

Balloon - Aircraft Mission Logistics

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Mission Objectives

Daytime Mission

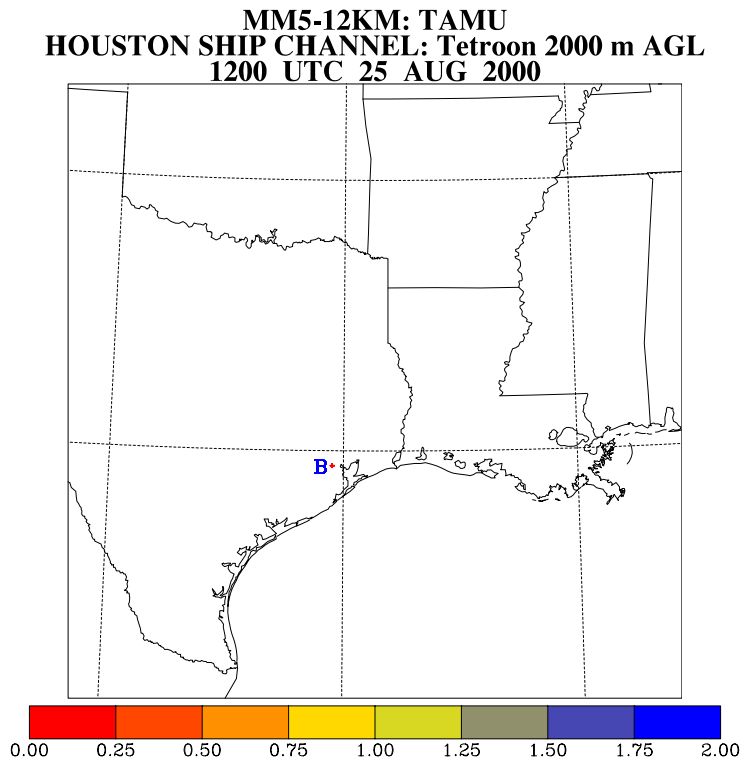
- Daytime chemistry and transport of early morning Houston/Ship Channel emissions under well-defined southerly flow.

Nighttime Mission

- Nighttime chemistry and transport of afternoon Houston/Ship Channel emissions in well-mixed residual layer.
- Noor's Hypothesis: Nighttime long-range transport of concentrated emissions from Ship Channel released into the stable residual layer followed by fumigation and ozone production the following morning.

Lagrangian Particle Dispersion Modeling of Early Morning Houston Emissions

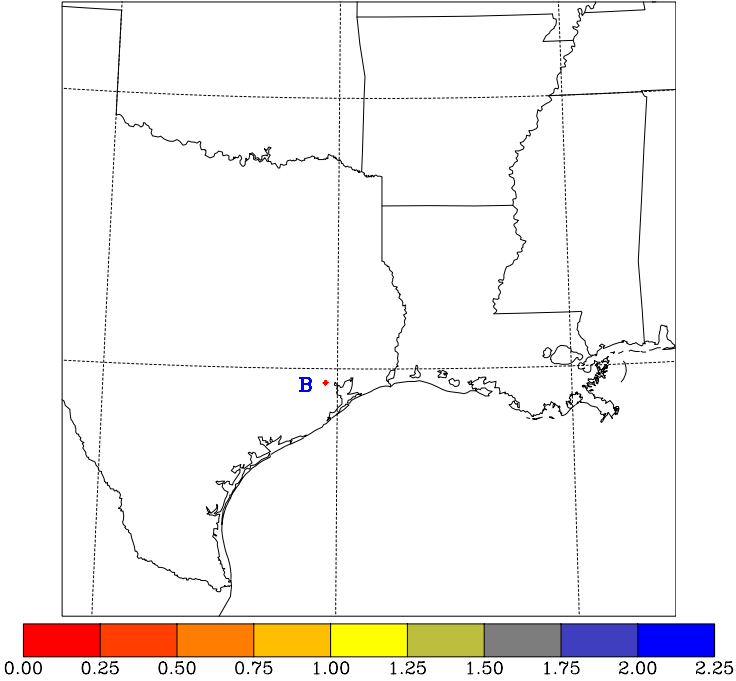
0700 LST



Courtesy: Dick McNider and Kevin Doty

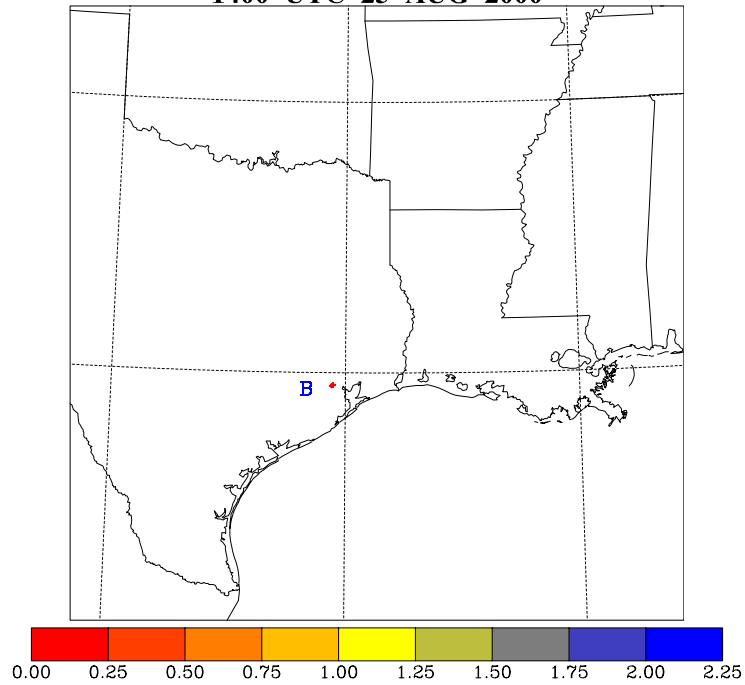
0800 LST

MM5-12KM: TAMU
HOUSTON SHIP CHANNEL: Tetron 2000 m AGL
1300 UTC 25 AUG 2000



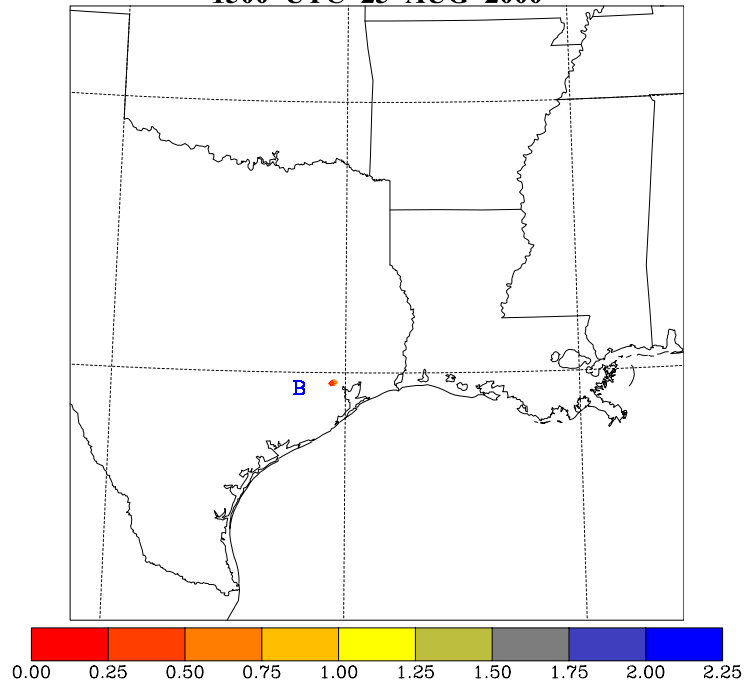
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1400 UTC 25 AUG 2000**



