TRENF, HONO-FLUX and HINT Sub-Experiments

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Traffic Related Emissions of HONO and HCHO (TRENF)

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- Objectives

1) **Measurements of HCHO, HONO, CO and meteorological parameters at a roadside location in Houston for about 4 weeks.**

2) **Determination of HCHO/CO and HONO/CO ratios during nighttimes and rush-hour times.**

3) **Using CO as a marker for traffic related emission processes, these ratios will allow to determine traffic related emissions of HCHO and HONO.**

4) **Results will be made available as input and validation data for air quality modeling**

Traffic Related Emissions of HONO and HCHO (TRENF)

- Timeline & Status

(√)

August-December 2008:
- **Order new HONO, CO**
- **Purchase and install racks and portable tower for mobile measurement trailer**
- **TRENF site selections and negotiations` √**

January-March 2009:
- **Continue construction, installation, and testing of mobile measurement trailer**
- **Deploy measurement trailer for traffic emission study (TRENF)**

May-August 2009:
- **Begin data reduction and preliminary analysis**
- **Submit final report September 2009**

Study of HONO Surface Fluxes (HONO-FLUX)

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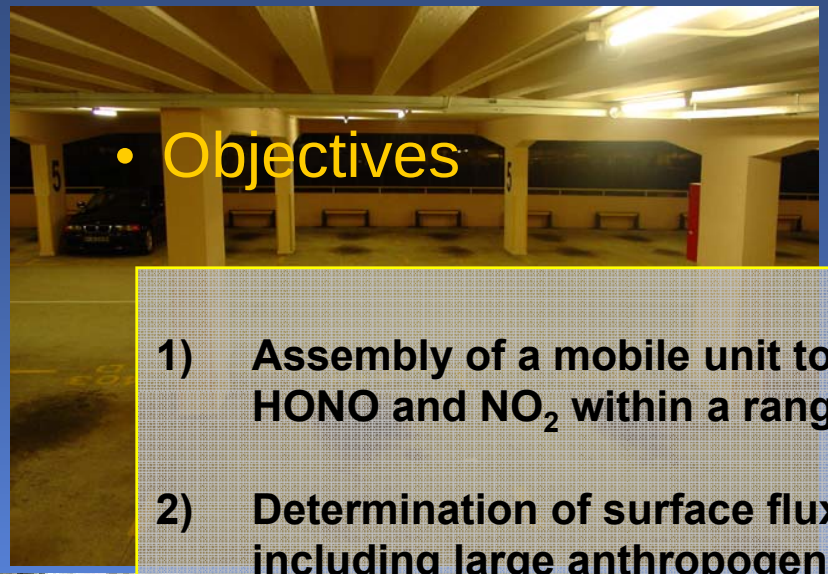
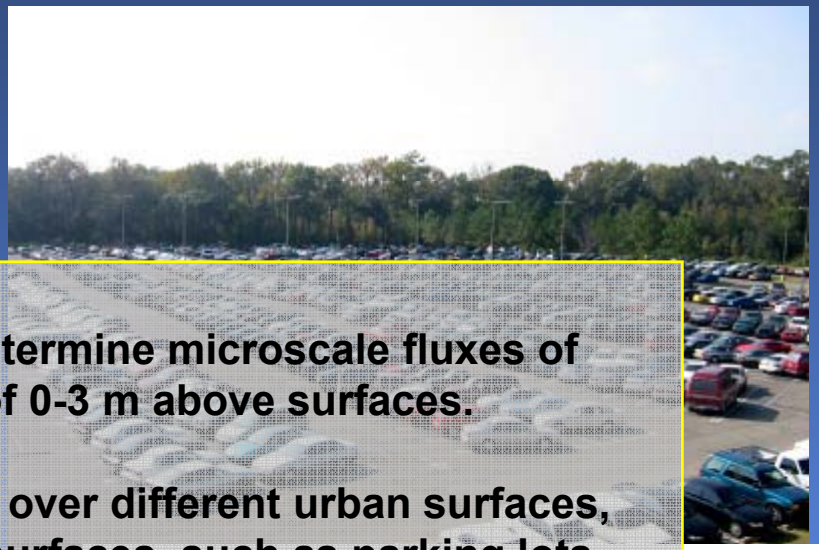


- Objectives

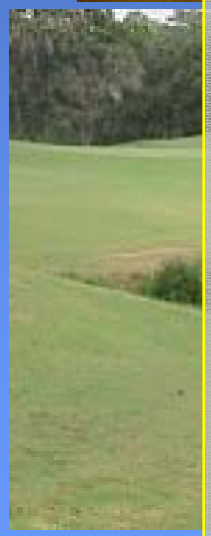


1) Assembly of a mobile unit to determine microscale fluxes of HONO and NO_2 within a range of 0-3 m above surfaces.

