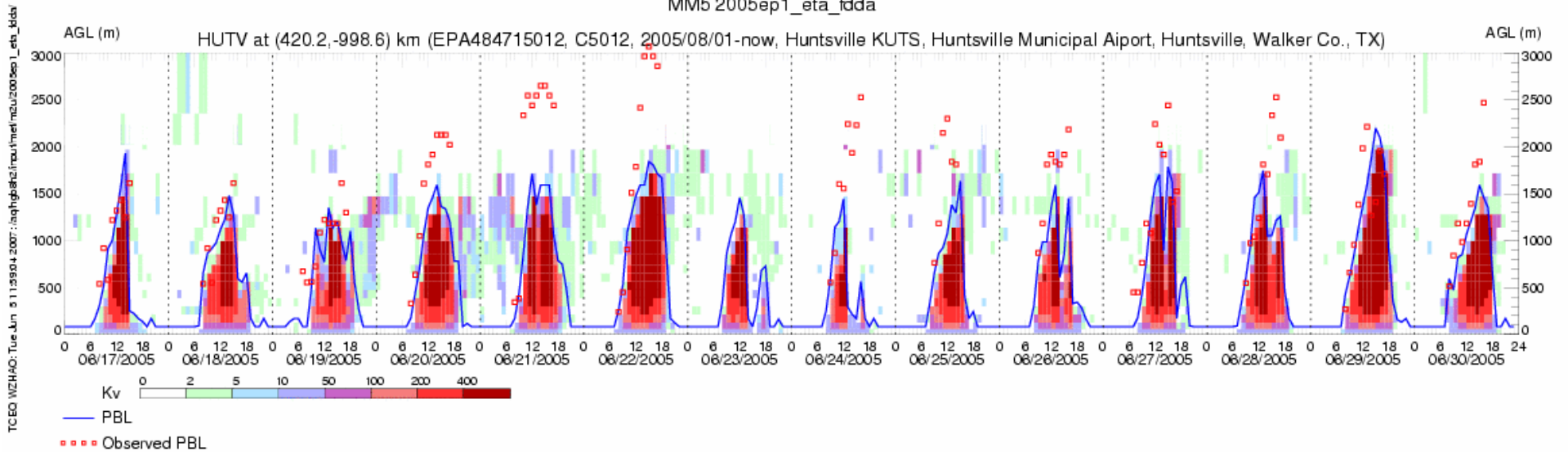
Vertical Diffusivity K_v (m^2/s) (06/17/2005-06/30/2005)

MM5 2005ep1_eta_fdda



Vertical Diffusivity K_v (m^2/s) (06/17/2005-06/30/2005)