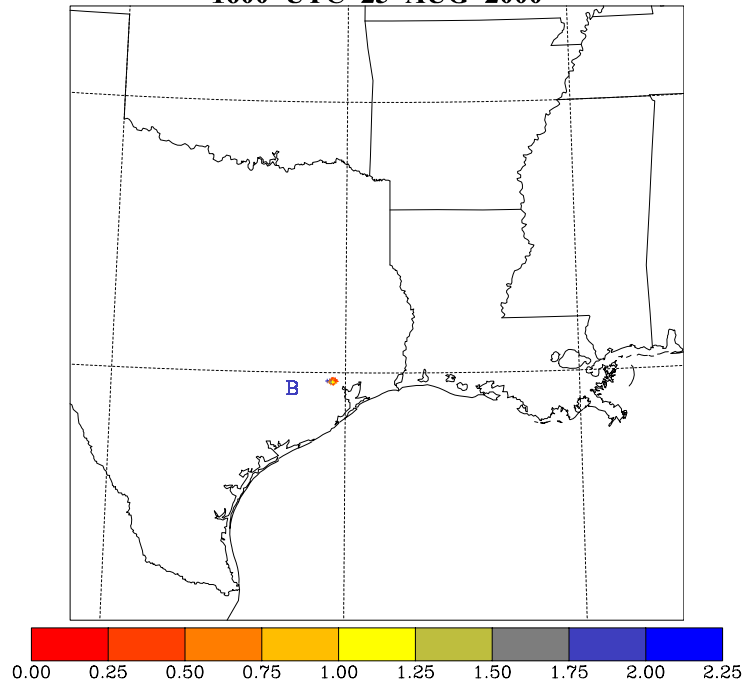
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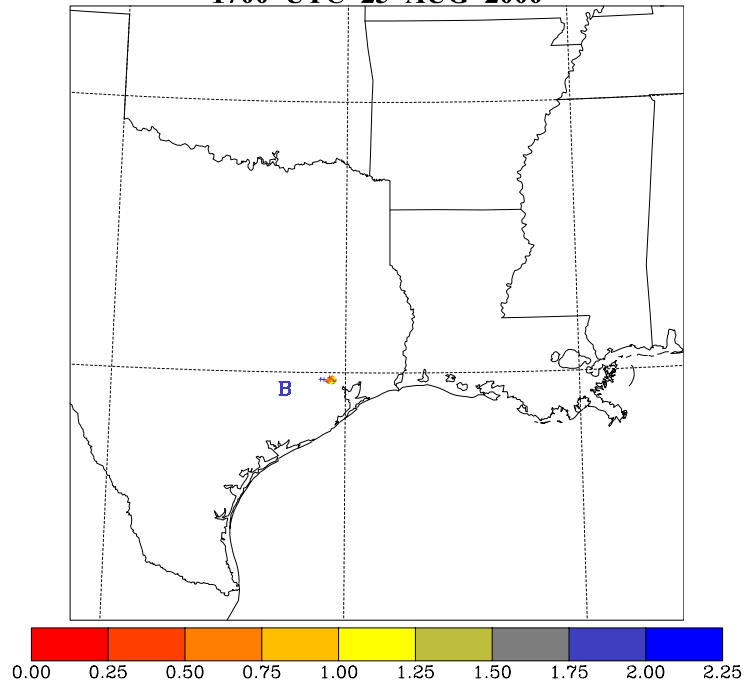
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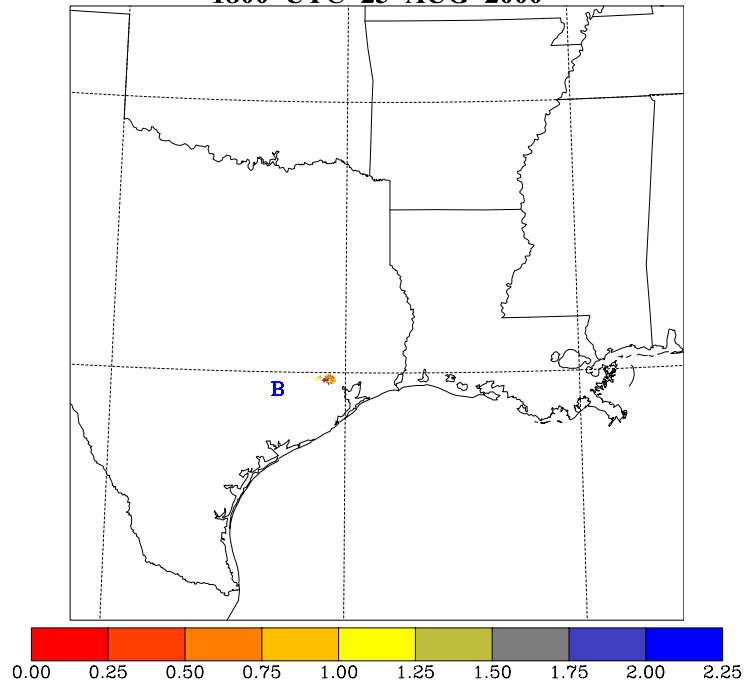
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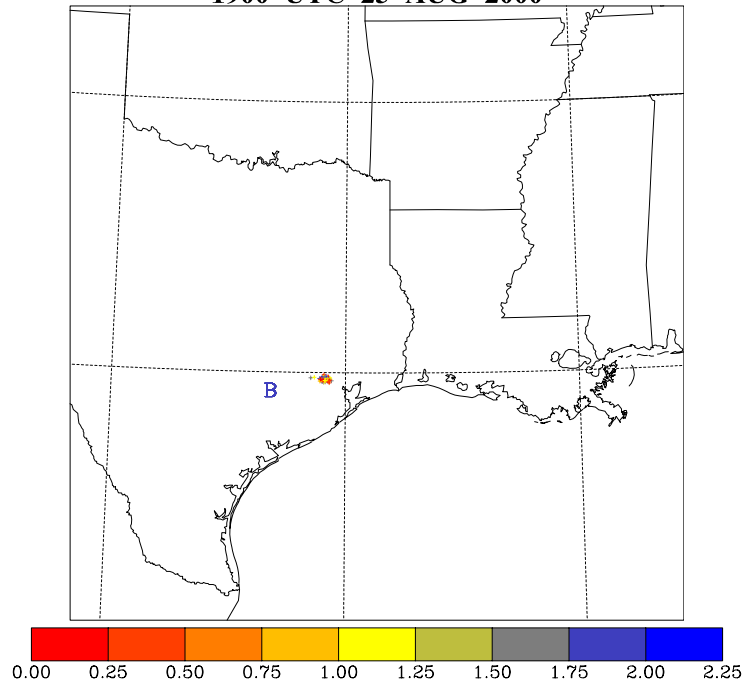
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1800 UTC 25 AUG 2000**



