Review of Summertime Winds at George Bush International Airport (KIAH)

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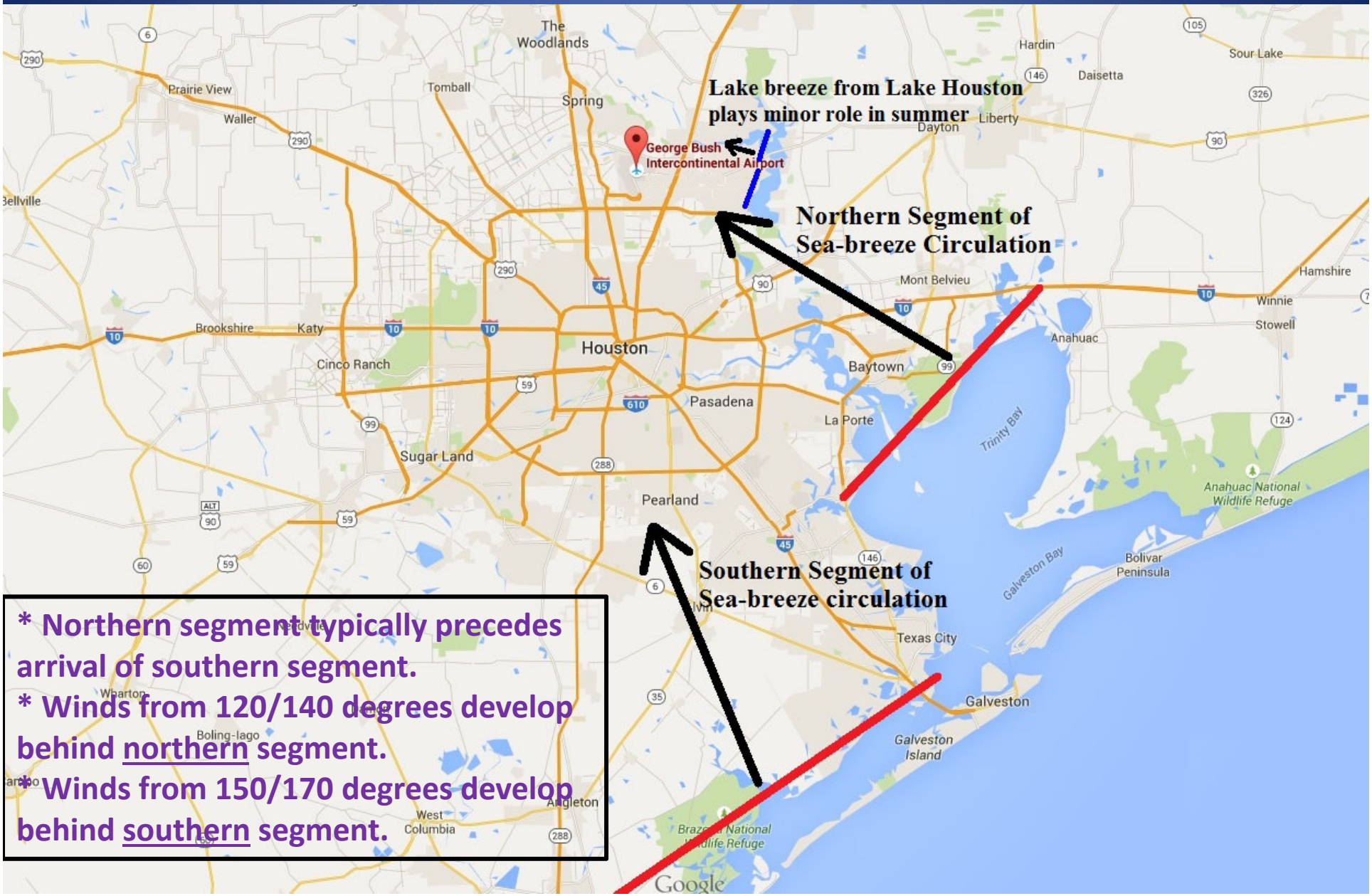
Geography of Houston Metro Area