MM5 2005ep1_eta_fdda

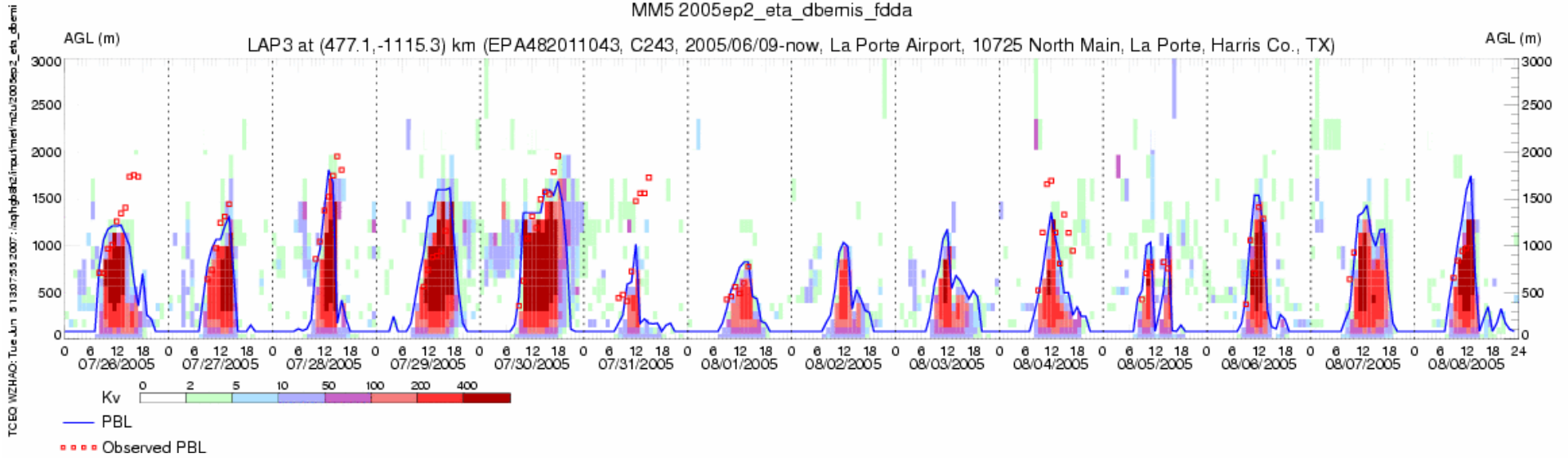




k_v & PBL Depth, 7/26/05-8/8/05

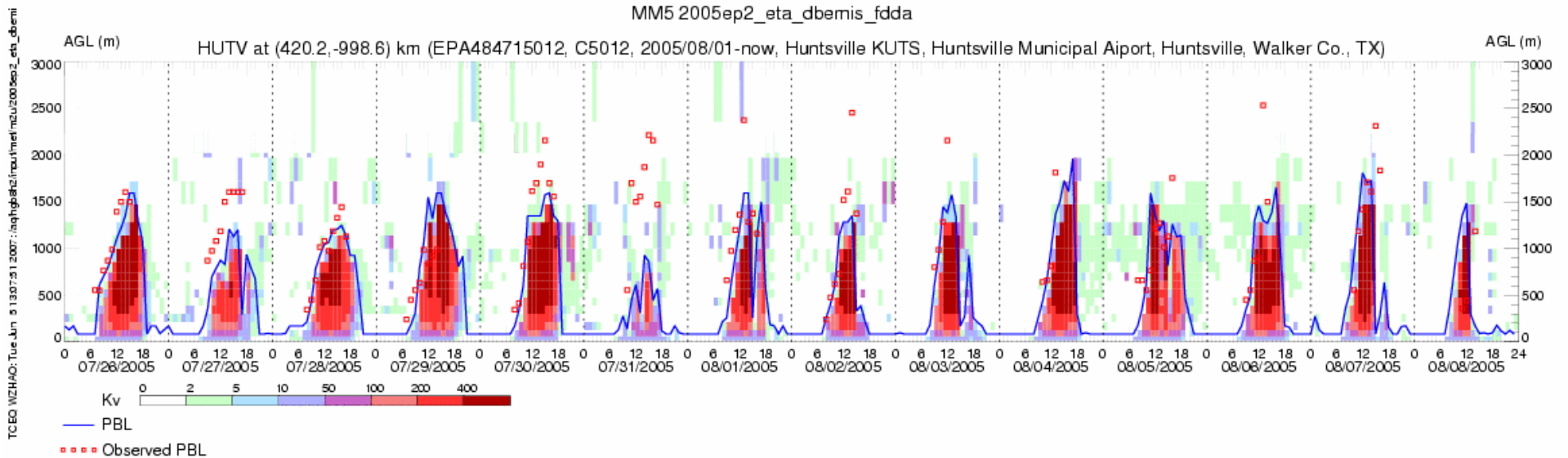
Vertical Diffusivity K_v (m^2/s) (07/26/2005-08/08/2005)

MM5 2005ep2_eta_dbemis_fdda



Vertical Diffusivity K_v (m^2/s) (07/26/2005-08/08/2005)

