

Real-Time Air Pollution Meteorology Modeling and Forecasts in Support of Field Activities

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**The Center for
Atmospheric Chemistry
and the Environment**

Field Forecasting Support

- Real-time Modeling (4 km over Texas)
 - Feed to UAH for transport and UH for photochemical simulations
 - Upgrade to 72-h forecasts for NETPS
- Field Operations Support
 - Daily meteorology and ozone forecasts and updates



Website Features

- Model output graphics
- Model log
- Forecast discussions and weather summaries
- Forecast discussion images



The Sea Breeze Low-Level Jet

- Coastal Plain winds accelerate inland after sundown
- Wind maximum 200m-500m AGL
- Band of strong winds rotates overnight (SE-S-SW-W), weakens after sunrise
- Inland penetration can be Houston, Dallas, or in between
- Can merge with Great Plains LLJ
- Complex wind pattern under ideal intrastate transport conditions



Summer 2005 Retrospective Runs

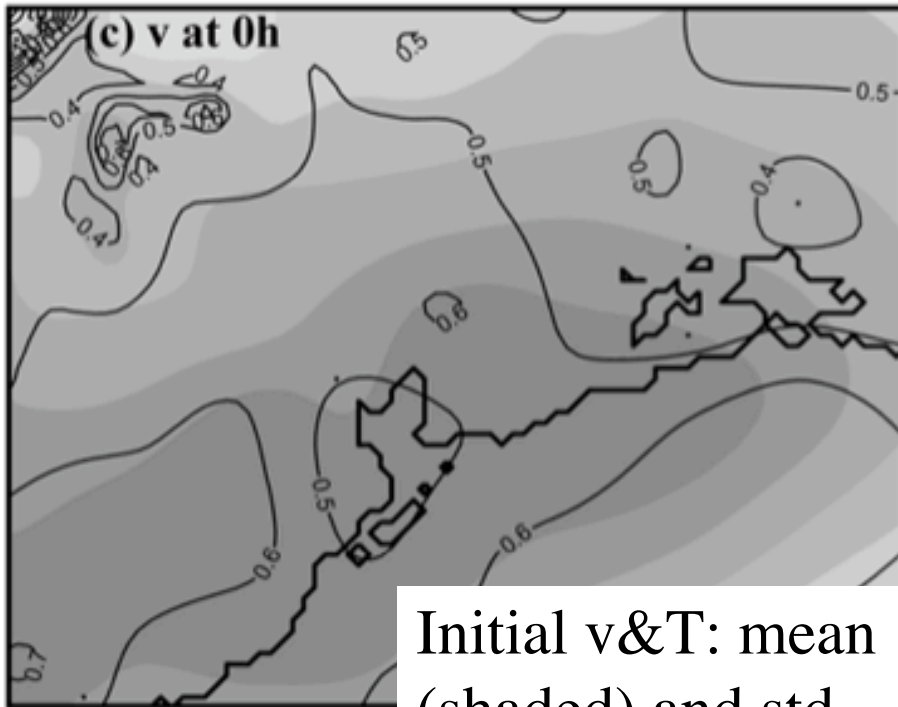
- 36 km and 12 km for May 15 thru Sept 30
- 4 km for selected ozone episodes
- UH land surface modifications
- Better-performing convection setup
- One shot ... schedule/budget did not allow model readjustments