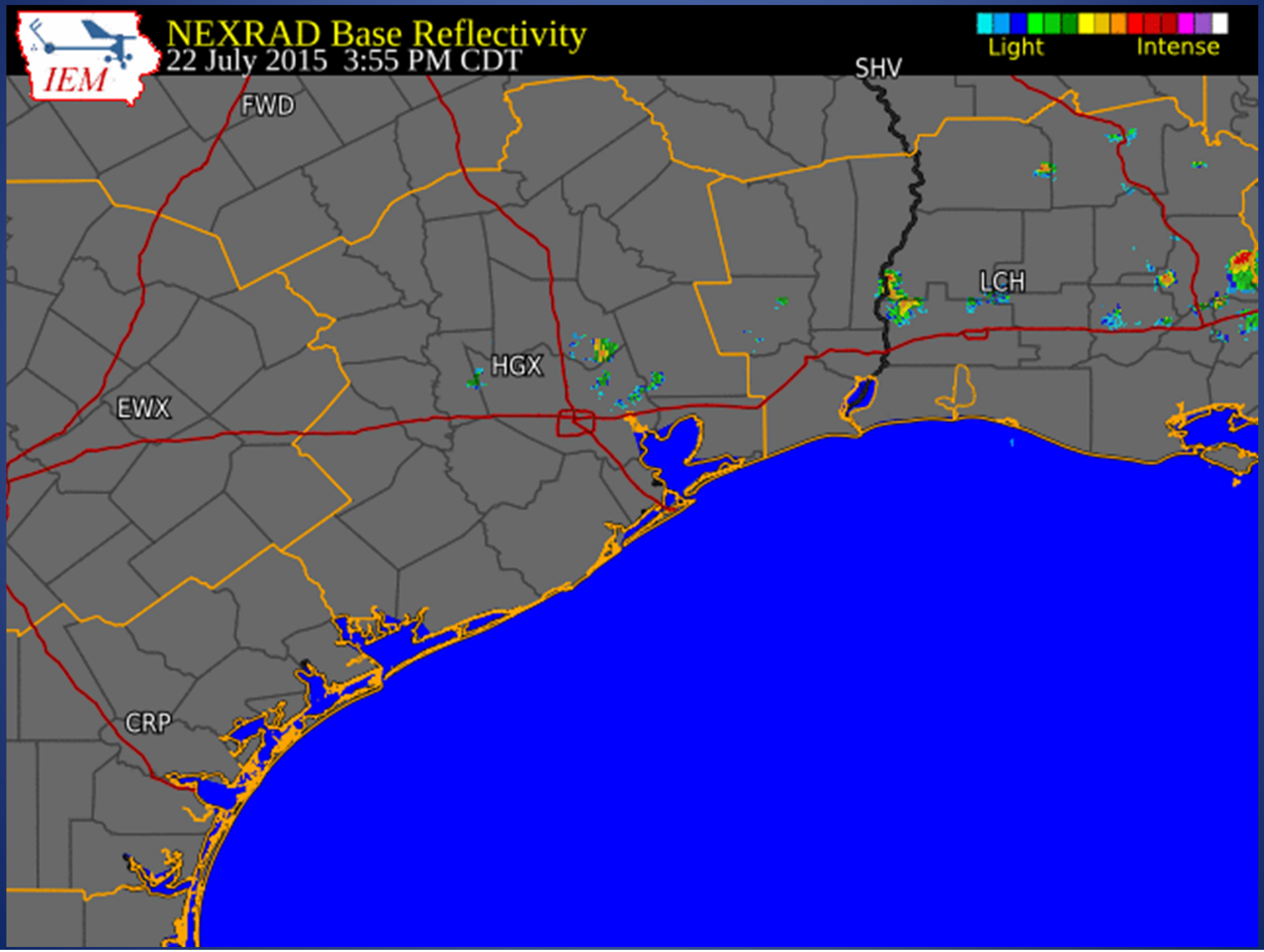
* Northern segment typically precedes arrival of southern segment.
* Winds from 120/140 degrees develop behind northern segment.
* Winds from 150/170 degrees develop behind southern segment.

July 22, 2015 Event

- Afternoon convection developed east of KIAH with outflow boundaries arriving at KIAH prior to 21Z.
- Interaction of aforementioned outflow boundaries, northern segment of sea-breeze circulation (and possible enhancement from lake breeze from Lake Houston) maintained easterly winds for approximately 2 hours.
- A persistent and deep southerly flow was noted through the lowest 5,000 feet in the afternoon/evening. This allowed main (southern) segment of sea-breeze circulation to arrive from the south prior to 23Z.

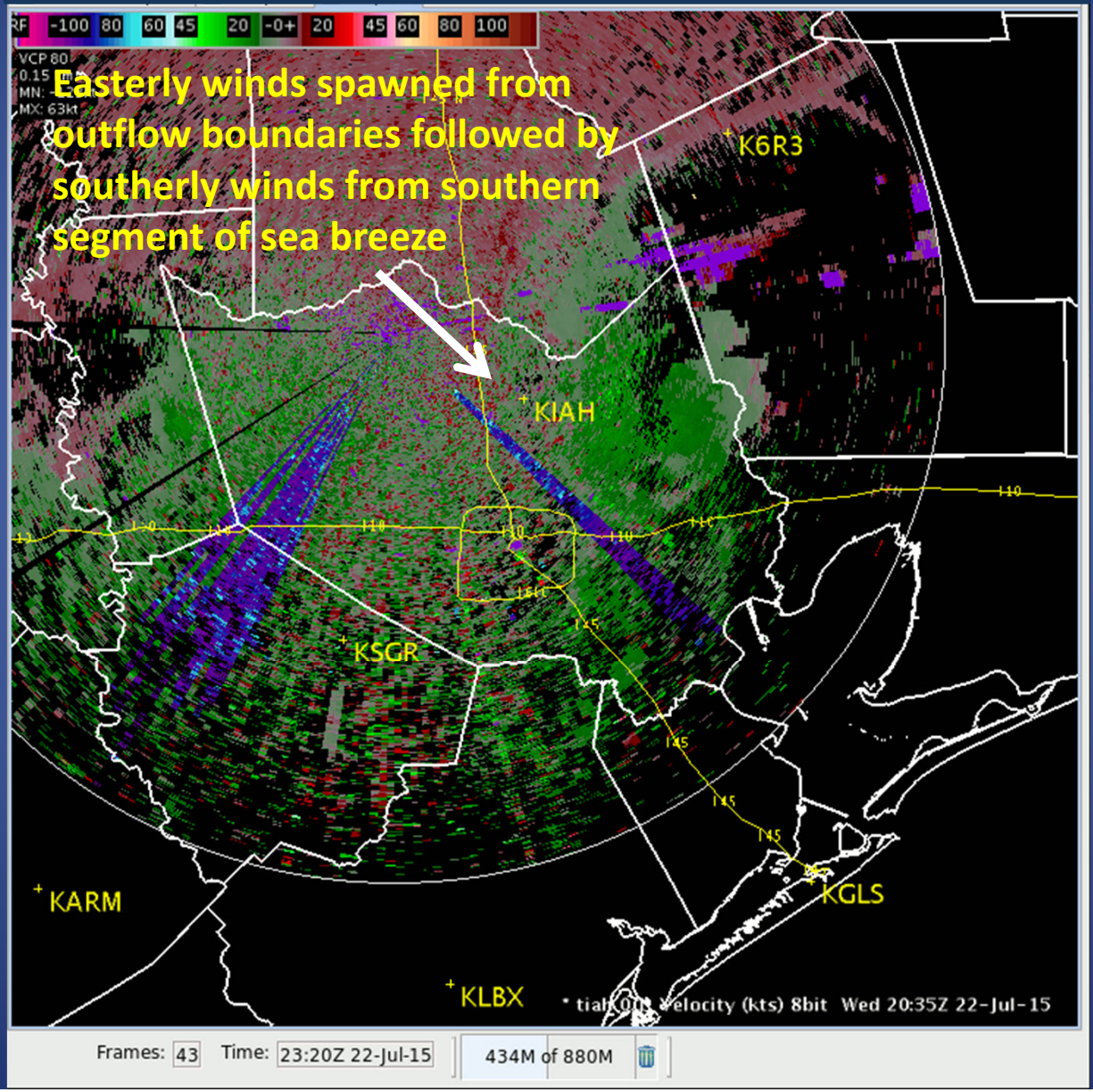
See following slides for animation of kiah reflectivity data and tiah 0.1 velocity data