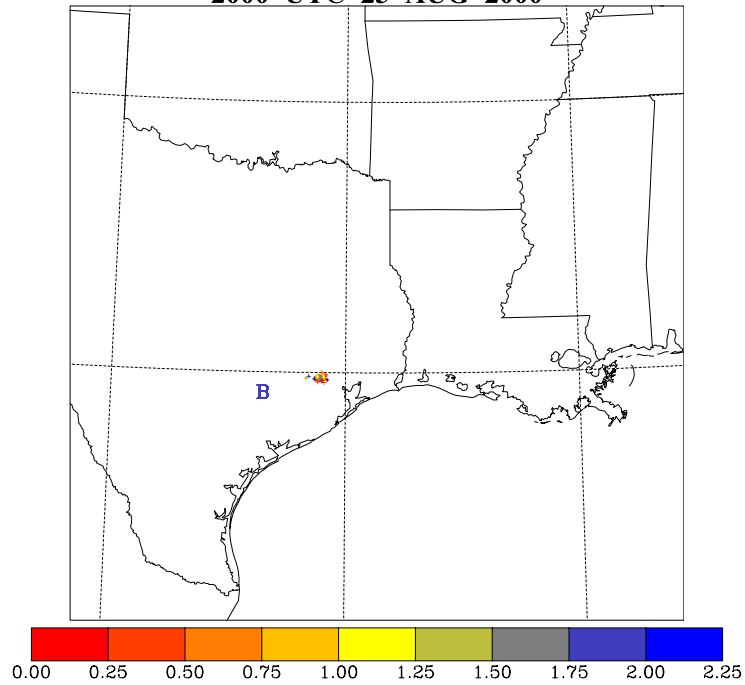
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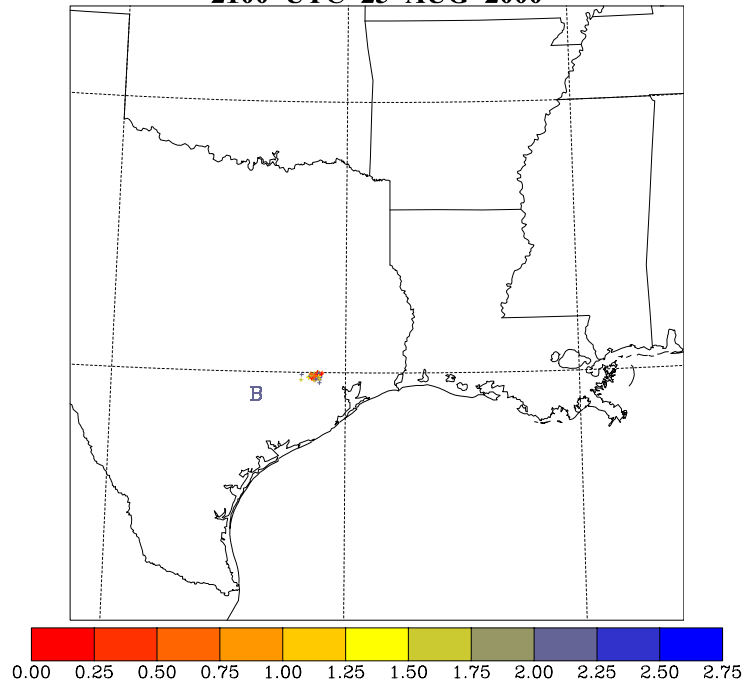
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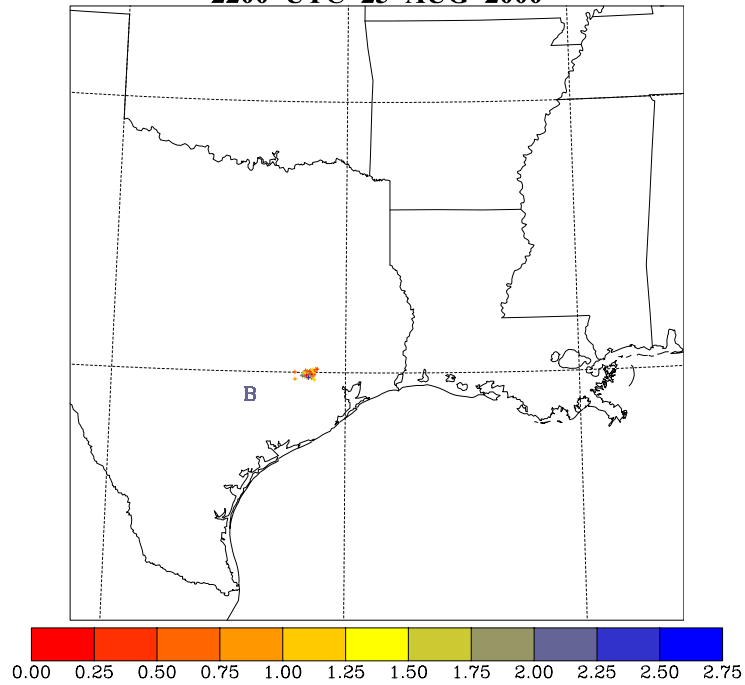
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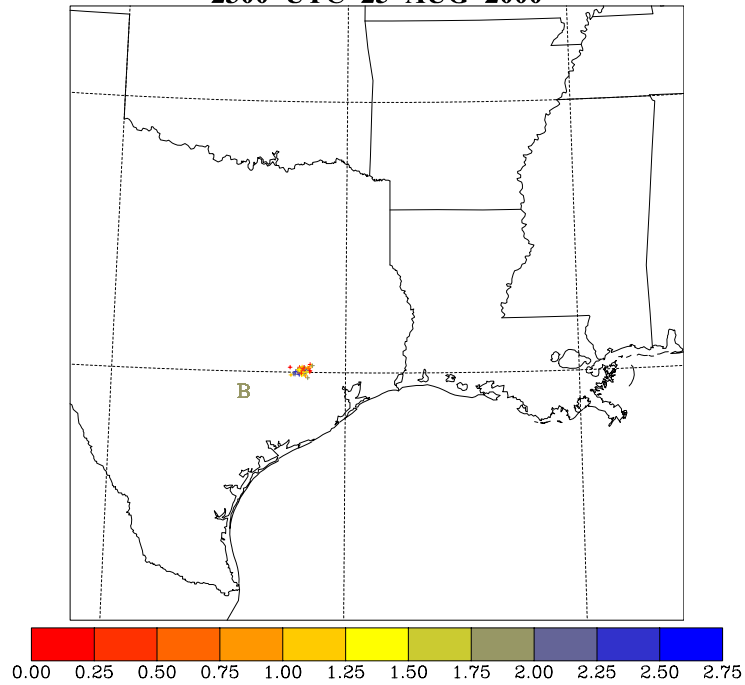
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2200 UTC 25 AUG 2000