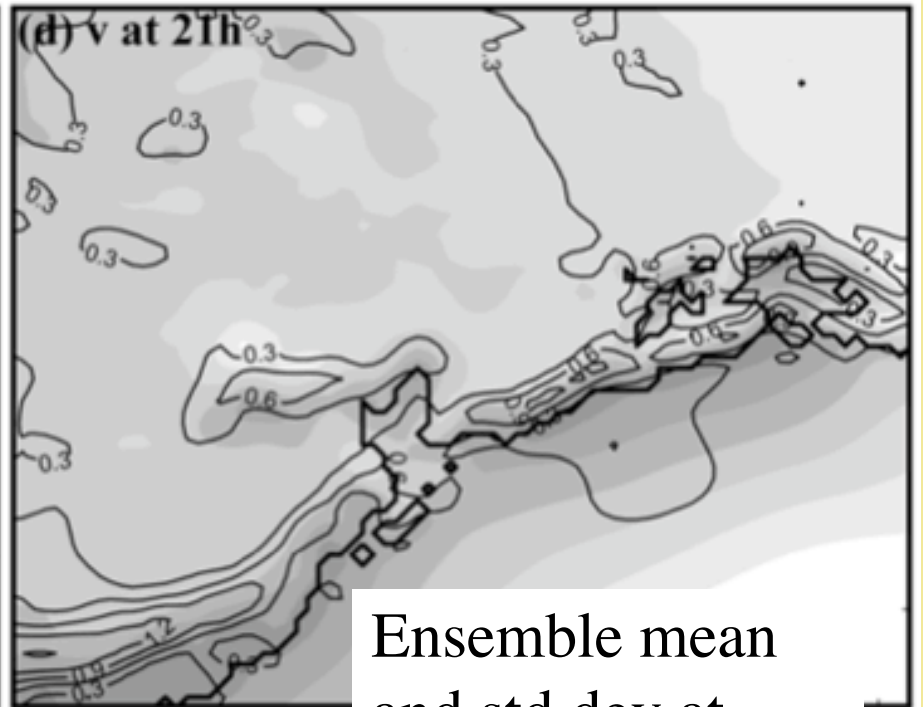
Coupled Ensemble Experiments

- August 30, 2000
- 4 km MM5 --> CMAQ; 20 members
- Enhanced light olefins
- Initial variability patterns drawn from historical events
 - Wind uncertainty: 1.5 mph
 - Temperature uncertainty: 1.5 F

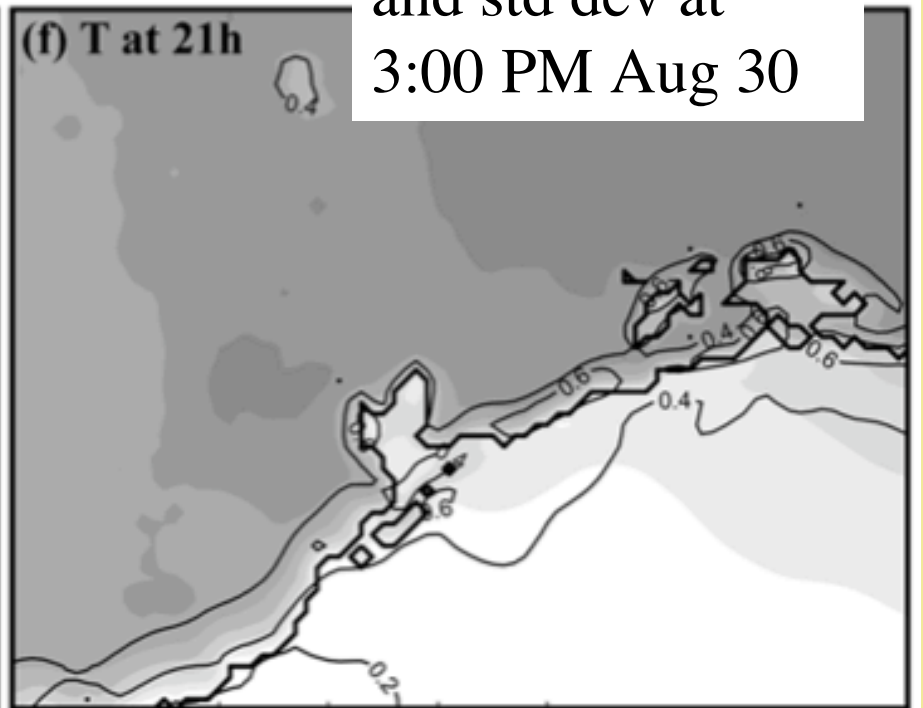
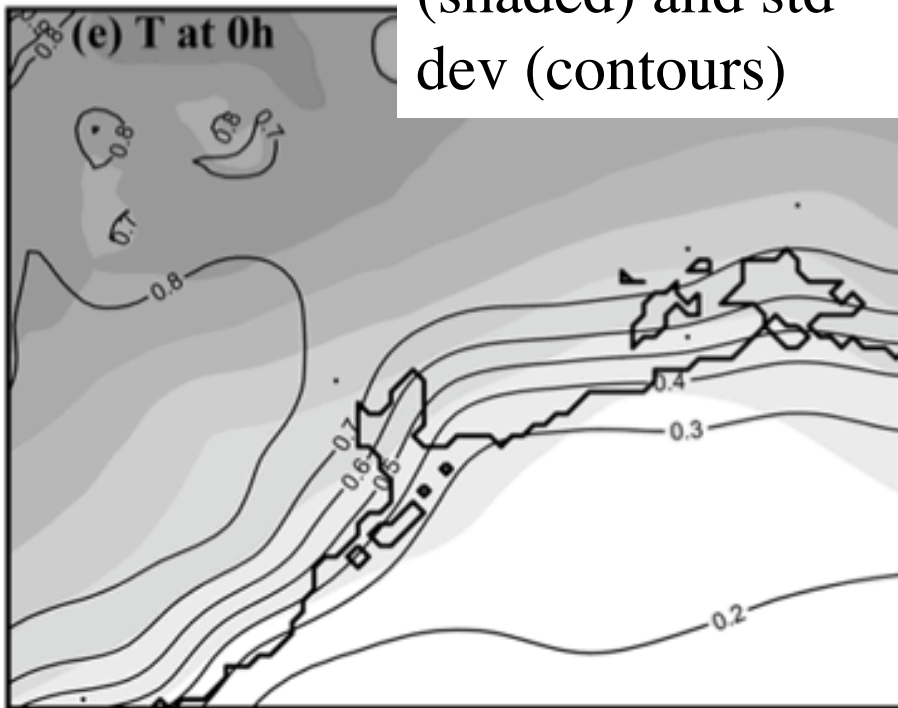