MM5 2005ep2_eta_dbemis_fdda



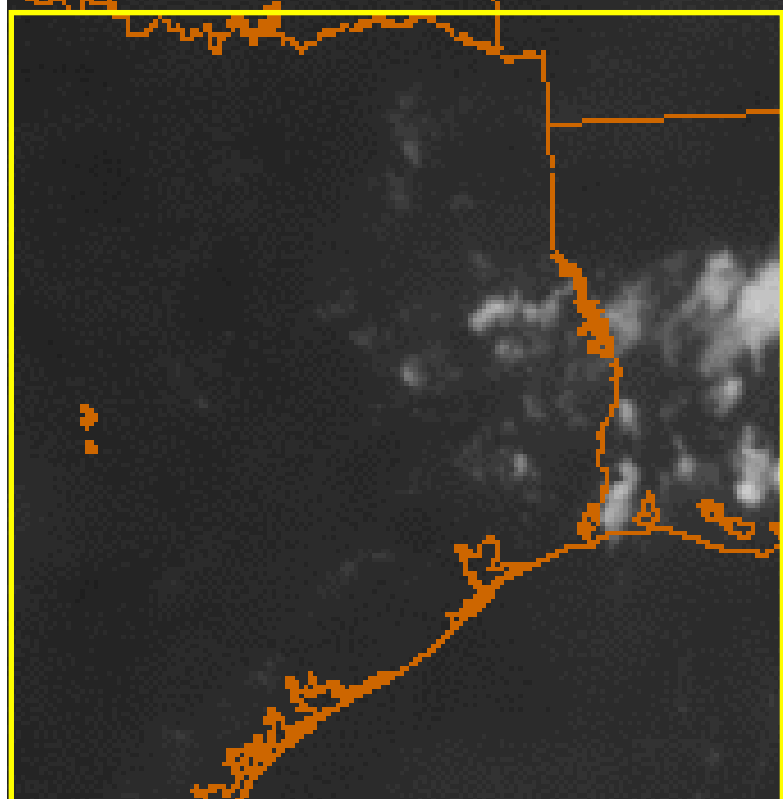
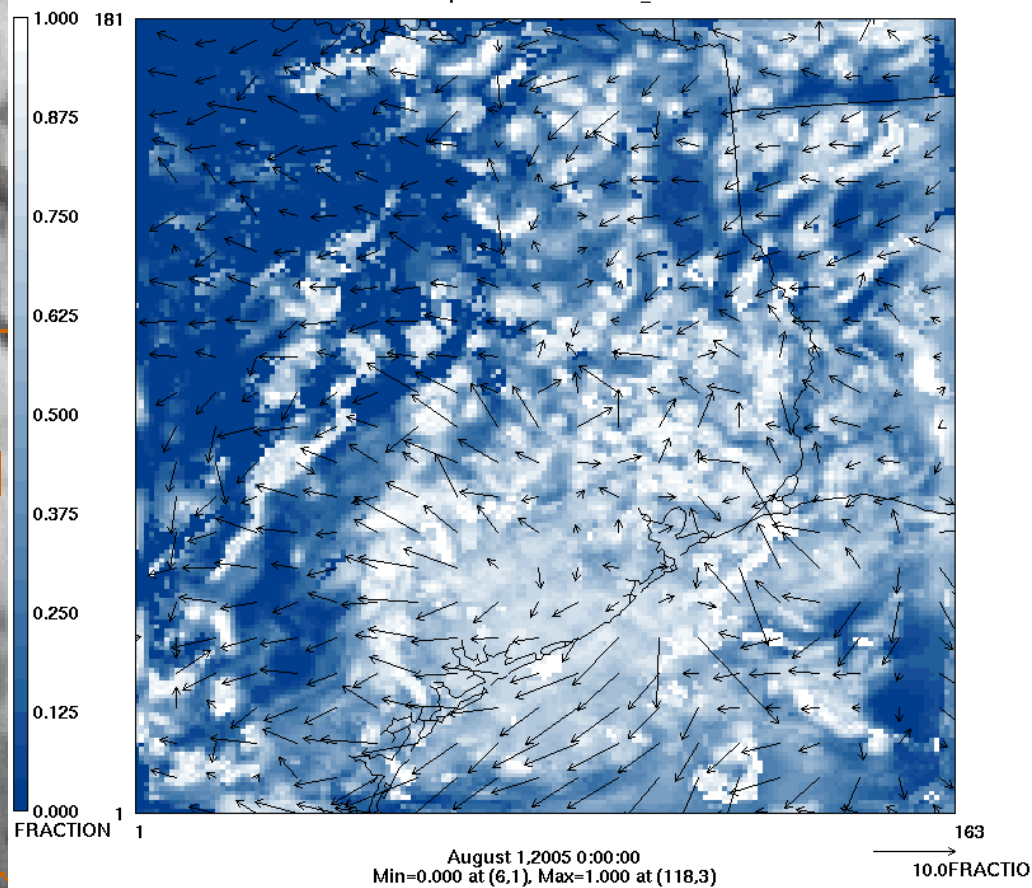