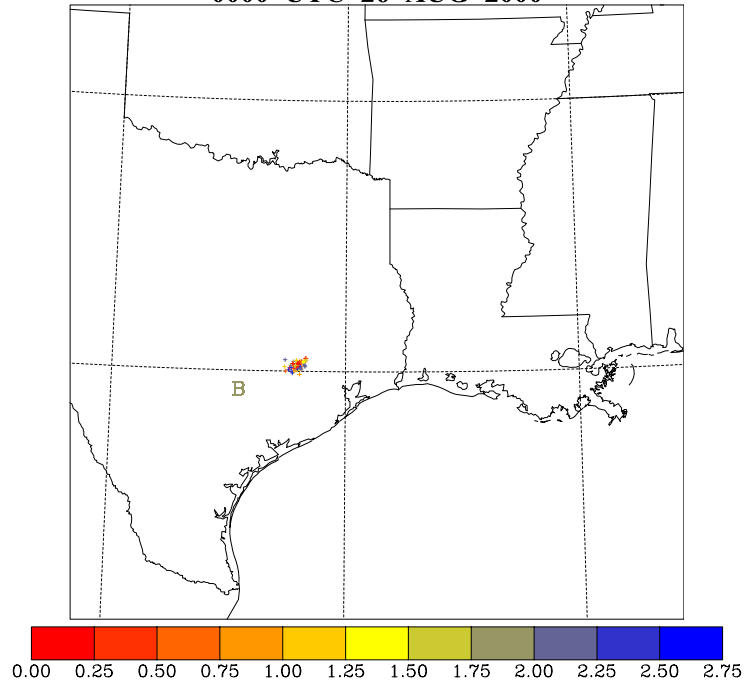
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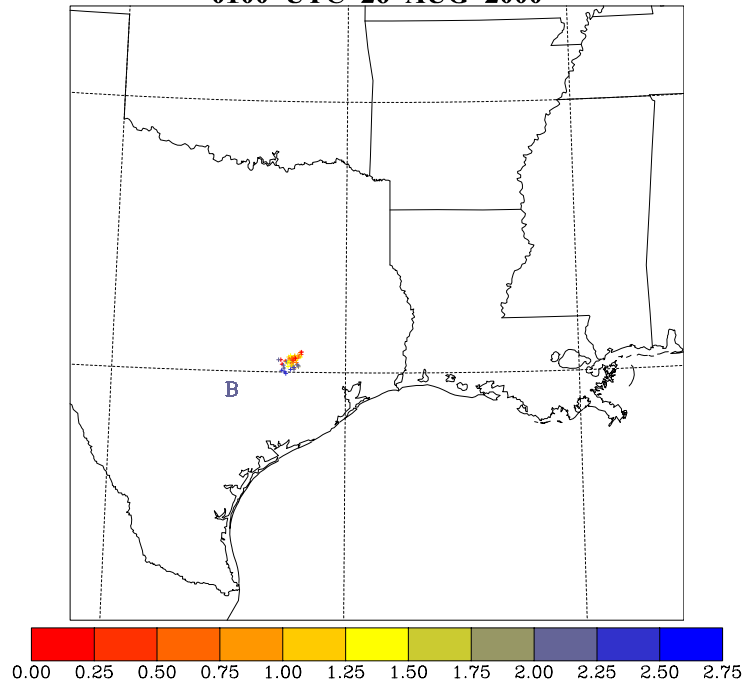
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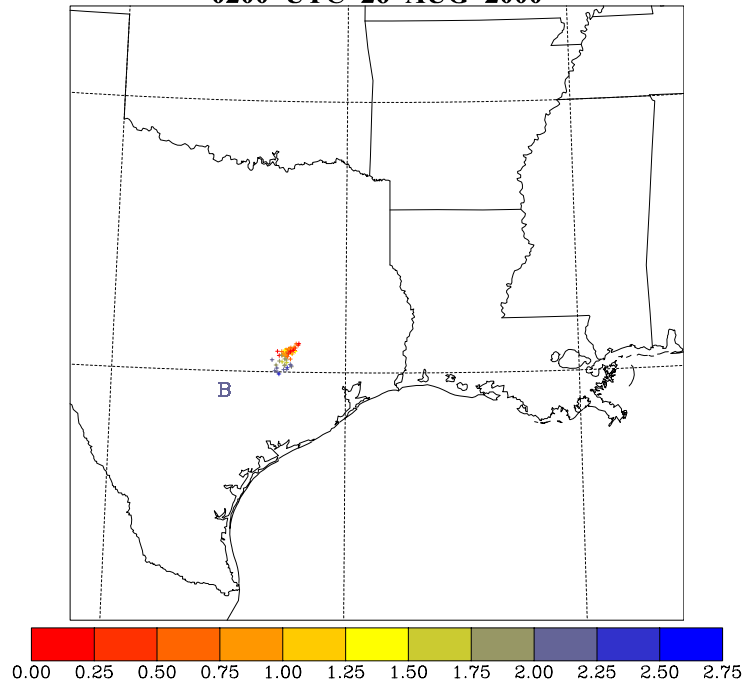
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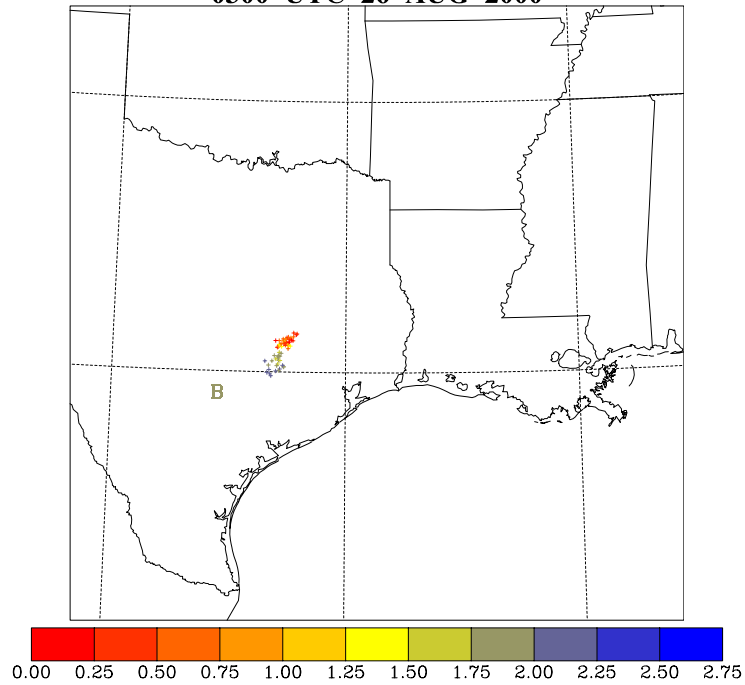
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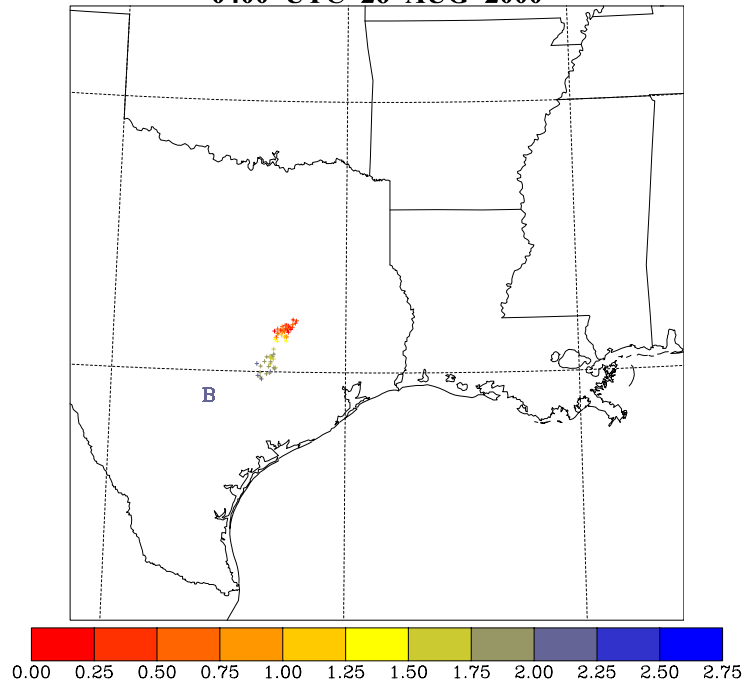
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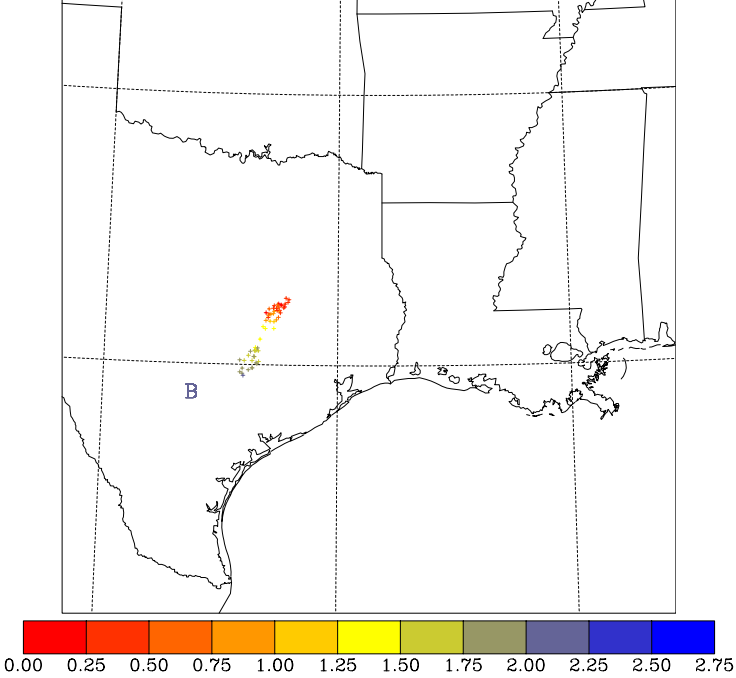