2) Determination of surface fluxes over different urban surfaces, including large anthropogenic surfaces, such as parking lots and buildings, in particular parking garages, and park areas.

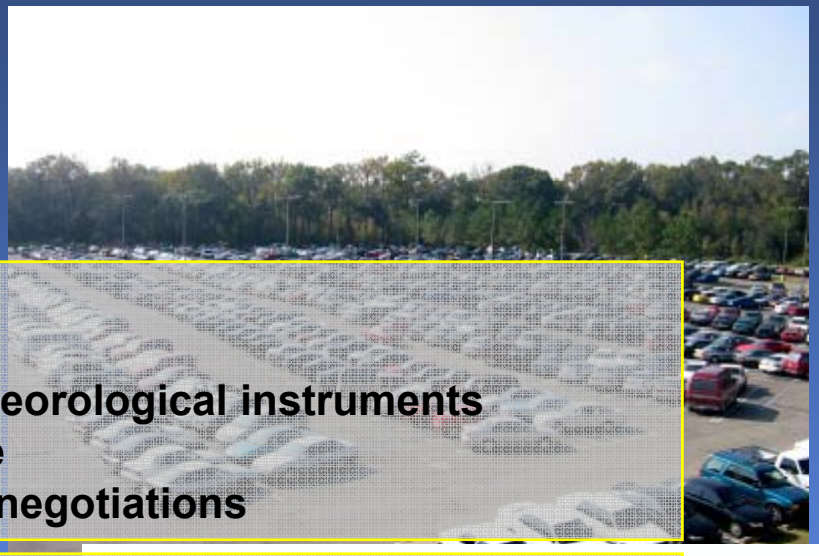
3) Measurement times: before sunrise until about 11 am. This time period offers the best chance to see different gradients close to the surface.

4) Results will be made available for implementation in the land use and land cover data currently being utilized by the UH IMAQS modeling group.



Study of HONO Surface Fluxes (HONO-FLUX)

- Timeline & Status



(√)

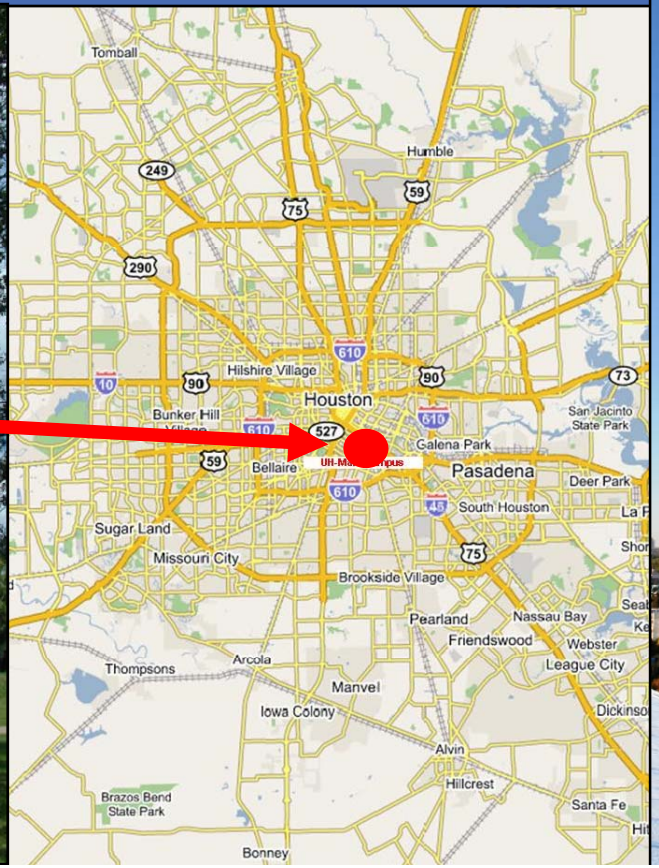
August-December 2008:
- **Order new HONO, NO_x, and meteorological instruments**
- **Construct instrument enclosure**
- **HONO-Flux site selections and negotiations**