Modeled Cloud Fraction vs. Satellite Observed Clouds

- **Modeled cloud fraction is output from MM5.**
- **Observed cloud cover used for comparison is GOES IR imagery.**

MM5 Cloud Fraction

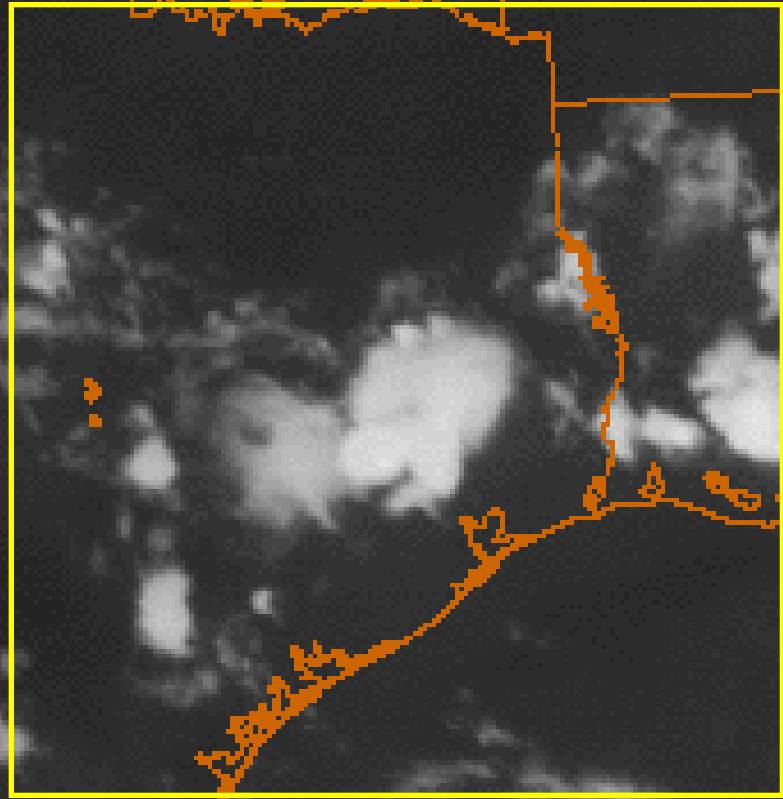
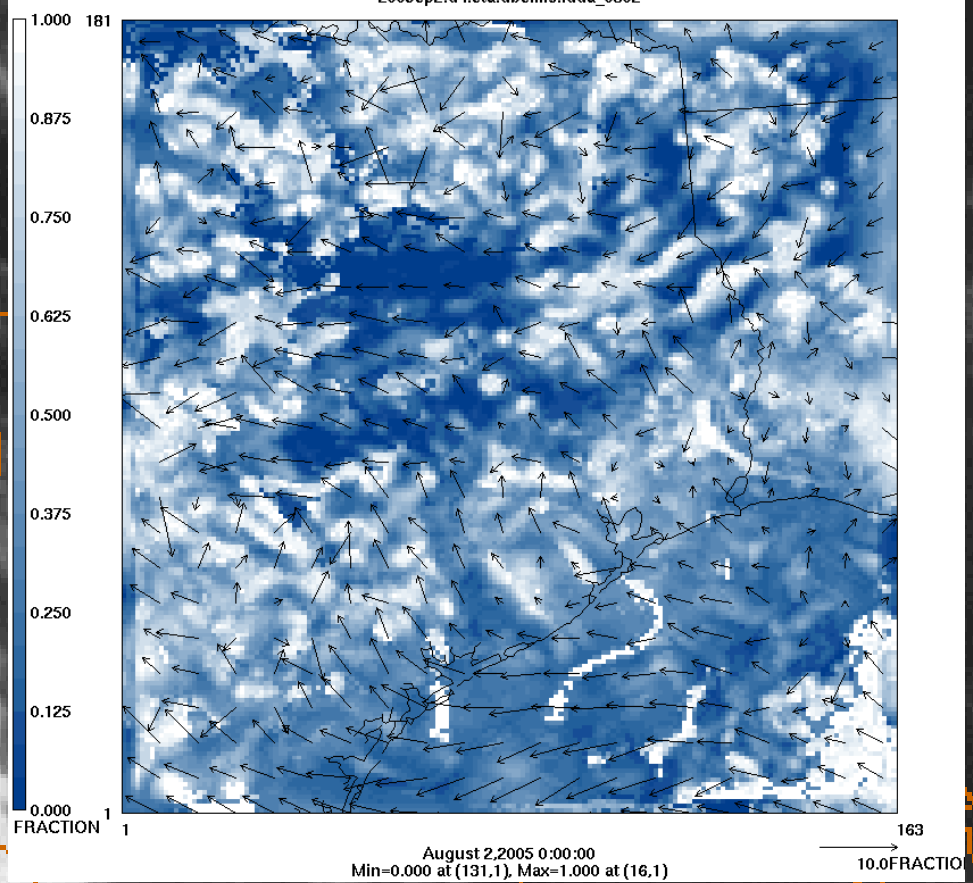
2005ep2.d4.eta.dbemis.fdda_0801



