Today (Monday): **No fly day.** Region under an easterly flow regime and under the influence of an upper level ridge. Moisture and convective outflow from now TS Ingrid has impacted the area; a cirrus cloud deck covers much of southern Texas, while some lower level clouds are also present.

Tomorrow (Tuesday): **Cloudy conditions remain,** though it should be somewhat less cloudy than Monday. As Ingrid moves SW, the moisture and convective outflow should also shift SW; less moisture and cirrus should thus impact the region though not enough to dissipate the cirrus deck significantly.

Wednesday: **May be OK to fly.** However, the forecast is very uncertain. The upper level ridge weakens and moves E, while an upper trough builds over the continental US. This should bring some instability to the region.

Thursday: **Not looking good for a flight.** Instability from the trough and moisture inflow from the Gulf should allow for convection and precipitation.
9/16/2013 Weather Briefing

Clare Flynn
Recommendations

• Tuesday: **No fly day.** Cirrus deck remains over study region, though coverage should be less than today (scattered rather than broken). However, NWS forecaster thinks tomorrow afternoon might be best conditions for flight all week.

• Wednesday: **Possibly a fly day;** cloud coverage decreases on this day. However, forecast is uncertain due to remaining moisture and developing upper trough.
Current Conditions

Conroe:

- Weather: A Few Clouds
- Temperature: 86°F (30°C)
- Humidity: 65%
- Wind Speed: E 5 mph
- Barometer: 30.06 in (1017.6 mb)
- Dewpoint: 73°F (23°C)
- Visibility: 10.00 mi
- Heat Index: 93°F (34°C)
- Last Update on 16 Sep 11:53 am CDT

Houston Hobby:

- Weather: Overcast
- Temperature: 89°F (32°C)
- Humidity: 63%
- Wind Speed: NE 9 mph
- Barometer: 30.02 in (1017.0 mb)
- Dewpoint: 75°F (24°C)
- Visibility: 10.00 mi
- Heat Index: 99°F (37°C)
- Last Update on 16 Sep 11:53 am CDT
Current Conditions

Galveston:

Partly Cloudy

86°F

30°C

Humidity 75%
Wind Speed NE 12 mph
Barometer 30.03 in (1016.7 mb)
Dewpoint 77°F (25°C)
Visibility 10.00 mi
Heat Index 97°F (36°C)

Last Update on 16 Sep 11:52 am CDT
Today: Easterly flow. Region remains under influence of the upper ridge. Moisture will continue to stream into region from Ingrid; will have to fight the subsidence for any convection to occur. Thick cirrus deck likely, as well as lower level clouds.

1 PM CDT
500 mb vorticity
10 m winds at 1 PM today
Tomorrow: Similar situation to Monday; perhaps less moisture in SE Texas. As TS Ingrid moves SW, the moisture and upper level outflow should also move SW.

1 PM CDT
500 mb vorticity
Conroe
Today: Partly cloudy
Tomorrow: Partly cloudy
Houston Hobby
Today: Partly cloudy
Tomorrow: Partly cloudy
Galveston
Today: Partly cloudy
Tomorrow: Partly cloudy
Wednesday: Upper ridge weakens and moves E as an upper trough builds over the continental US. Cold front passes to the E of the study region. Easterly flow.

1 PM CDT
500 mb vorticity
10 m winds at 1 PM Wednesday
Thursday: Upper trough continues to dominate the region. Moisture inflow from the Gulf combined with instability associated with the trough will make conditions favorable for clouds and precipitation.

1 PM CDT
850 mb RH

500 mb vorticity
Conroe

Wednesday: Partly cloudy
Thursday: Mostly cloudy
Houston Hobby

Wednesday: Partly cloudy
Thursday: Mostly cloudy
Galveston

Wednesday: Partly cloudy
Thursday: Mostly cloudy
-Tomorrow: Scattered Cu and high cloud.
-Wednesday: Scattered Cu and high cloud
-Thursday: Low clouds and precipitation.
- Tomorrow: Scattered Cu and high cloud.
- Wednesday: Scattered Cu and high cloud.
- Thursday: Low clouds and precipitation.
-Tomorrow: Scattered Cu during afternoon; high cloud during afternoon/evening.
-Wednesday: Clouds at low and high levels throughout day.
-Thursday: Low clouds/convective clouds and precipitation.
Tomorrow: NAM – Cirrus all day; some low cloud to west of region.
Tomorrow: GFS – Cloudy all day
Tomorrow: Canadian – Cloudy all day