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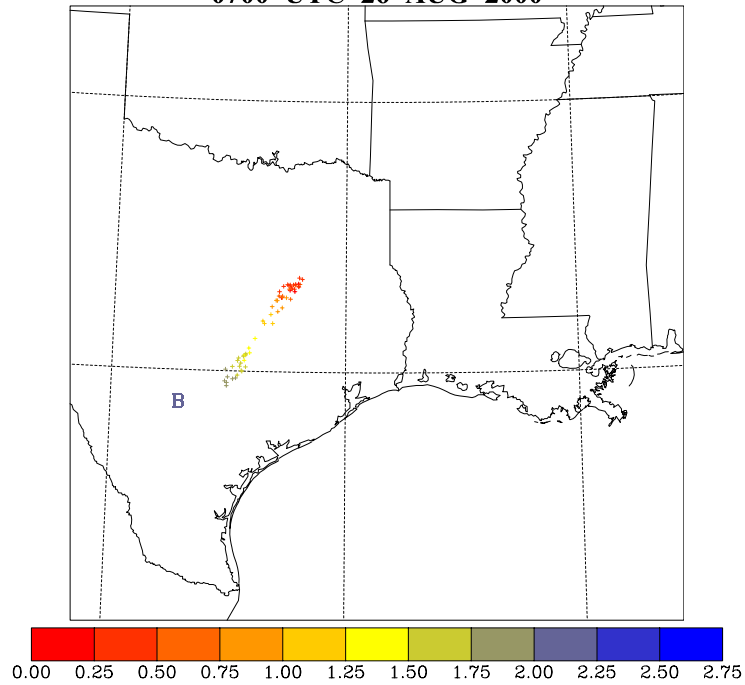
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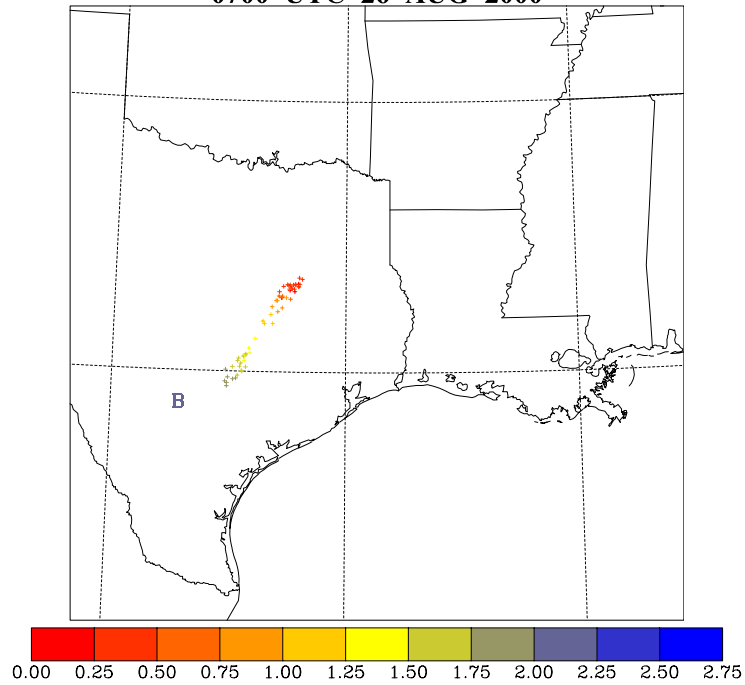
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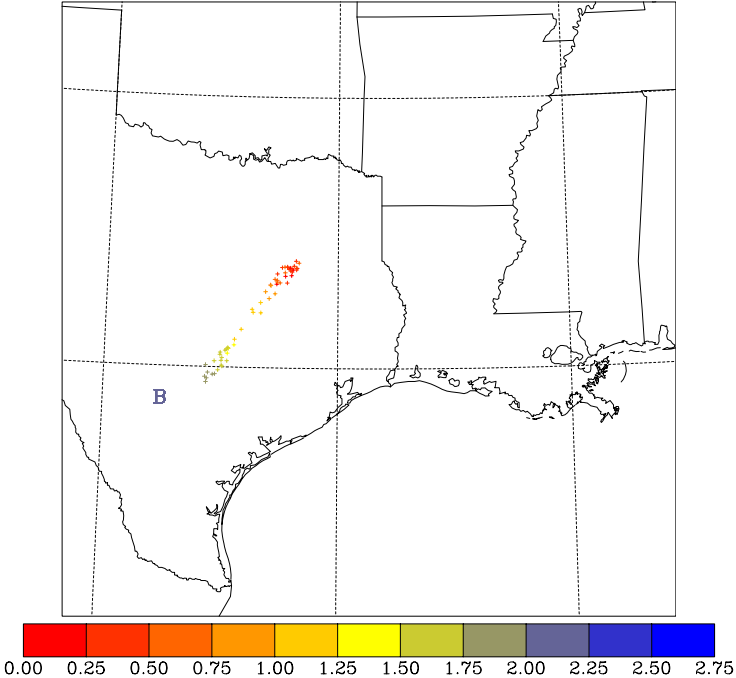
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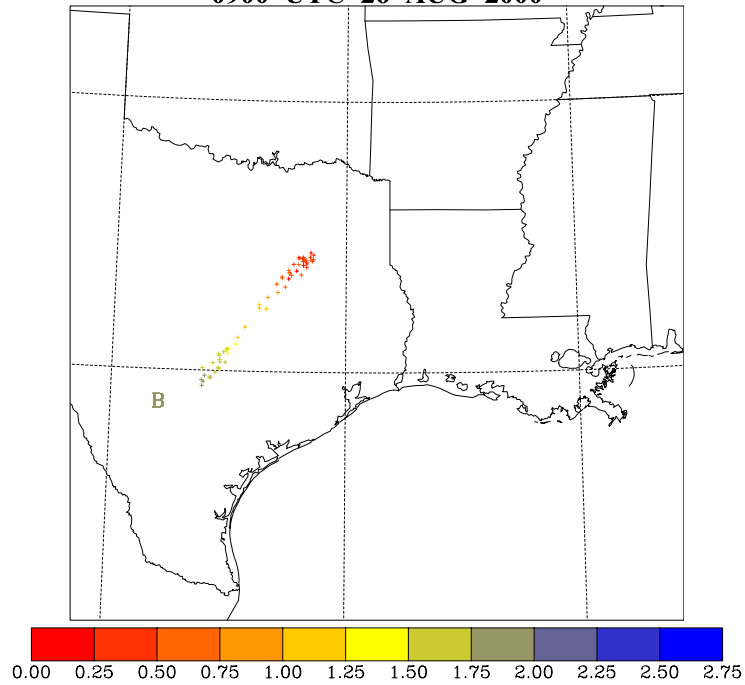
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HOUSTON SHIP CHANNEL: Tetron 2000 m AGL
0800 UTC 26 AUG 2000**