TCEQ, goes-12 1r 2005/08/01 00:08:30 UTC

MM5 Cloud Fraction

2005Sep2.d4.eta.dbemis.fdda_0802



TCEQ, goes-12 lr 2005/08/02 00:08:30 UTC



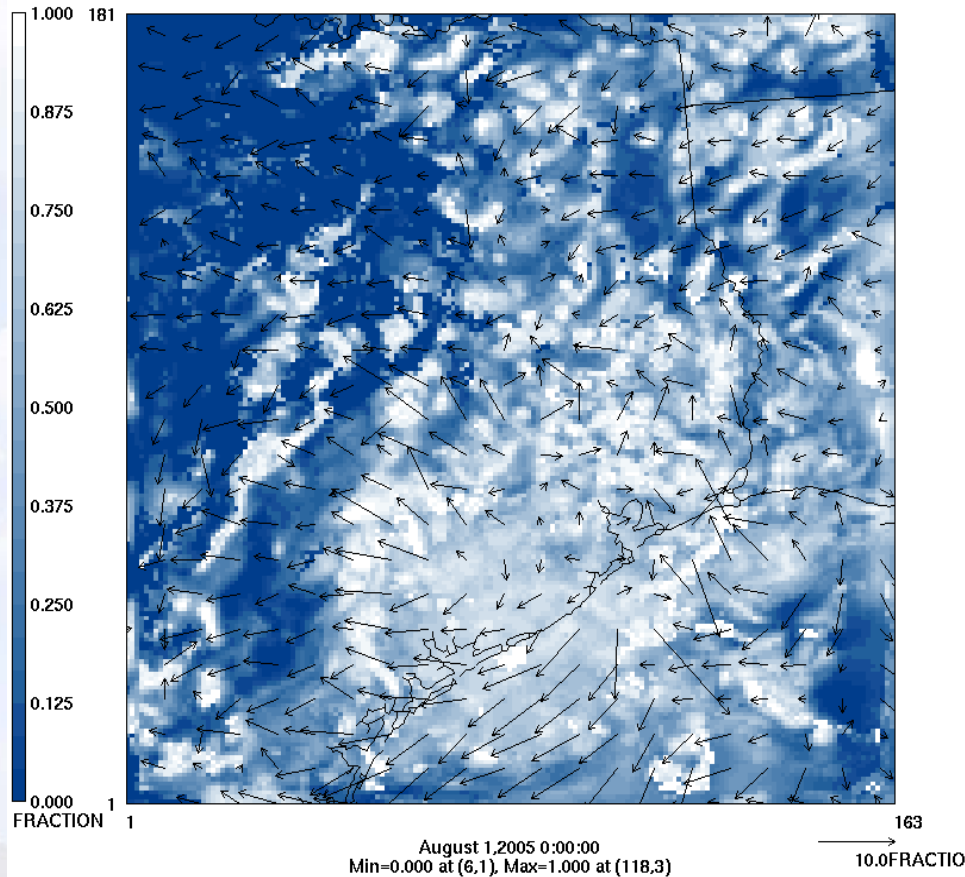
Modeled Cloud Fraction vs. Modeled PBL & Winds

- **The PBL varies with land use, and is affected by cloud cover and winds.**
- **Side-by-side comparisons of modeled PBL & cloud fractions, overlaid with winds, provide insight into the complex inter-relationships among these variables.**