kiah Reflectivity–Animation (July 25, 2015)



tiah 0.1 Degree Velocity - Animation

July 22, 2015 20:35Z – 23:10Z



KIAH METARs – July 22, 2015

Houston Intercontinental Airport, TX. KIAH (NWS/FAA)

Elev: 89 ft; Latitude: 29.98440; Longitude: -95.36074

NOTE: earlier METARs displayed at bottom

KIAH 230353Z 19006KT 10SM FEW250 28/23 A2995 AO2 SLP142 T02830228

KIAH 230253Z 18004KT 10SM FEW250 29/23 A2993 AO2 SLP133 T02890233 53019

KIAH 230153Z 19005KT 10SM FEW250 30/23 A2990 AO2 SLP125 T03000228

KIAH 230053Z 18009KT 10SM FEW045 SCT250 32/23 A2989 AO2 SLP120 T03170233

KIAH 222353Z 16011KT 10SM FEW050 SCT250 32/24 A2987 AO2 SLP115 60000 T03220239 10356 20294 56007

KIAH 222253Z 16016G21KT 10SM FEW060 SCT250 33/25 A2988 AO2 SLP115 T03330250

Arrival of southern segment

KIAH 222153Z 11011KT 10SM SCT050 BKN095 BKN250 31/26 A2989 AO2 WSHFT 2057 SLP120 T03060256

KIAH 222115Z 11012KT 10SM SCT050 BKN090 BKN250 30/26 A2990 AO2 WSHFT 2057 CB DSNT N-NE MOV NE

Effects from outflow boundaries and sea breeze

KIAH 222053Z 16005KT 10SM SCT050 BKN090 OVC250 32/25 A2990 AO2 RAB08E21 SLP122 CB DSNT NE-E MOVG NE P0000 60000 T03170250 56014

KIAH 221953Z 19007KT 10SM SCT050 SCT095 BKN250 35/23 A2990 AO2 SLP124 CB DSNT E-SE MOVG NE T03500228

KIAH 221853Z VRB05KT 10SM SCT050 BKN250 35/22 A2992 AO2 SLP129 CB SHRA DSNT SE MOVG NE T03500222

KIAH 221753Z 27007KT 230V300 10SM SCT040 BKN250 34/23 A2994 AO2 SLP136 CB DSNT SE MOVG NE T03390228 10339 20256 58006

KIAH 221653Z 21008KT 10SM SCT038 SCT250 34/23 A2995 AO2 SLP141 MDT CU E-S T03390228

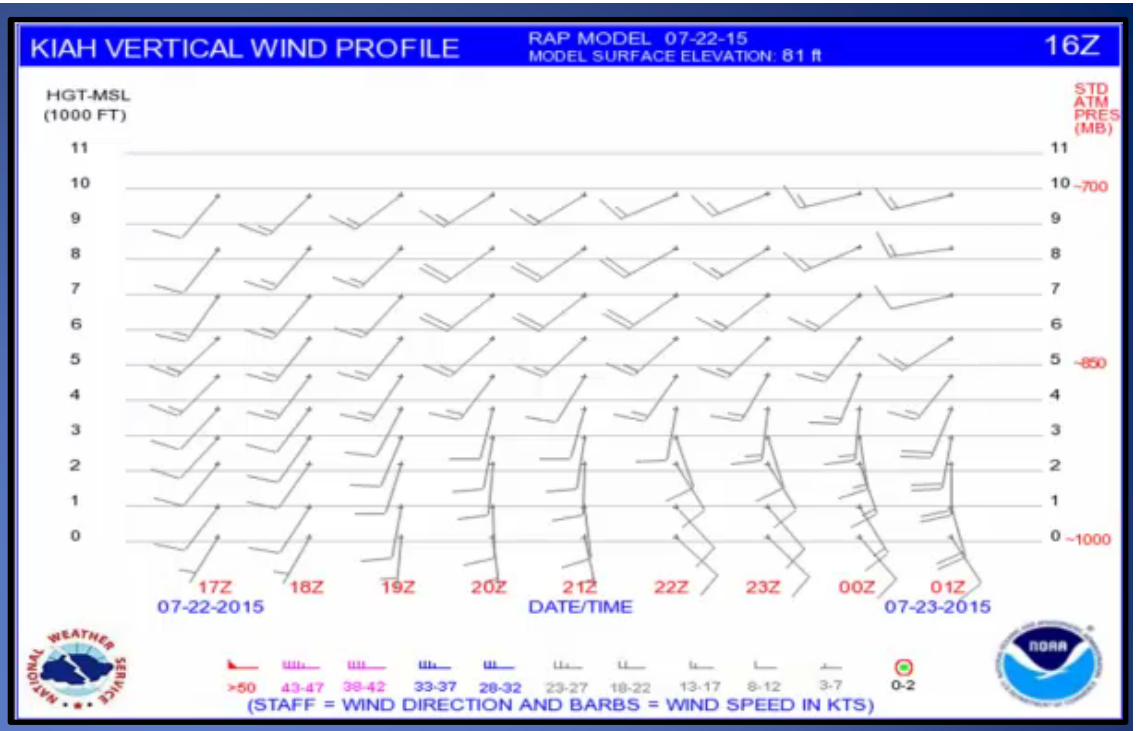
KIAH 221553Z 21007KT 180V240 10SM BKN030 BKN250 32/23 A2995 AO2 SLP141 T03170233