January-March 2009:
- **Continue construction, installation, and testing of portable measurement enclosure**

June-August 2009:
- **Deploy portable enclosure for HONO Surface Flux study (HONO-FLUX)**
- **Begin data reduction and preliminary analysis**
- **Submit final report September 2009**

HONO Levels and their Impact on Radical Levels in Houston: Intercomparison of different analytical methods to measure ambient HONO (HINT)

- Measurements at the UH Moody Tower



HINT

- Objectives

1) Simultaneous deployment of different HONO instruments on the Moody Tower in order to challenge these instruments with the complex real world ambient air composition in the Houston air.

2) intercomparison study supported by measurements of HO_x radicals using laser-induce fluorescence as well as radical reactivity (Penn State University).

3) The currently approved amount of funding allows the intercomparison of DOAS and LOPAP measurements.

Collaboration with:
- UCLA (DOAS)
- Penn State (HO_x; radical reactivity)

HINT

- Timeline & Status

August-December 2008:

(√) (√) - **Order new HONO, and CO_2/H_2O**
- **Construct NO_y channel, HONO calibration source**
- **Order calibration gases, storage container**
- **Identify and arrange for expendables, housing, rental car and other needs for visiting scientists**

(√) - **Identify "missing"instruments and attempt to find group and funds for participation**

HINT

- Timeline & Status

January-March 2009:

1) **Preparations for SHARP Moody Tower Campaign and HONO intercomparison including**
    1) **Installation of Scaffold Tower for PSU OH/HO2 measurements and other inletless instruments**
    2) **Testing and calibration of instruments**
    3) **Identify and reserve lab space, tower space, desk space, meeting space, and power requirements for visiting scientists**
    4) **Coordinate weather and air quality forecasting with various measurement projects (SHARP, SOF, MAX-DOAS, I-DOAS, Aircraft etc.)**

HINT

- Timeline & Status

April-May 2009:

- **Begin a daily forecasting and planning meeting for SHARP, SOF, MAX-DOAS, I-DOAS, Aircraft, etc.**

June-August 2009:

- **Return/unassemble scaffold tower, mobile storage, and other campaign only assets.**
- **Additional calibration and evaluation of instrument performance during April-May intensive**
- **Begin data reduction and preliminary analysis**
- **Submit final report September 2009**

Amendments

- HINT

In order to fully evaluate the HINT campaign at the Moody Tower it will be critical to perform the entire suite of available air quality measurements at the Moody Tower including:

UH

NO, NO_2, NO_y,
speciated PAN,
O_3, CO, SO_2,
HCHO, H_2O_2, speciated VOCs,
CO_2/H_2O fluxes
photolysis frequencies

UNH

HONO (MC/IC)
HNO3 (MC/IC)

UNH MC/IC method the 3rd measurement technique for the HONO intercomparison

UNH MC/IC available during TRAMP

Amendments

- HINT

The measurements listed in the amendment will help to

(i) determine possible interferences in HONO measurements
(ii) evaluate primary emissions of HONO and HCHO
(iii) identify signatures of burning fossil fuel using CO_2 fluxes
(iv) identify possible relationships between H_2O fluxes and HONO
(v) elucidate the relative importance of ozone photolysis, HONO, HCHO, and H_2O_2 as radical sources to the Houston atmosphere.