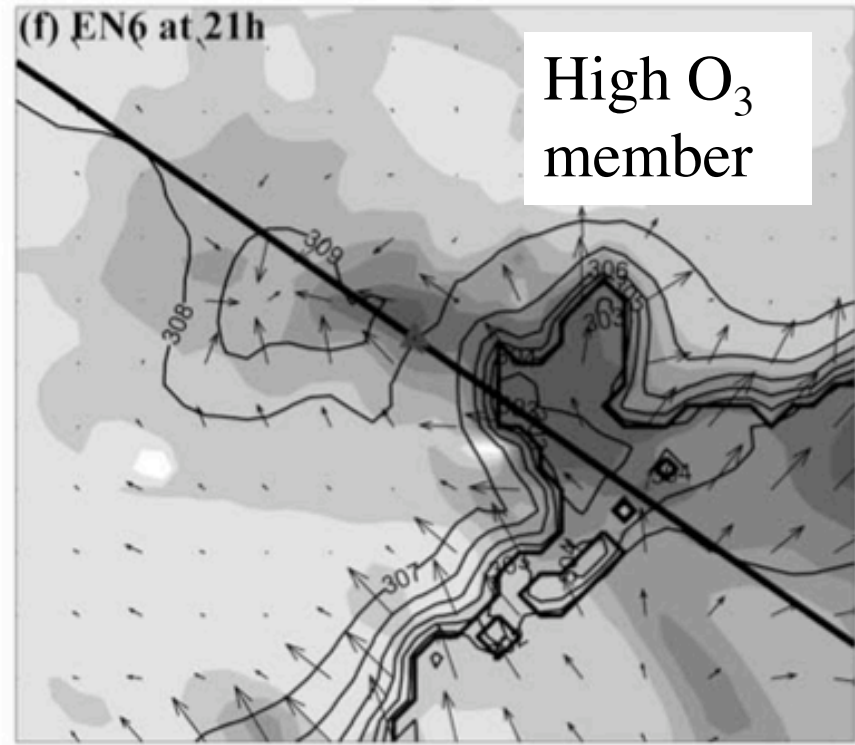
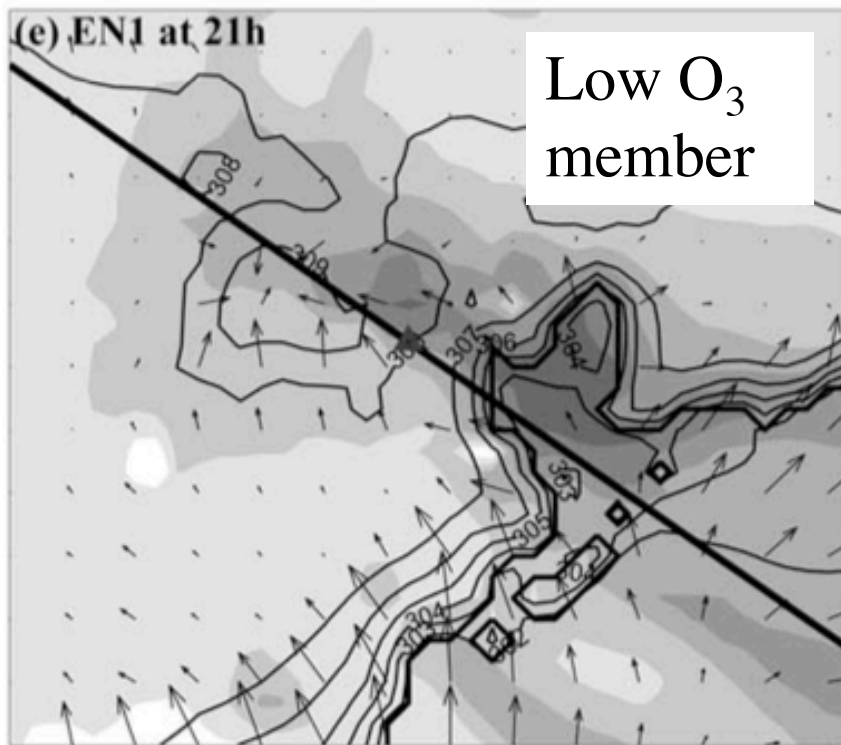
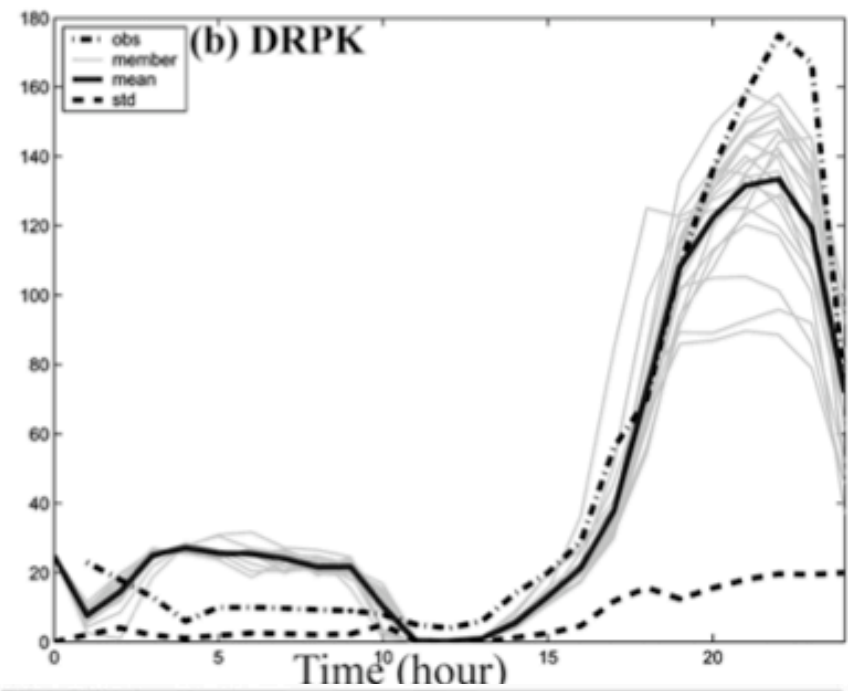
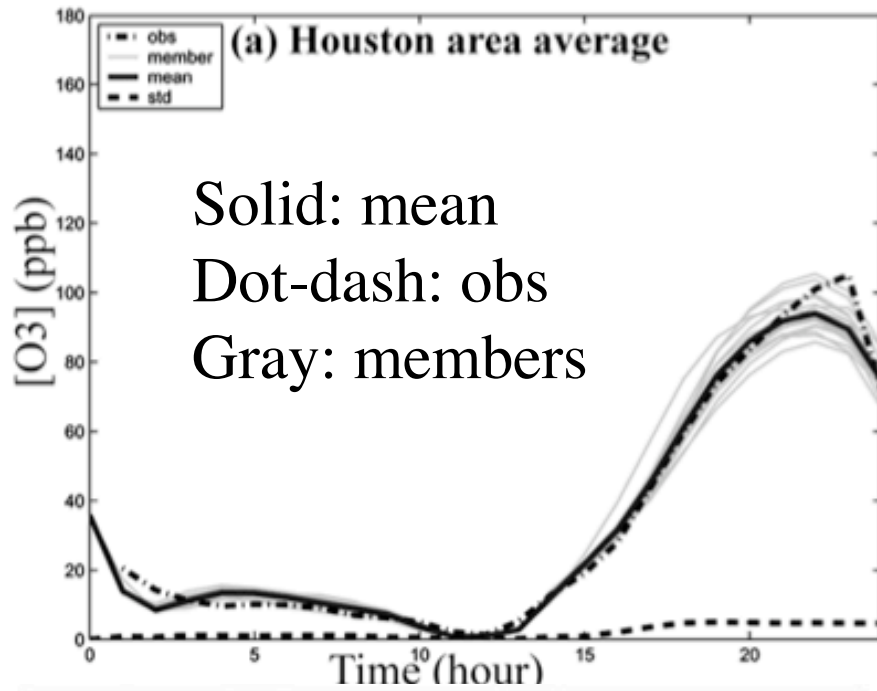