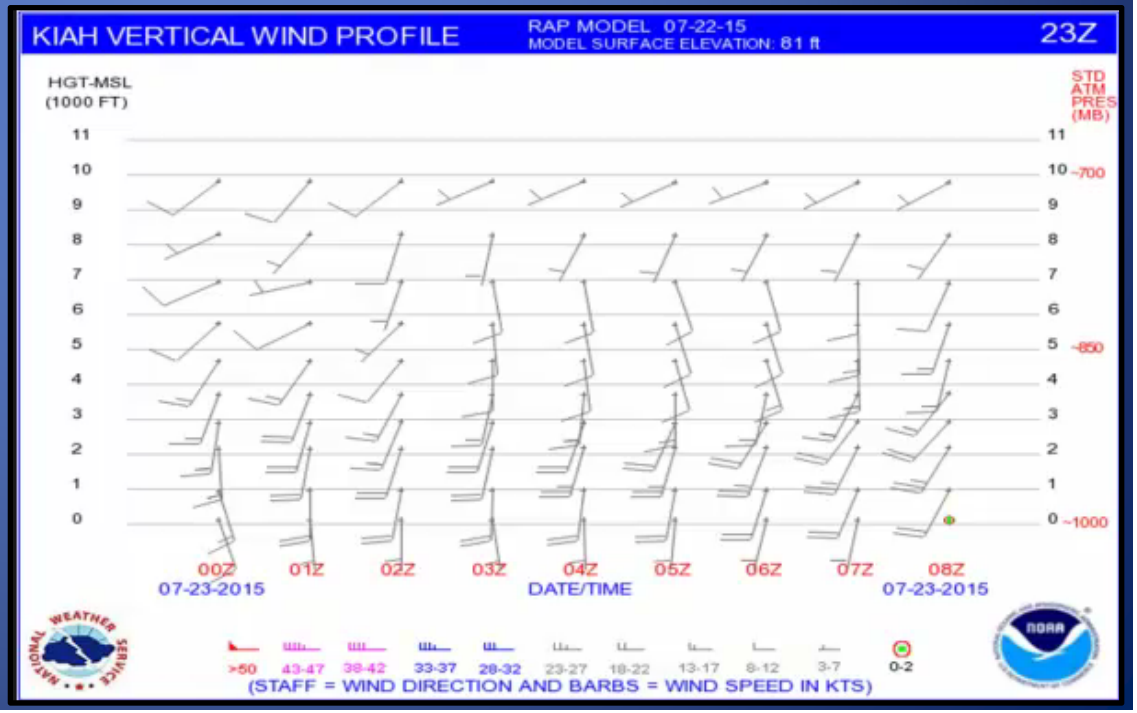
KIAH RAP Vertical Wind Profile - July 22, 2015

16Z issuance - top image

23Z issuance – bottom

NOTE: Pronounced southerly winds through the lowest 5,000 feet allowed for the southern segment of sea-breeze to arrive within a few hours of northern segment.