If approved, these measurements will also be made available for SOOT (H101)

Amendments

- Study of Houston Atmospheric Boundary Layer during SHARP
  - *Objectives*

HONO levels often peak in the early morning when the boundary layer shows strong variation

it is critical to know the height of the boundary layer (BL) to determine:

a) total mass of HONO in the BL column

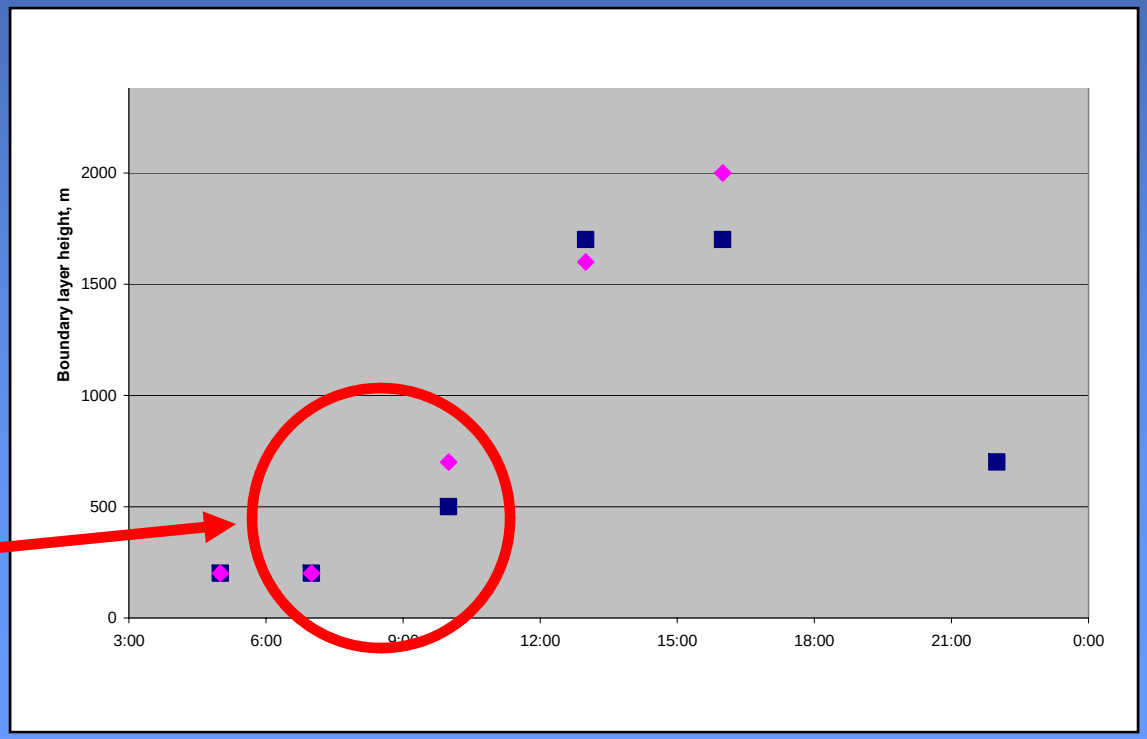
b) the aerosol surface area available in the BL column for secondary HONO production.

Amendments

- Study of Houston Atmospheric Boundary Layer during SHARP
  - *Problem*

Radiosondes, considered the standard technique, may not be used for highly temporally resolved measurements.

Critical morning transition times cannot be observed sufficiently precise.



Amendments

- Study of Houston Atmospheric Boundary Layer during SHARP
  - *Objectives*

1) Deployment of a Vaisala CL31 Aerosol LIDAR to continuously monitor height of the atmospheric boundary layer near the UH Moody Tower facility.

2) Continuous BL height measurements are important to cover the critical morning transition times.

3) 20 Vaisala RS92 Radiosondes will be launched at selected times of the day and night to validate the BLH retrieval of the CL31.

Amendments

- Study of Houston Atmospheric Boundary Layer during SHARP
  - *Timelines*

December 2008
- **Order Vaisala CL31 Aerosol LIDAR with BLH retrieval algorithm**
- **Order 20 Vaisala RS92 radiosondes.**

January – March 2009
- **Install and test Aerosol LIDAR at UH Radiosonde launch facility on the UH-Main Campus.**
- **Compare Aerosol LIDAR boundary layer height measurements on a number of BLH retrieved from radiosonde launches (Approximately 5).**

Amendments

- Study of Houston Atmospheric Boundary Layer during SHARP
  - *Timelines*

April – May 2009 (SHARP Campaign)
- **Monitor performance of Aerosol LIDAR and launch remaining 15 RS92 radiosondes.**

June – August 2009
- **Data reduction and preliminary analysis of BL height evolution during SHARP campaign.**
- **Submit final report.**