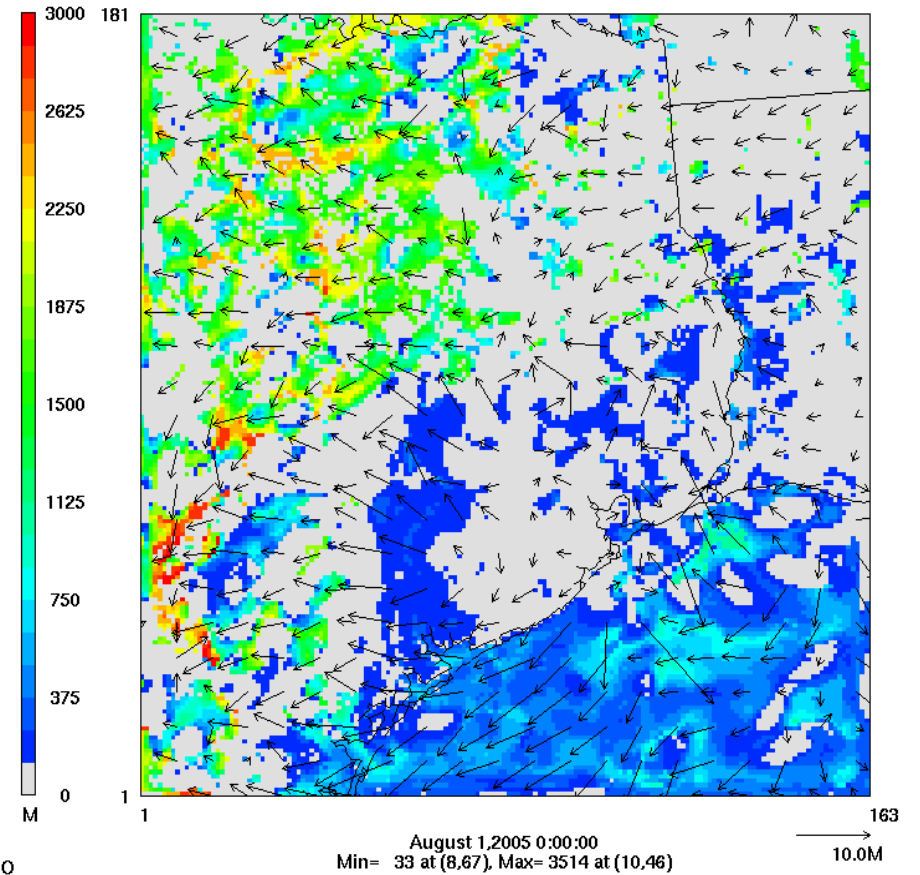
MM5 Cloud Fraction

2005ep2.d4.eta.dbemis.fdda_0801



MM5 PBL Depth (m)

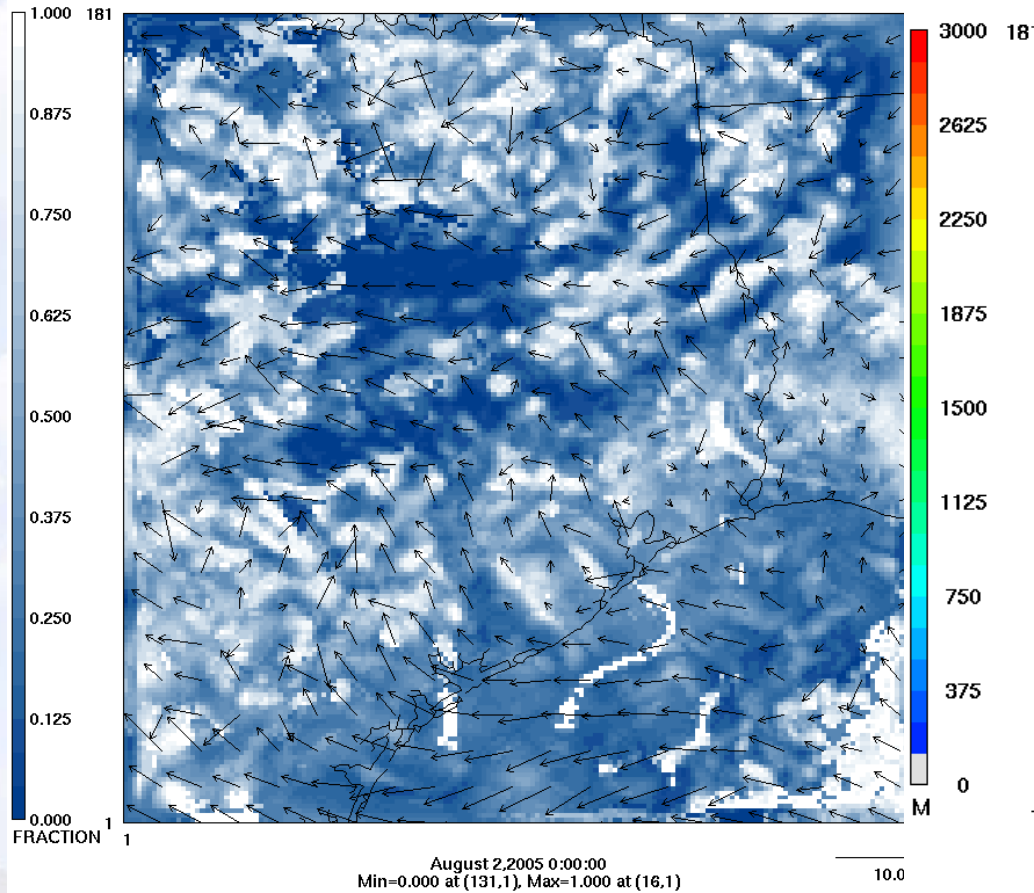
2005ep2.d4.eta.dbemis.fdda_0801





MM5 Cloud Fraction

2005ep2.d4.eta.dbemis.fdda_0802



MM5 PBL Depth (m)

2005ep2.d4.eta.dbemis.fdda_0802