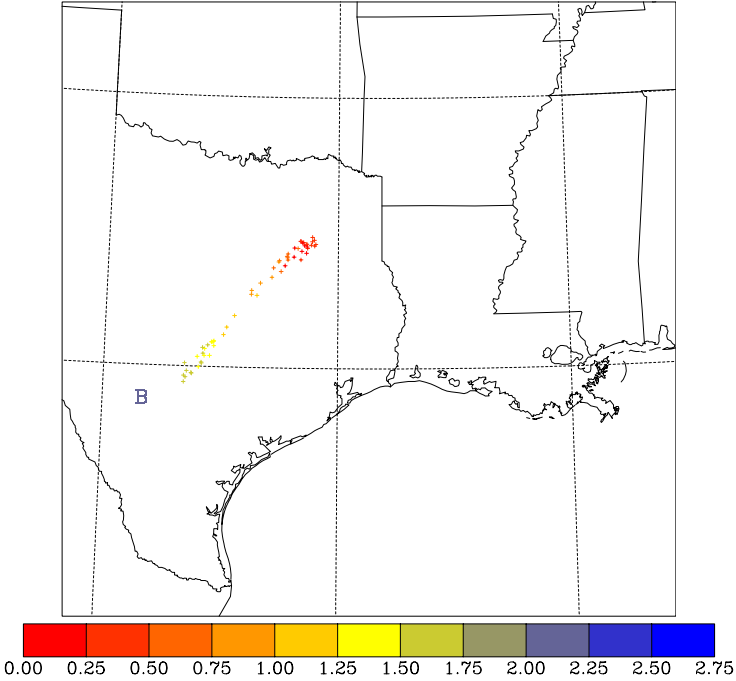
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HOUSTON SHIP CHANNEL: Tetron 2000 m AGL
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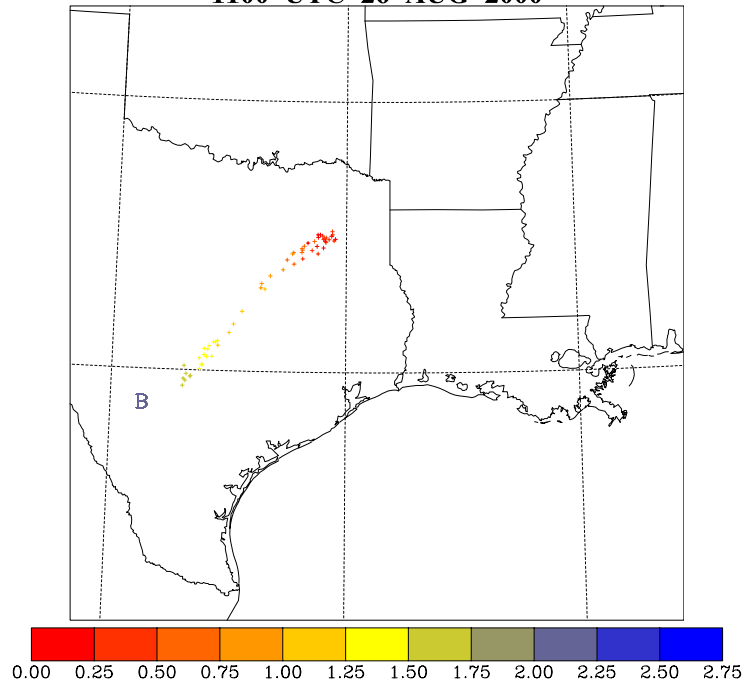
0500 LST