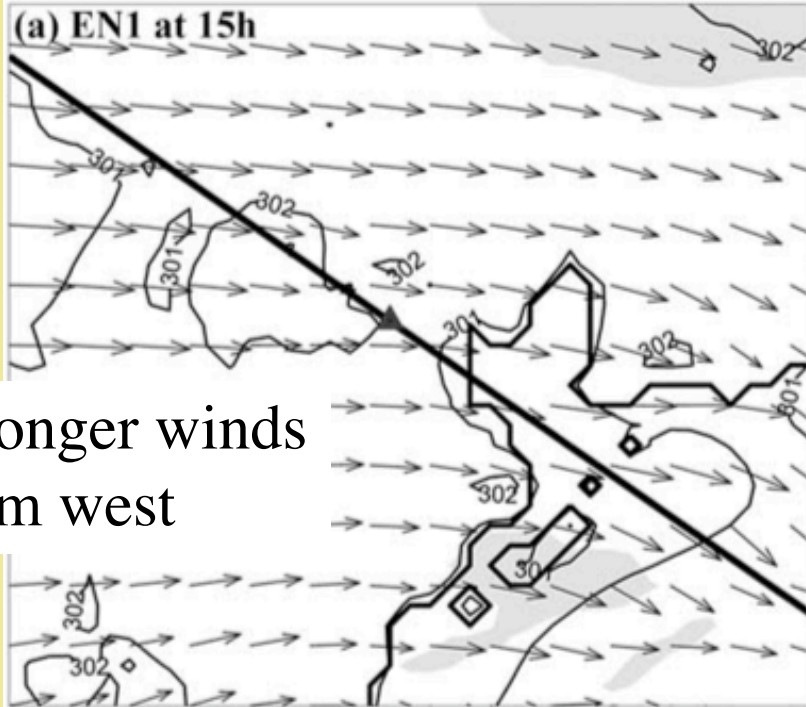
Initial v&T: mean
(shaded) and std
dev (contours)