10 AM CDT

1 PM CDT

4 PM CDT

7 PM CDT
Tomorrow: GEOS-5 – High clouds all day, some low clouds by afternoon

10 am 1 pm 4 pm 7 pm

High  Mid  Low
Wednesday: NAM – high level clouds through most of day

Integrated liquid and frozen hydrometeors (all levels)

10 AM CDT

1 PM CDT

4 PM CDT

7 PM CDT
Wednesday: GFS – Clouds through the afternoon
Wednesday: GEOS-5 –high throughout the day, some mid level cloud during afternoon
Thursday: NAM – Clear throughout the day
Thursday: GEOS-5 – high cloud throughout the day; mid level during afternoon

10 am 1 pm 4 pm 7 pm
### Current Information:
- Center Location: 23.8 N, 98.2 W
- Max Sustained Wind: 60 mph
- Movement: WNW at 8 mph

### Forecast Positions:
- Tropical Cyclone
- Post-Tropical

<table>
<thead>
<tr>
<th>Sustained Winds</th>
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<tr>
<td></td>
<td>&lt; 39 mph</td>
<td>39-73 mph</td>
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<td></td>
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<td>74-110 mph</td>
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<td>&gt; 110 mph</td>
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### Tropical Storm Ingrid
- Monday, September 16, 2013
- 10 AM CDT Advisory 17
- NWS National Hurricane Center

### Potential Track Area:
- Day 1-3
- Day 4-5

### Watches:
- Hurricane
- Trop.Storm

### Warnings:
- Hurricane
- Trop.Storm
TCEQ AQ Forecast:

**TODAY-THURSDAY:** Code Green - Good

Enough said.
Hourly Ozone (airnowtech.org)**
September 2nd – 15th  **EVERY 6th HOUR PLOTTED!!!!!

Marine flow = lower ozone
Hourly Ozone (airnowtech.org)

Saturday

6 am Saturday – 6 am Sunday

Sunday

6 am Sunday – 6 am Monday

Hourly Ozone (ppb)

60
40
20

0
20
40
60
80

Houston Aldine C3/O3 - 44201/1 Hr/2
Houston Westhollow C410/O3 - 44201/1 Hr/1
Manvel Croix Park C84/O3 - 44201/1 Hr/1
Conroe Relocated C78/O3 - 44201/1 Hr/1
West Houston C554/O3 - 44201/1 Hr/1
Galveston Airport C1034/O3 - 44201/1 Hr/1
Coastal Center C697/O3 - 44201/1 Hr/1
West Liberty C699/O3 - 44201/1 Hr/1
Clinton C403/O3 - 44201/1 Hr/3

Northwest Harris Co. C26/C110/C154/O3 - 44201/1 Hr/2
Houston Deer Park C35/O3 - 44201/1 Hr/1
Seabrook Friendship Park C45/O3 - 44201/1 Hr/1
Texas City C620/O3 - 44201/1 Hr/1
La Porte Sylvan Beach C556/O3 - 44201/1 Hr/1
Sugarland C696/O3 - 44201/1 Hr/1
Jones Forest C598/O3 - 44201/1 Hr/1
Channelview C155/O3 - 44201/1 Hr/3
Houston Texas Avenue C411/O3 - 44201/1 Hr/1 (Method: 047)
Houston Network of Environmental Towers (H-NET) collect chemistry and meteorological measurements for air quality model applications in Houston Galveston Area. This web site provides real-time update of collected data, as well as historical data.

Currently, five sites have been set up in

- UH - Main Campus (695)
- Jones State Forest (698)
- West Liberty Airport (699)
- UH - Sugar Land (696)
- UH - Coastal Center (697)

More about this project.
**HNET**

### Ozone (ppbv)

**NE & E flow:** Sugarland-West Liberty ~35-40 ppbv

**Variable & sometimes gusty winds:** ~25-30 ppbv

**E & SE winds = marine flow.**
Sugar Land
Jones Forest
Moody Tower
West Liberty
Coastal Center

O₃ (ppbv) – 15 min avg
September 2nd – 15th

= 50 ppbv

Houston – Network of Environmental Towers (H-NET)
Not sure what happened as wind speed and direction didn’t change much.