**MM5-12KM: TAMU
HOUSTON SHIP CHANNEL: Tetron 2000 m AGL
1000 UTC 26 AUG 2000**



0600 LST

**MM5-12KM: TAMU
HOUSTON SHIP CHANNEL: Tetron 2000 m AGL
1100 UTC 26 AUG 2000**




Aircraft Flight Planner

- Plots and logs waypoints and provides information needed by pilots/FAA.
- Automatically keeps track of balloon and plume positions

Aircraft Flight Planner - VFR-1 Map

Mouse Pointer	Lat: 29.3429	29	20.6	from the last point clicked on map	Mouse Click	Way Point	Lat: 30.3474	Radial	Dist (nm)	ETE (min)	Cumulative Dist (nm)	Cumulative ETE (min)
	Lon: -95.1162	-95	7.0		<input checked="" type="checkbox"/> Automate		Lon: -95.42	-99	0	0	0	0
					<input type="checkbox"/> Plot and Log							



min

Aircraft Ground Speed (kts)

Start at Airport (Plot and Log)

Return to Airport (Plot and Log)

Reset Waypoints

Read and Plot Logged Waypoints

Help

Tentative Timeline for the Daytime Mission

The day before:

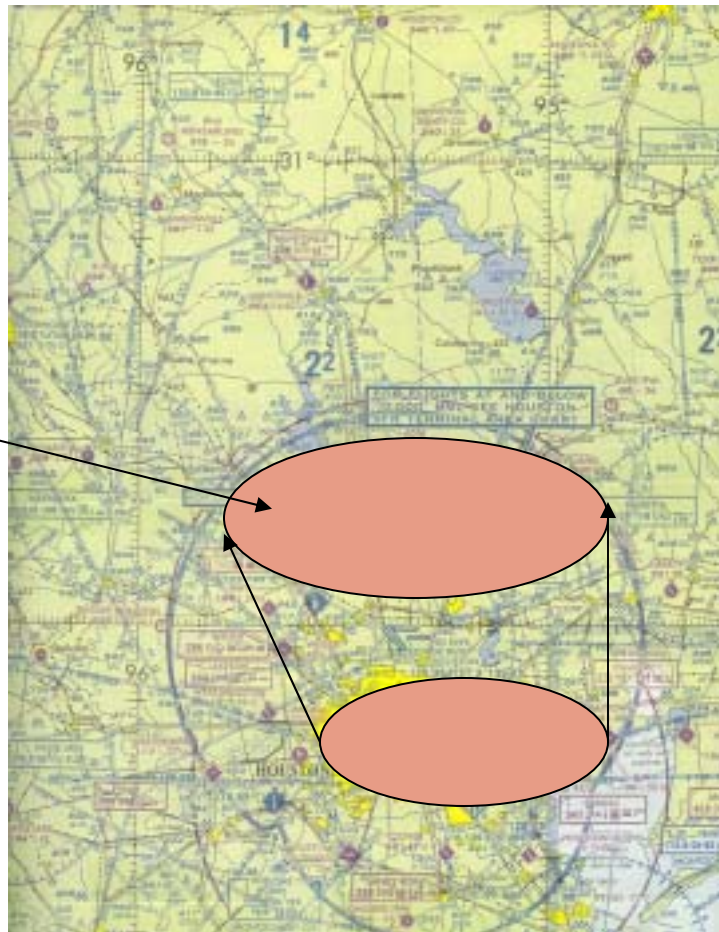
- Consult model forecasts
- Favorable conditions include southeasterly to southwesterly flow

Tentative Mission Timeline

The Mission Day

- **0700 – 0900 LST:** Use real time profiler wind data/rawinsonde data to estimate the position of the early morning Houston emissions at 0900.

Estimated position
of the early
morning emissions
using real time
profiler and
rawinsonde data



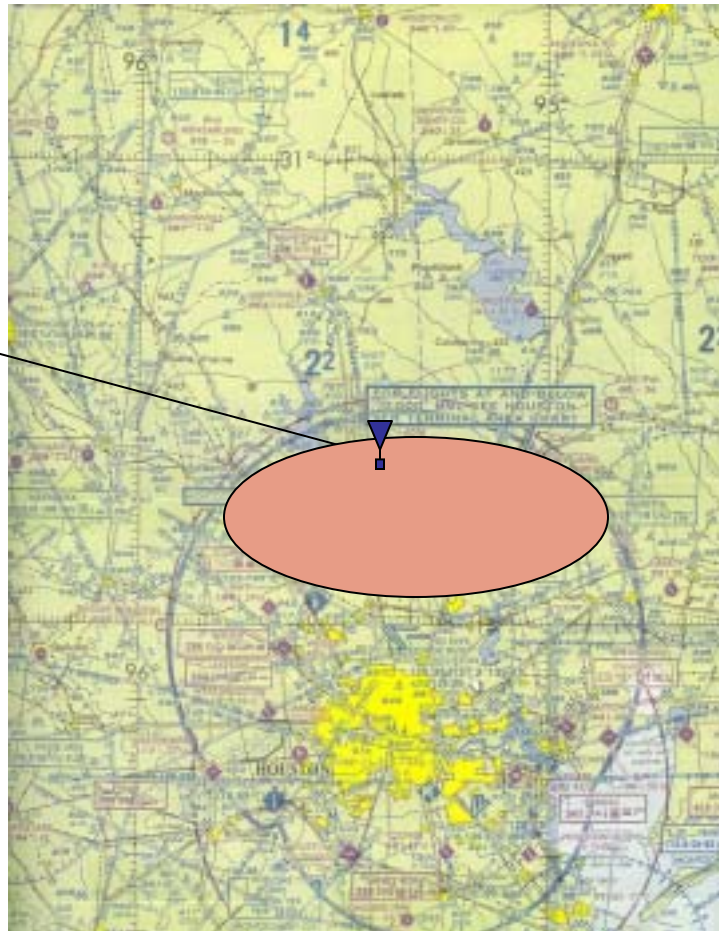
0900 LST

0700 LST

Tentative Mission Timeline

- **0900 - 1000 LST:** Launch a COMET balloon under favorable conditions. Perform a sounding and position it at a desired altitude.

Launch COMET balloon from Montgomery County airport

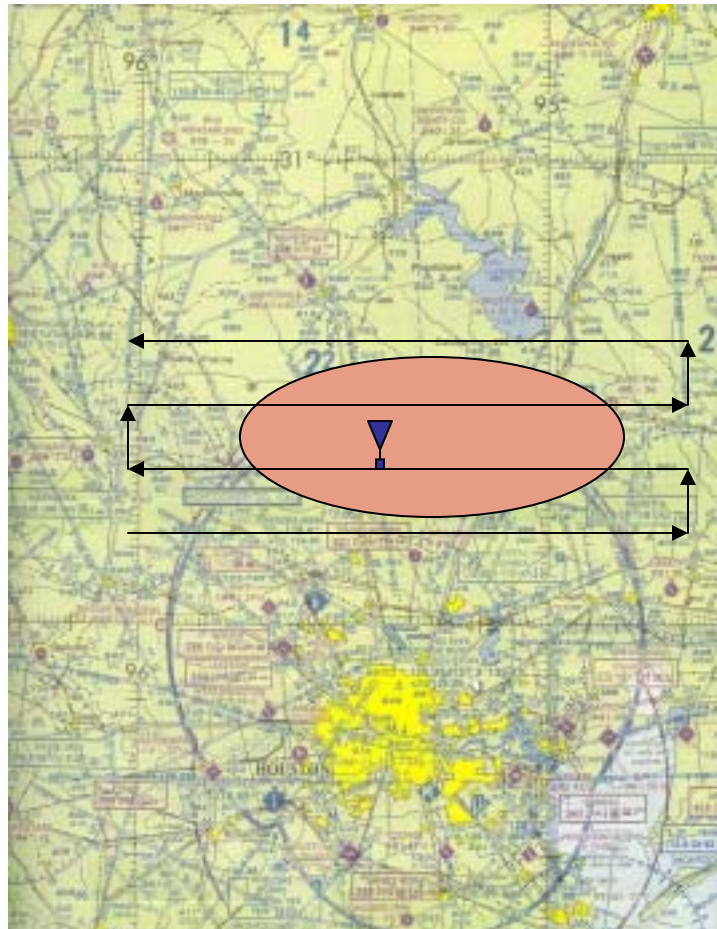


0900 LST

Tentative Mission Timeline

- **0900 LST:** Prepare and file an aircraft flight plan for the first flight
- **1000 – 1300 LST:** First aircraft flight