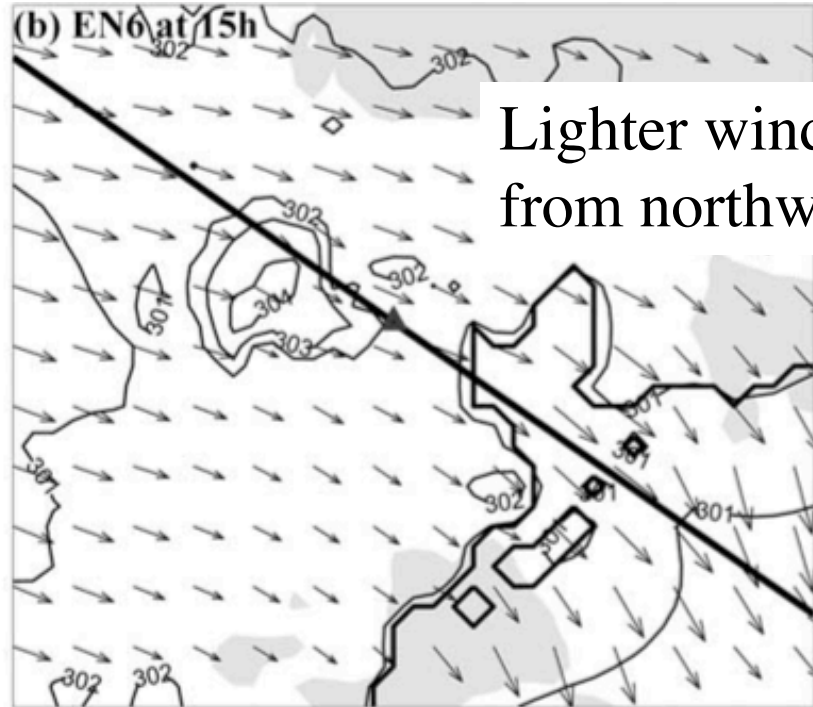
Ensemble mean
and std dev at
3:00 PM Aug 30