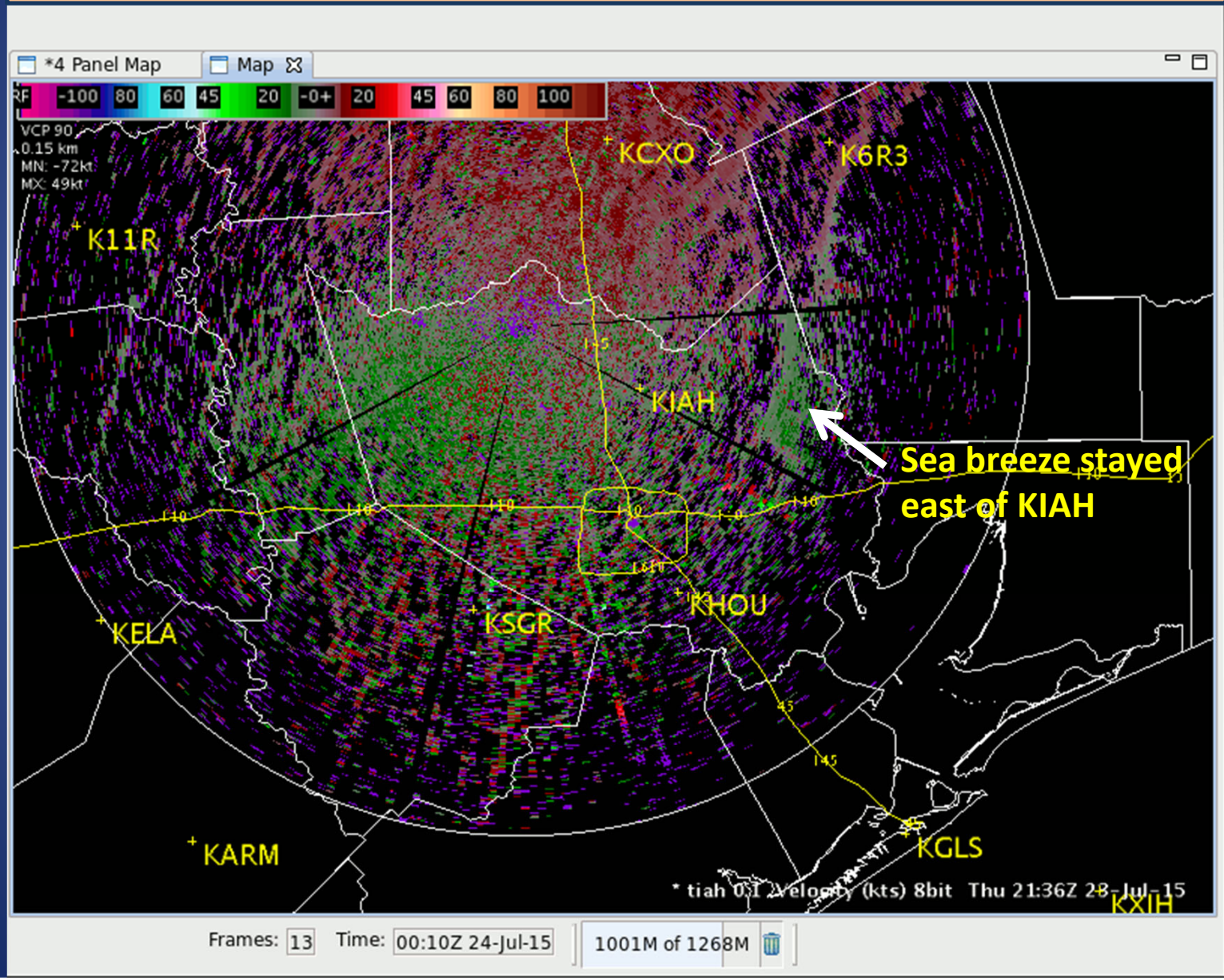
July 23, 2015 Event

- There was no convection on this day.
- A persistent and deep southerly flow was noted through the lowest 5,000 feet in the afternoon/evening.
- These winds held the northern segment of the sea-breeze circulation east of KIAH while some semblance of the southern segment may have arrived late.
- Surface winds at KIAH stayed between 180/230 degrees.

See following slide for tiah 0.1 velocity data

tiah 0.1 Velocity- Animation

July 23, 2015 21:36Z – 00:50Z



KIAH METARs – July 23, 2015

NOTE: No sea breeze arrival

Houston Intercontinental Airport, TX. KIAH (NWS/FAA)