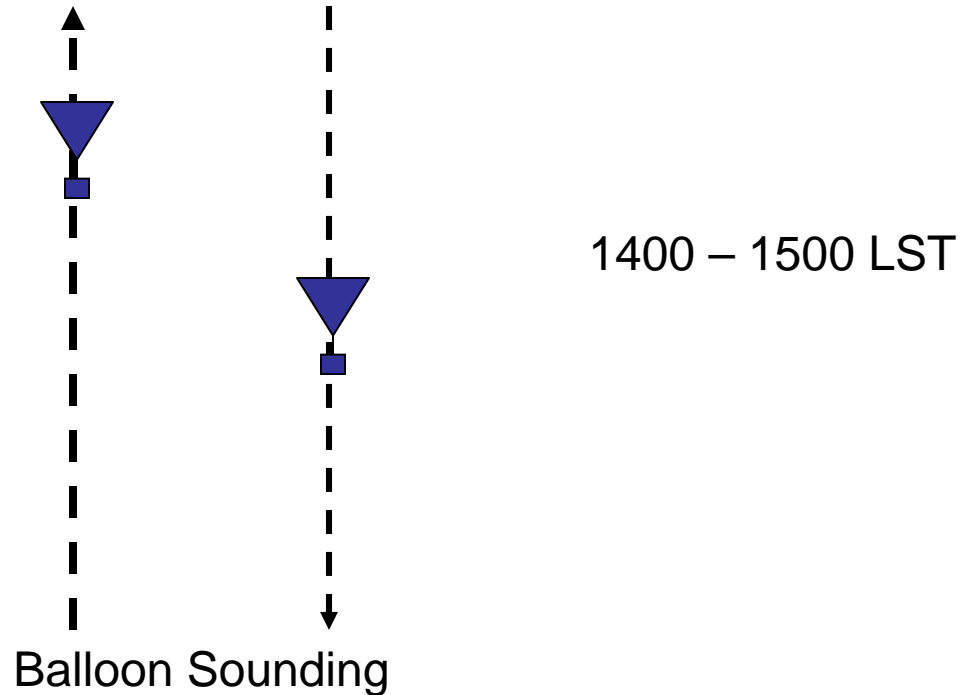
First aircraft flight
1000 – 1300 LST



1000 – 1300I LST

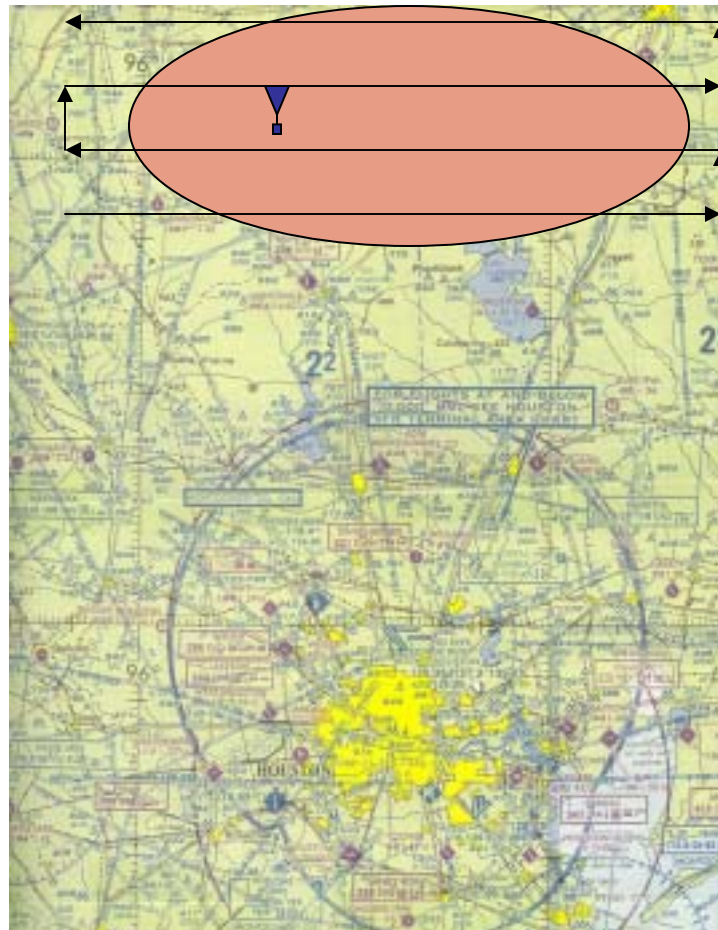
Tentative Mission Timeline

- **1315 – 1400 LST:** Debrief and take a quick look at the readily available data (?) Will there be an onboard scientist?
- **1400 LST:** Prepare and file a flight plan for the second aircraft flight
- **1400 – 1500:** Carry out another COMET balloon sounding and reposition it at a desired altitude.



Tentative Mission Timeline

- **1500 – 1800 LST:** Second aircraft flight
- **1815 – 1900:** Debrief and take a quick look at the readily available data.
- **1800 LST:** Let the balloon continue making soundings overnight



1500 – 1800 LST

Second aircraft flight

1500 – 1800 LST

Tentative Mission Timeline

- Aircraft Flight 3: Revisit the balloon/estimated plume position the next morning to see if we can see the plume signal.

Nighttime Missions

- Nighttime missions need input from pilots, flight crew, and FAA – Can we do nighttime sampling?
- The timeline of activities is anticipated to be similar to the daytime mission.

Mission Requirements

- Each mission would require ~10 hours of aircraft flight hours spread over two days.
- Goal is to carry out up to 4 missions over a period of two weeks in August.

Needs/Questions

- Model forecasts
- Real-time access to profiler winds in Houston area?
- Pilots and flight crew duty day?
- Aircraft endurance? FAA approval of our tentative plans?
- Aircraft instrument suite?
- Will there be an onboard scientist?
- Ground to air communication?

Summary of the Tentative Mission Timeline

- **Day before:** Consult forecasts for favorable conditions (southerly flow)
- **0700 – 0900:** Use real time profiler wind data/rawinsonde data to estimate the position of the early morning Houston emissions.
- **0900:** Launch a COMET balloon if conditions are favorable.
- **0900:** Prepare and file an first aircraft flight plan.
- **0900 – 1000:** Carry out a COMET balloon sounding and position the balloon at a desired altitude between 1000 and 3000 ft.
- **1000 – 1300:** Aircraft Flight 1
- **1315 – 1400:** Debrief and examine readily available data.
- **1400:** Prepare and file the second aircraft flight plan
- **1400 – 1500:** Carry out another COMET balloon sounding and reposition it at a desired altitude.
- **1500 – 1800:** Aircraft Flight 2
- **1815 – 1900:** Debrief and examine readily available data.