Seems to be shift to marine influence though.
CO (ppbv) – 15 min avg
September 2nd – 15th

= 200 ppbv
NOAA Experim. CMAQ

1.5 Km Ozone

9 am

2 pm

5 pm

9 am noon 2 pm 5 pm
NO2 [ppb] at 1013 [hPa] Valid 14Z SEP 17 2013

TUESDAY
NOAA Experm. CMAQ Model
Surface Formaldehyde

FORM [ppb] at 1013 [hPa] Valid 19Z SEP 17 2013

2 pm

TUESDAY

NOAA Experm. CMAQ Model
Surface Formaldehyde

FORM [ppb] at 1013 [hPa] Valid 22Z SEP 17 2013

5 pm
CAMx Model

**Ozone**

**9 am**
Best Case: CAMx Layer 14

Min(113,25) = 24.6, Max(94,99) = 64.4
Tue September 17 09:00 CST

**noon**

Min(106,25) = 24.5, Max(99,65) = 71.9
Tue September 17 12:00 CST

**2 pm**

**Ozone**
Best Case: CAMx Layer 14

Min(98,25) = 24.7, Max(96,102) = 79.1
Tue September 17 14:00 CST

**5 pm**

Min(88,2) = 25.5, Max(90,105) = 77.1
Tue September 17 17:00 CST
Formaldehyde
Best Case: CAMx Layer 14

2 pm

TUESDAY

CAMx Model Formaldehyde
1.2 km (Layer 14)

Formaldehyde
Best Case: CAMx Layer 14

5 pm

Tue September 17 14:00 CST

Min(50,59) = 0.4, Max(137,50) = 3.9

Min(52,59) = 0.1, Max(122,48) = 4.5

Tue September 17 17:00 CST
Fire-counts over last week.
High AOD associated with agricultural fire plume.

Backdoor cold front pushed smoke over Houston.
High AOD associated with agricultural fire plume.

Pushed north of us.
Hourly PM$_{2.5}$ (airnowtech.org)**

September 2$^{nd}$ – 15$^{th}$

** EVERY 6$^{th}$ HOUR PLOTTED!!!!!!
DRAGON: September 12th (Thursday) at Level 1.5

0.08-0.22
0.19-0.34
DRAGON : September 14th (Saturday) at Level 1.5

0.37-0.60
Plume north of area today.

Plume just north & east of Houston so needs to be watched.

Model assumes persistence of agricultural fires, so ....
TUESDAY

2 pm

NOAA Experimental CMAQ AOT

5 pm

(dev) aot 32H VALID 14Z 17 SEP2013 [dimensionless]

(dev) aot 40H VALID 22Z 17 SEP2013 [dimensionless]
PBL Height
Texas 12km

Min(12,108) = 15.9, Max(49,41) = 1083.2

Tue September 17 08:00 CST
Model Intercomparison
September 16, 2013

Mariel Friberg
O3
CAMx vs. NOAA-CMAQ
vs. UH-CMAQ
Surface
CAMx

Ozone
Best Case

NOAA-CMAQ
Surface O3

03 [ppb] at 1013 [hPa] Valid 19Z SEP 17 2013

Min(71,14) = 25.7, Max(81,71) = 83.5
Tue September 17 14:00 CST

Min(55,4) = 1.1, Max(89,104) = 74.2
Tue September 17 17:00 CST

UH-CMAQ

CMAQ 20130916_19:00:00Z

CMAQ 20130916_22:00:00Z
O3

CAMx vs. NOAA-CMAQ
vs. UH-CMAQ
Layer 14
CAMx
Ozone
Best Case: CAMx Layer 14

NOAA-CMAQ
850 hPa O3
O3 [ppb] at 850 [hPa] Valid 14Z SEP 17 2013

UH-CMAQ
CMAQ 20130916_14:00:00Z
O3 (ppbv) at 850 hpa
UH Modeling Group

CMAQ 20130916_17:00:00Z
O3 (ppbv) at 850 hpa
UH Modeling Group

Min(113,25) = 24.6, Max(94,99) = 64.4
Tue September 17 09:00 CST

Min(106,25) = 24.5, Max(96,65) = 71.9
Tue September 17 12:00 CST
NO2, NO, NOx

CAMx vs. NOAA-CMAQ
vs. UH-CMAQ
Layer 14
CH2O
CAMx Best Case vs. NOAA-CMAQ
vs. UH-CMAQ
Layer 14
AOD

NOAA-CMAQ vs. UH-CMAQ