Elev: 89 ft; Latitude: 29.98440; Longitude: -95.36074

NOTE: earlier METARs displayed at bottom

KIAH 240353Z 19007KT 10SM CLR 28/23 A3000 AO2 SLP159 T02830233

KIAH 240253Z 18007KT 10SM CLR 29/22 A2998 AO2 SLP150 T02940222 53015

KIAH 240153Z 19007KT 10SM FEW250 31/22 A2996 AO2 SLP143 T03110222

KIAH 240053Z 18010KT 10SM FEW250 33/22 A2995 AO2 SLP139 T03280217

KIAH 232353Z 19010KT 10SM FEW065 SCT250 34/20 A2993 AO2 SLP135 T03440200 10367 20344 56007

KIAH 232253Z 19008KT 10SM SCT065 36/21 A2994 AO2 SLP136 T03610206

KIAH 232153Z 18009KT 10SM SCT070 36/21 A2994 AO2 SLP137 T03610206

KIAH 232053Z 20008G15KT 150V230 10SM SCT060 SCT250 36/21 A2995 AO2 SLP142 T03610211 58019

KIAH 231953Z 19007KT 160V220 10SM SCT055 SCT250 36/22 A2998 AO2 SLP150 T03610217

KIAH 231853Z 23007G17KT 10SM SCT050 BKN250 35/22 A3000 AO2 SLP158 T03500222

KIAH 231753Z 21008G15KT 10SM SCT045 BKN250 35/23 A3001 AO2 SLP162 T03500228 10350 20250 58004

KIAH 231653Z 18008KT 10SM SCT035 SCT250 34/23 A3002 AO2 SLP166 T03390228

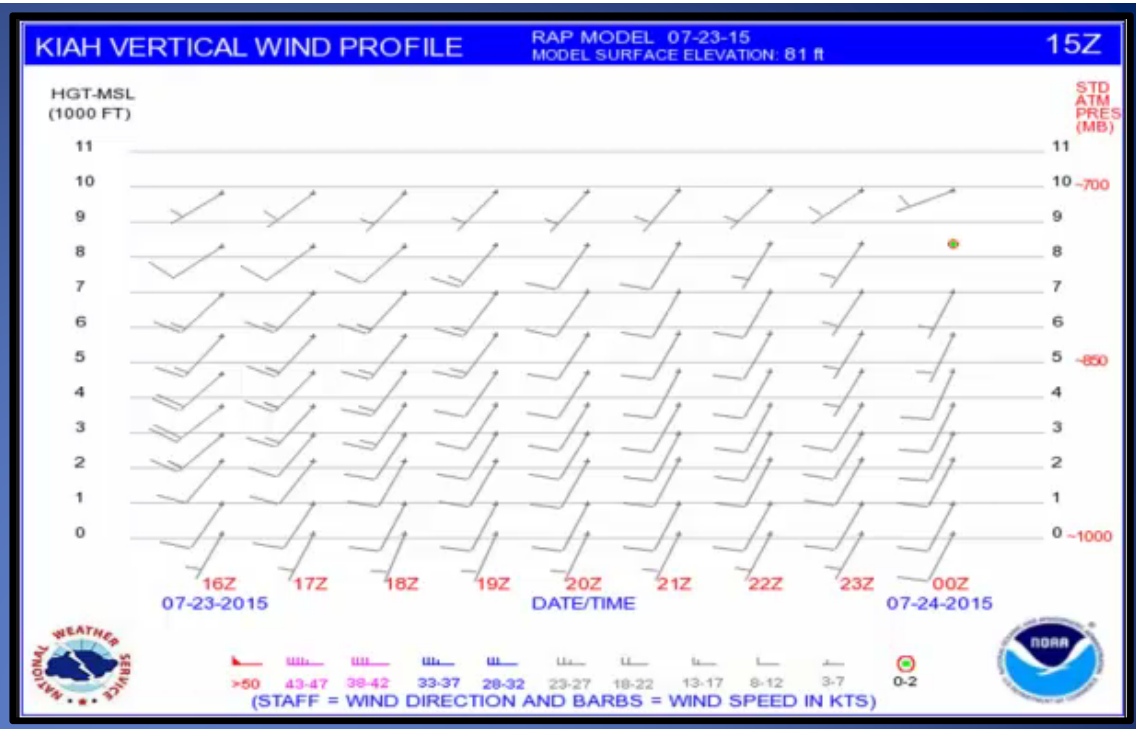
KIAH 231553Z 18008KT 10SM FEW028 SCT250 33/24 A3002 AO2 SLP166 T03280244

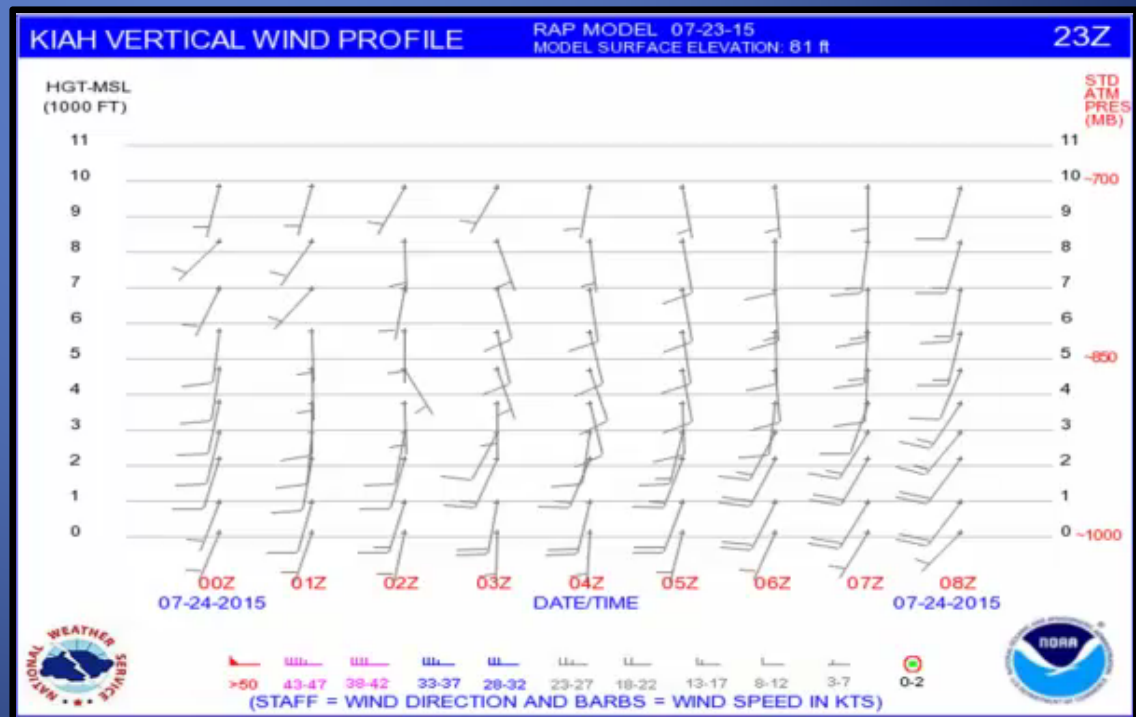
KIAH RAP Vertical Wind Profile - July 23, 2015

15Z issuance - top image

23Z issuance – bottom

NOTE: Both wind profiles indicated pronounced southerly winds (i.e., 10 knots or stronger) would extend through the lowest 5,000 feet and last through at least 00Z.