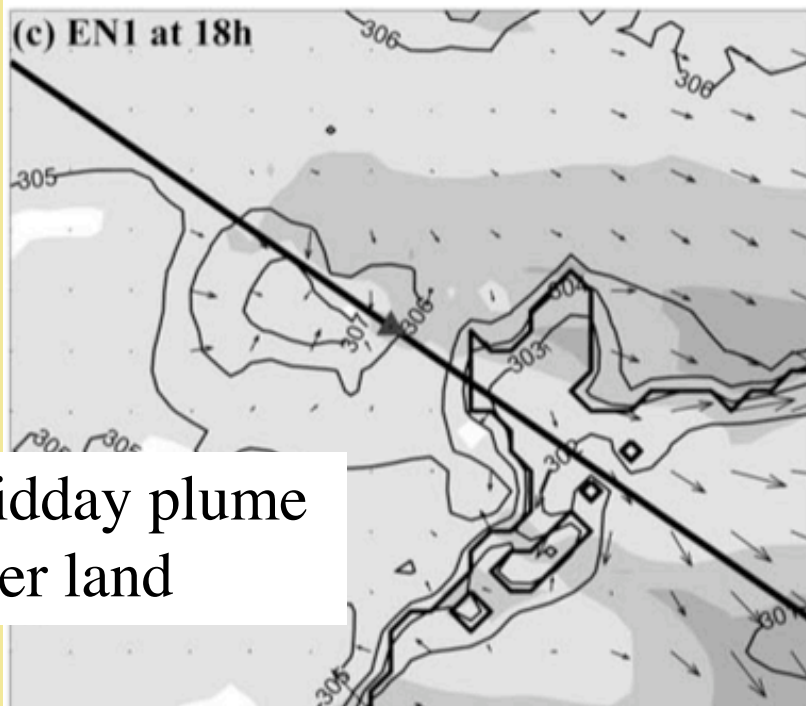




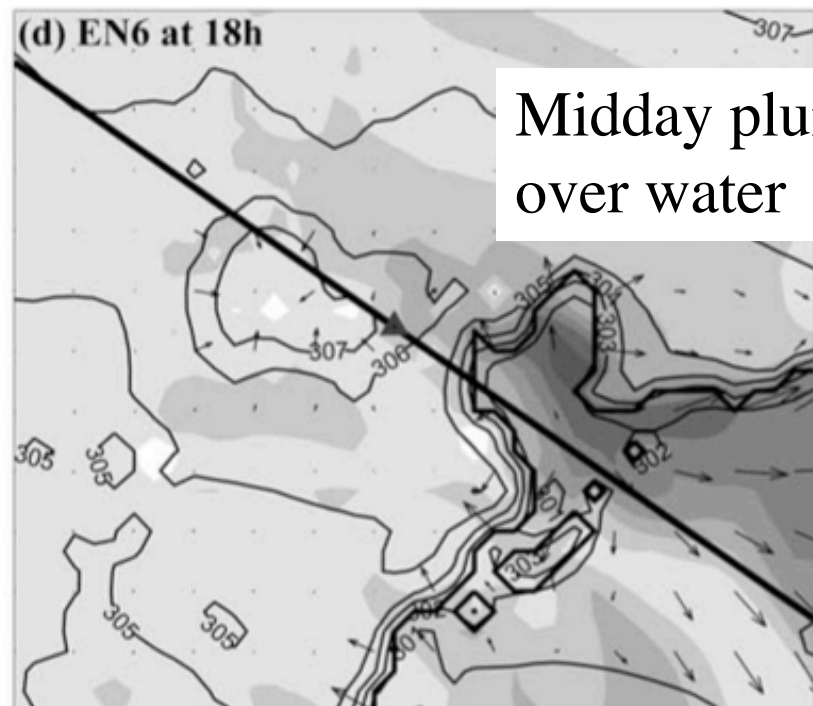
Stronger winds
from west



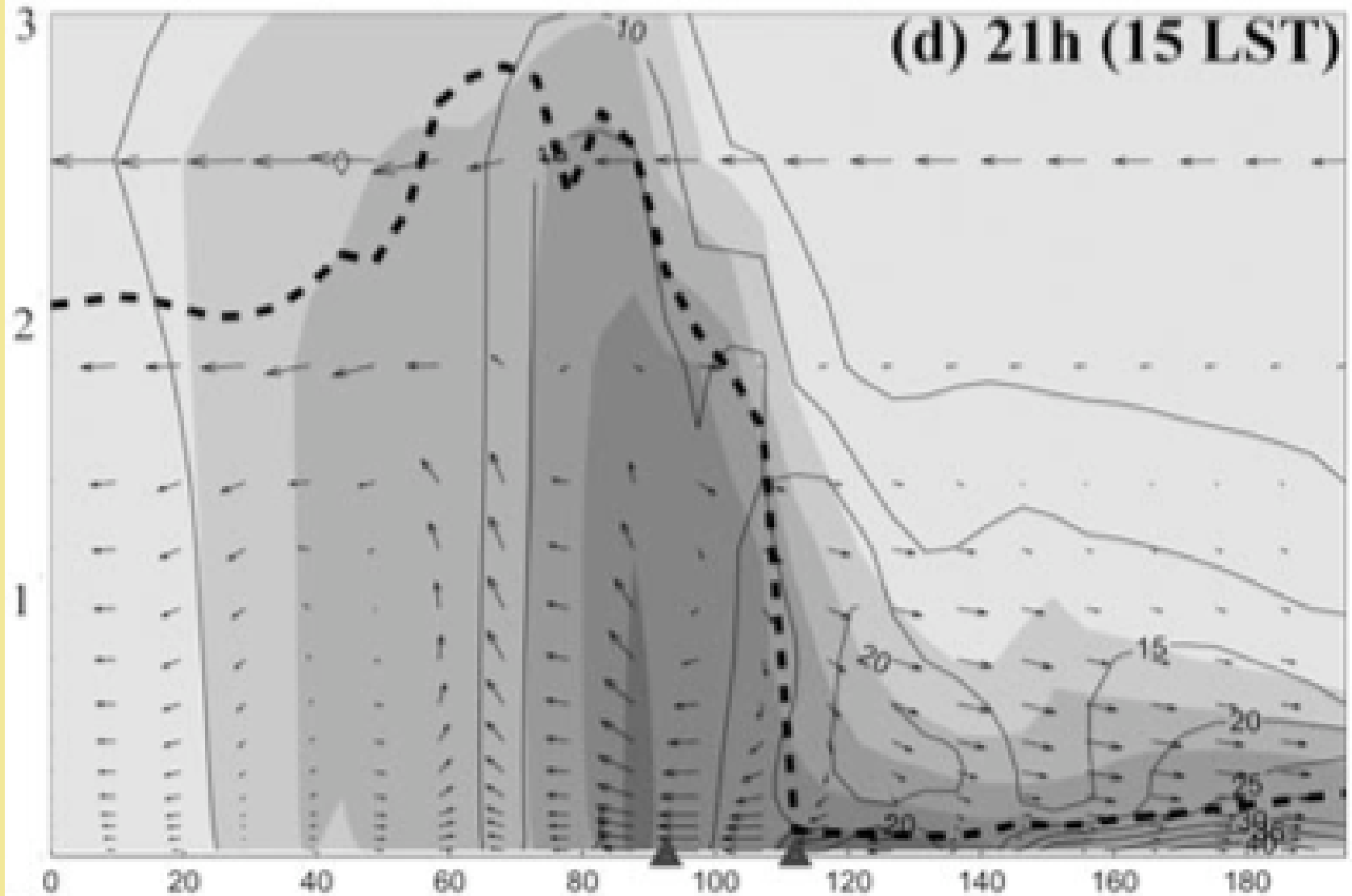
Lighter winds
from northwest



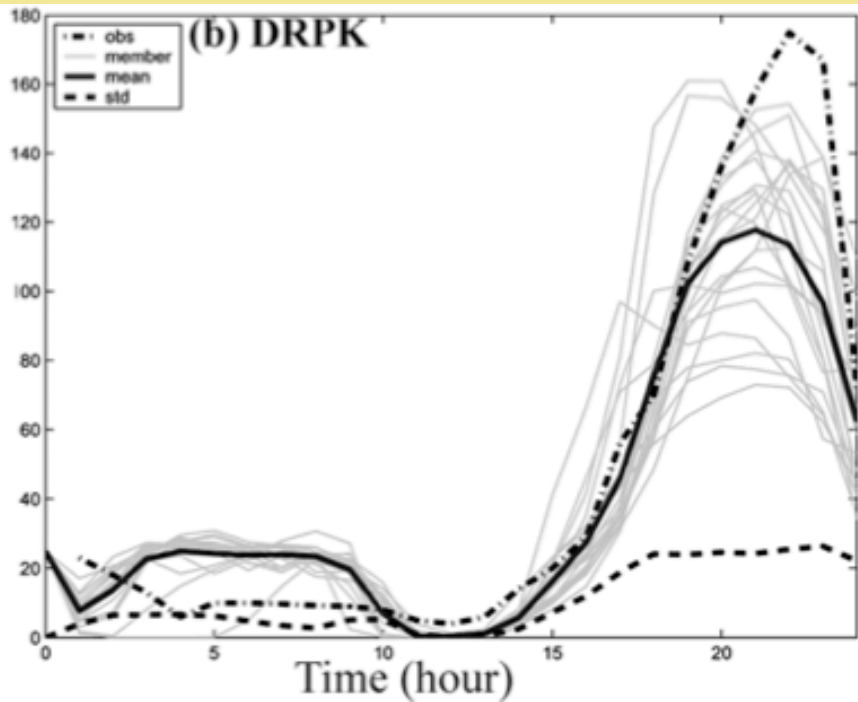
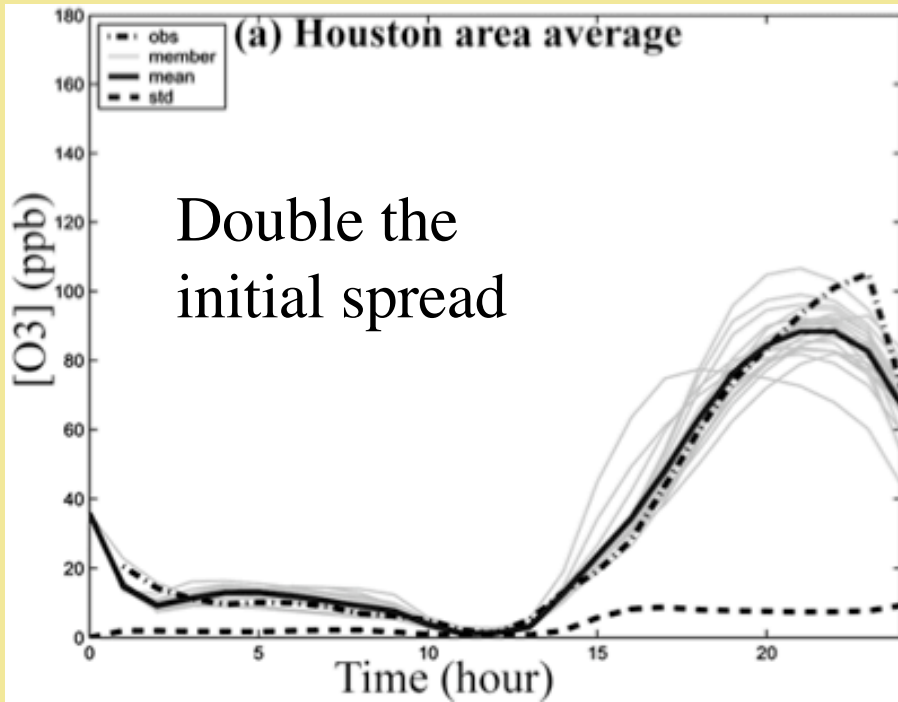