July 24, 2015 Event

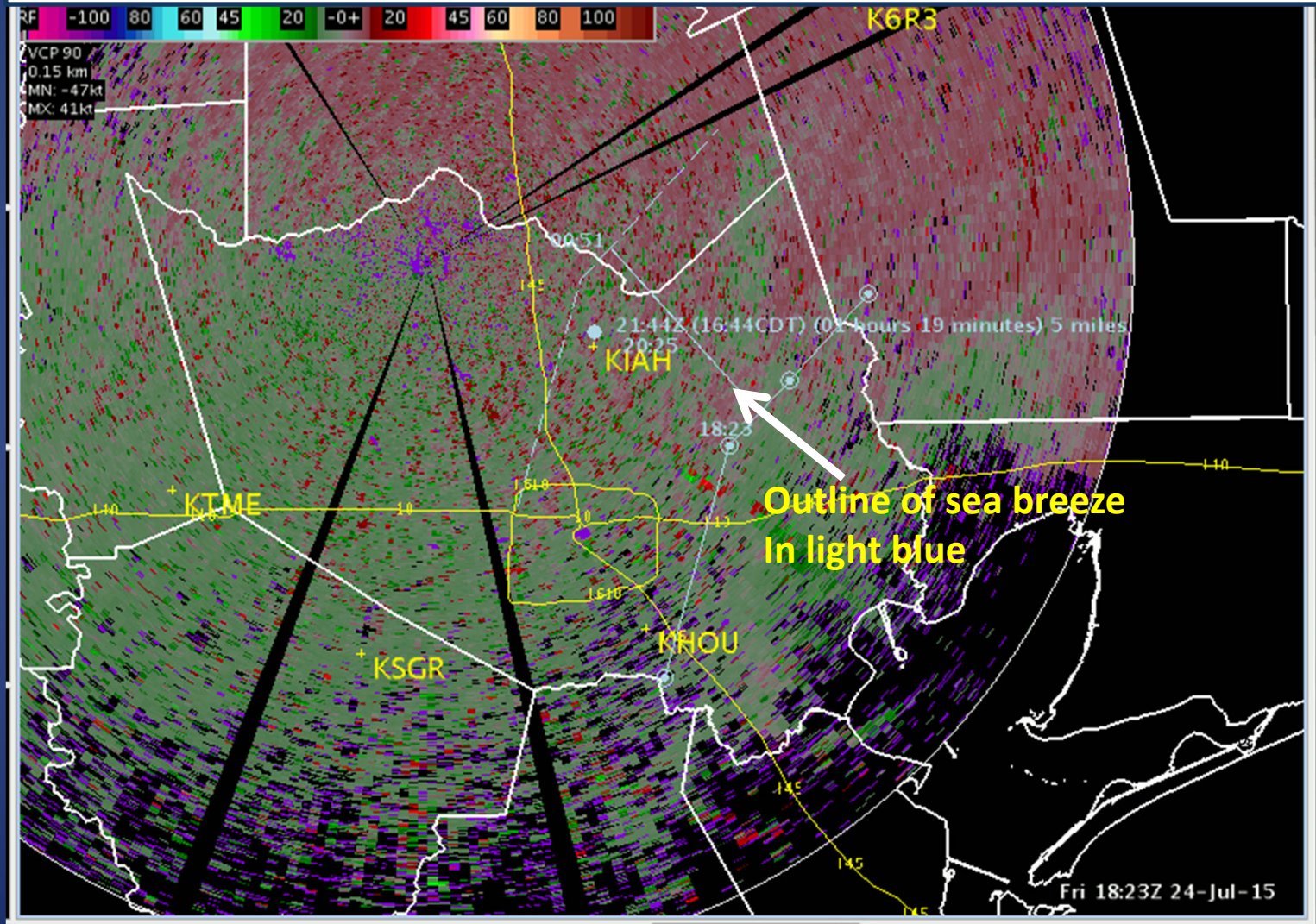
- There was no convection on this day.
- A weak southerly flow was noted through the lowest 5,000 feet in the afternoon/evening.
- In particular, winds within the lowest 3,000 feet were only 5 knots which enabled the northern segment of the sea-breeze circulation to arrive by 22Z with southeast winds (from 130 degrees and near 10 knots) developing in its wake and lasting for about 3 hours.

See following slide for tiah 0.1 velocity data

tiah 0.1 Velocity- Animation

July 24, 2015 18:23Z – 20:25Z

NOTE: Radar went offline after 20:25Z



KIAH METARs – July 24, 2015

Houston Intercontinental Airport, TX. KIAH (NWS/FAA)

Elev: 89 ft; Latitude: 29.98440; Longitude: -95.36074

NOTE: earlier METARs displayed at bottom

KIAH 250253Z 17007KT 10SM FEW040 SCT250 30/23 A2997 AO2 SLP147 T03000233 53006

KIAH 250153Z 17008KT 10SM FEW045 SCT250 31/23 A2996 AO2 SLP144 T03110233

KIAH 250053Z 17008KT 10SM FEW050 SCT250 32/23 A2995 AO2 SLP141 T03220233

KIAH 242353Z 14014KT 10SM FEW050 SCT250 33/24 A2995 AO2 SLP140 T03330239 10367 20333 56012

KIAH 242253Z 13012KT 10SM FEW060 SCT250 34/24 A2995 AO2 SLP141 T03390244

KIAH 242153Z 13007KT 10SM SCT065 36/23 A2997 AO2 SLP146 T03610228 **seabreeze arrival**