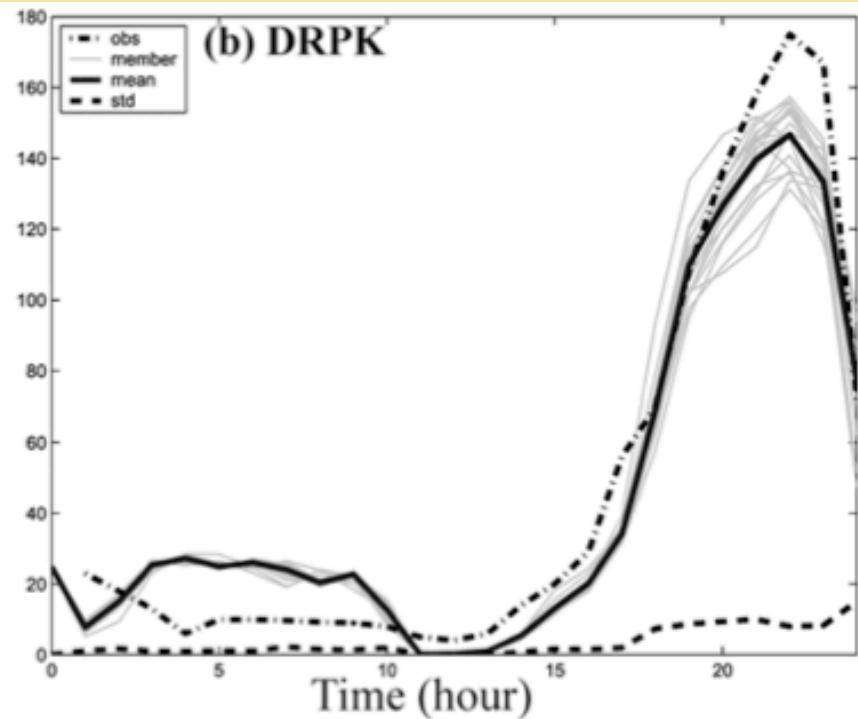
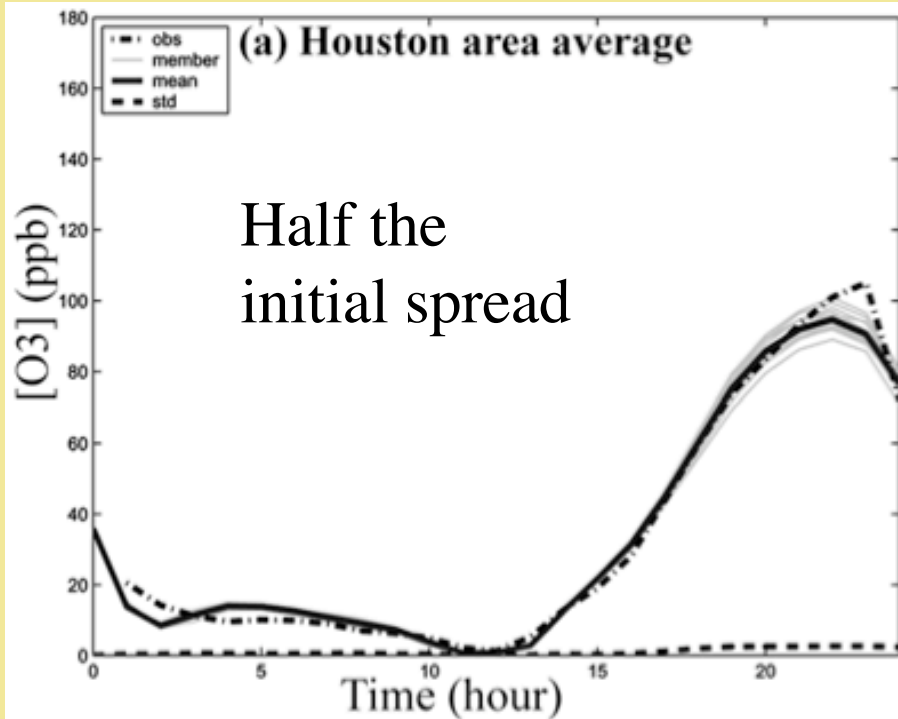
Midday plume
over land



Midday plume
over water



Ensemble mean reproduces “wall” of ozone;
largest uncertainty in offshore levels



Ensemble Sensitivity Results

- Realistic initial condition (analysis)
meteorological uncertainty leads to +/- 35 ppb
point errors near ozone maxima
- Model failure to reproduce highest ozone at Deer
Park is not due to analysis/initial condition error.
Other factors:
 - Model error (land, pbl, etc.)
 - Chemistry error (emissions, reactions)