KIAH 242053Z 16007KT 090V200 10SM SCT060 37/21 A2998 AO2 SLP152 T03670211 56022

KIAH 241953Z 18006KT 10SM SCT055 36/21 A3000 AO2 SLP157 T03610211

KIAH 241853Z 21007KT 10SM SCT050 35/22 A3002 AO2 SLP166 T03500217

KIAH 241753Z 26004KT 10SM SCT045 33/22 A3005 AO2 SLP174 T03330222 10339 20239 58004

KIAH 241653Z 17004KT 10SM SCT037 34/23 A3006 AO2 SLP178 T03390233

KIAH 241553Z VRB04KT 10SM SCT030 32/24 A3007 AO2 SLP180 T03220239

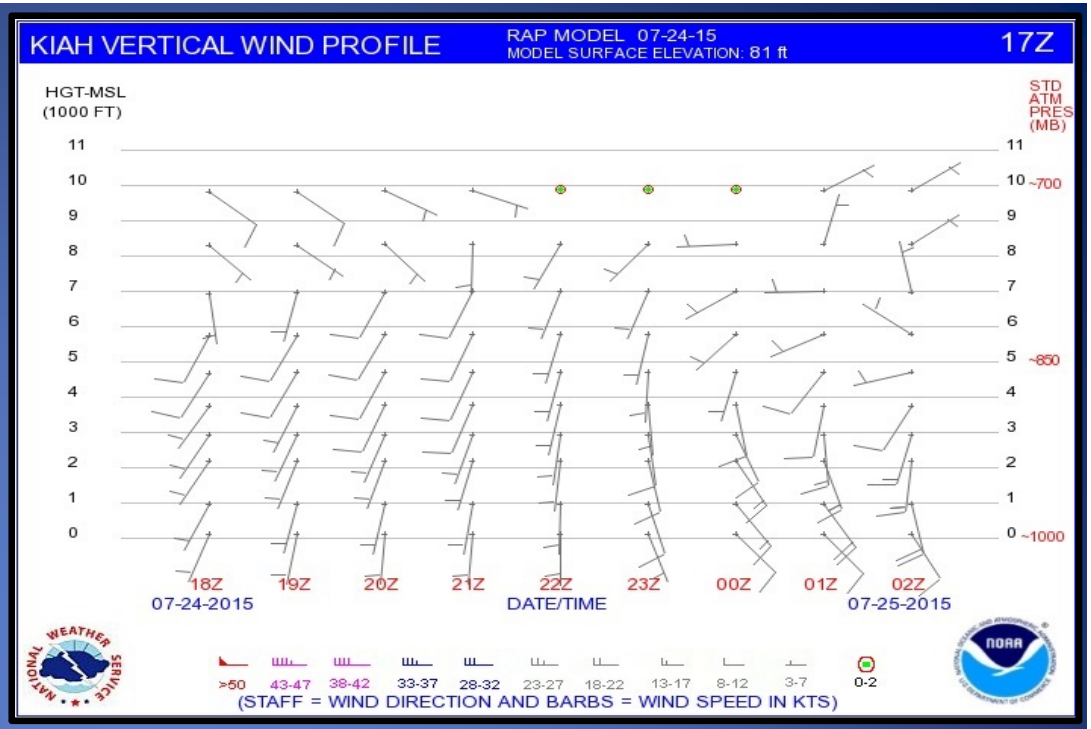
KIAH 241453Z VRB04KT 10SM SCT022 30/24 A3006 AO2 SLP179 T03000244 51014

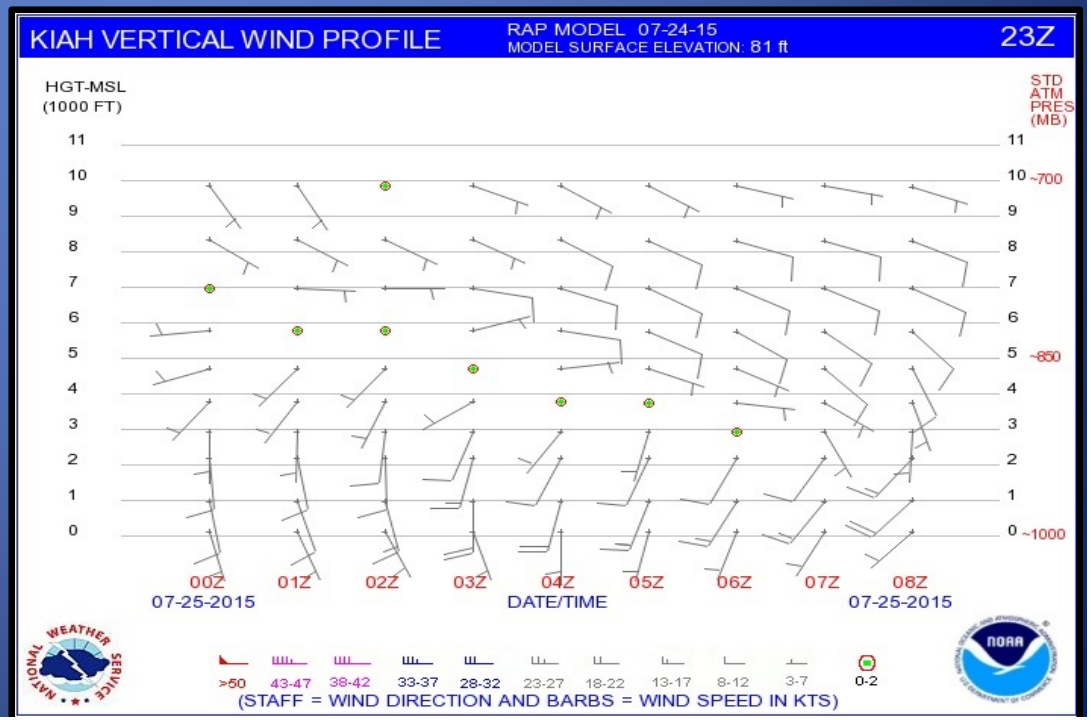
KIAH RAP Vertical Wind Profile - July 24, 2015

17Z issuance - top image

23Z issuance – bottom

NOTE: 17Z issuance indicated light southerly winds (i.e., 5 knots) would extend from surface through the lowest 5,000 feet and last through at least 00Z. Some semblance of sea-breeze arrival around 00Z.





What Can We Learn?

- KIAH RAP Vertical Wind Profile graphics can be a valuable tool in forecasting afternoon winds in the summer.
  - Identify potential changes in wind direction/speed.
  - Light winds within lowest 5,000 feet will favor arrival of northern segment of sea breeze with winds between 120/140 degrees.
  - Southerly winds of 10 knots or stronger within lowest 5,000 feet will preclude arrival of northern segment with winds backing no more than 160 degrees.
- Northern segment of sea breeze (if conditions support) **normally** arrives after 5 PM CDT and precedes arrival of southern segment. However, east or southeast winds in the lowest 5,000 feet will favor an earlier arrival of the northern segment.
- Inflow into thunderstorm development near KIAH can result in both an earlier arrival and prolonged event of easterly winds at KIAH!!