

UAL #898 IAH-MSY 15Mar2016 Turbulence Event

Information Provided by United:

1. Flight Number-Date	898-04
2. City Pairs	IAH – MSY
3. Aircraft number and type	N23708 B737-724
4. Approximate incident location (lat/lon or proximity to a station) and flight level.	In the vicinity of SBI (Sabine Pass) VOR /DME – (Lat: 29-41-12.191N Lon: 094-02-16.723W) @FL270
5. Time the event occurred.	Approx. 0250Z
6. Potential incident cause (clear air turbulence, convective activity, wind shear, etc...)	Clear Air Turbulence (Possible)
7. Verify if the seat belt signs were on.	Yes
8. Verify if the Flight Attendants were seated.	No
9. Dispatcher sector	Sector 24
10. Emergency declared?	Yes (Medical)
11. Paramedics requested?	Yes
12. Medlink contacted?	Yes – Case# BMDC-064626
13. Additional medical assistance?	Unknown
14. Additional comments.	None

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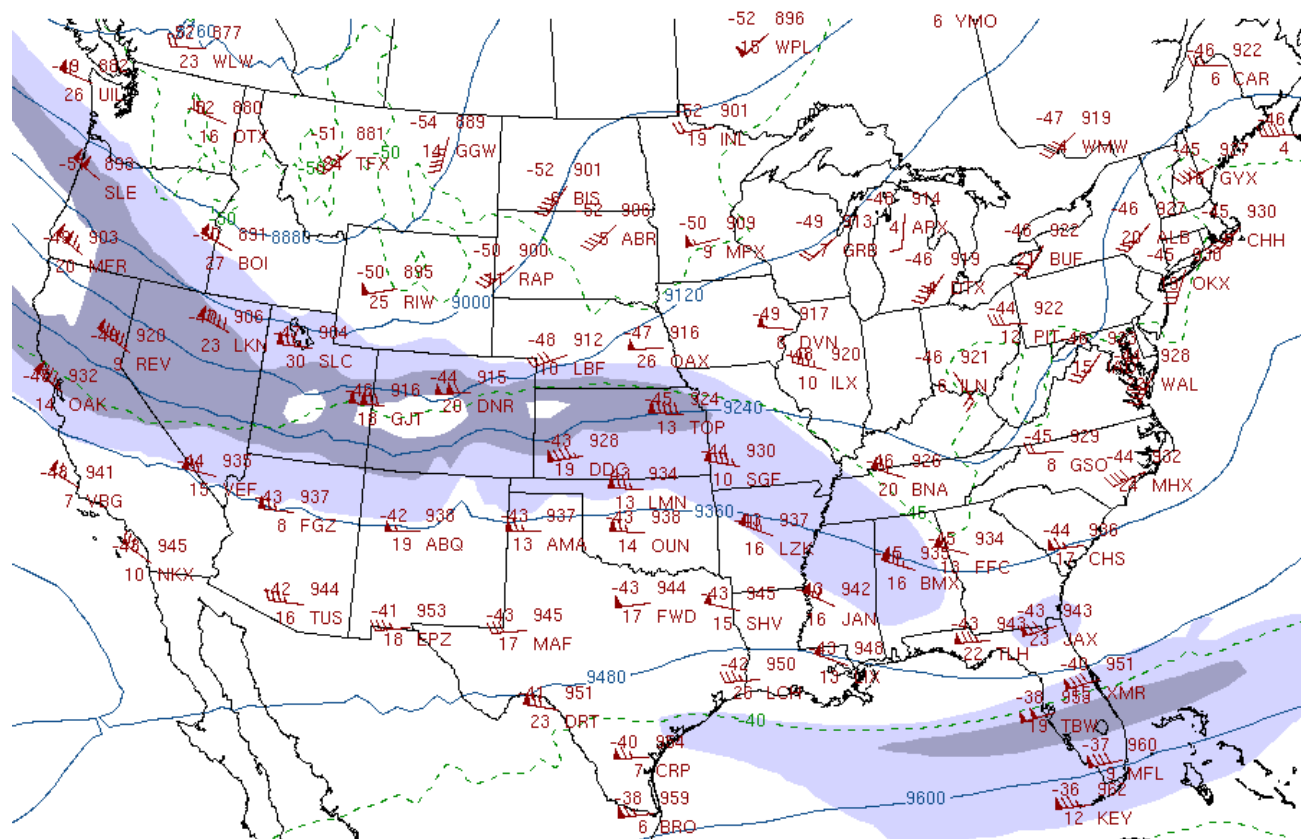
Weather Analysis:

- Wind flow patterns at first-glance look benign at flight levels (see radiosondes reports from 300mb at 15/0000z on the next slide).
- Satellite imagery supported this with drier air in the middle tropospheric levels across the northern half of TX and southern LA with increasing moisture further to the south with the stronger jet stream winds. None of these cloud signatures identified the potential for any significant turbulence.
- The RPM graphical turbulence guidance did forecast possible moderate turbulence in a narrow band further south, about 60-90nm south of the TX/LA coast, with a branch of the jet across south TX.
- All PIREPs and TAPS reports across the region leading up to the incident only indicated light turbulence or less. Consequently, The Weather Company forecasts only called for light turbulence (see FPG between FL290-360 on slide 6).
- However, when looking at the output coming from the AMDAR reported winds (winds reported by aircraft in the various phases of flight), it can be seen that the winds with the branch of the jet coming down from northern TX into southern LA, not necessarily from central and south TX eastward, were stronger in the mid FL300's than forecasted. See slides 8 and 9.
- The AMDAR winds reported at cruise as well as an ascent sounding from HOU indicate a rapid increase in wind speeds with altitude above FL300 on the order of 8-10ks/1000ft of altitude. This area of vertical shear likely developed rapidly, and thus was not captured by the forecasts or the ride reports until near the time UAL 898 encountered turbulence near the Sabine Pass VOR.

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Constant Pressure Wind chart valid 15/0000z:

- This chart represents wind, temperature and RH levels as measured by radiosondes at the 300mb level which is approximately 30,000ft MSL.
- It shows wind in the 65kt range and above flowing across central TX with a narrow zone of weaker winds, under 50kts, slight further north including the incident area near the SBI nav point.

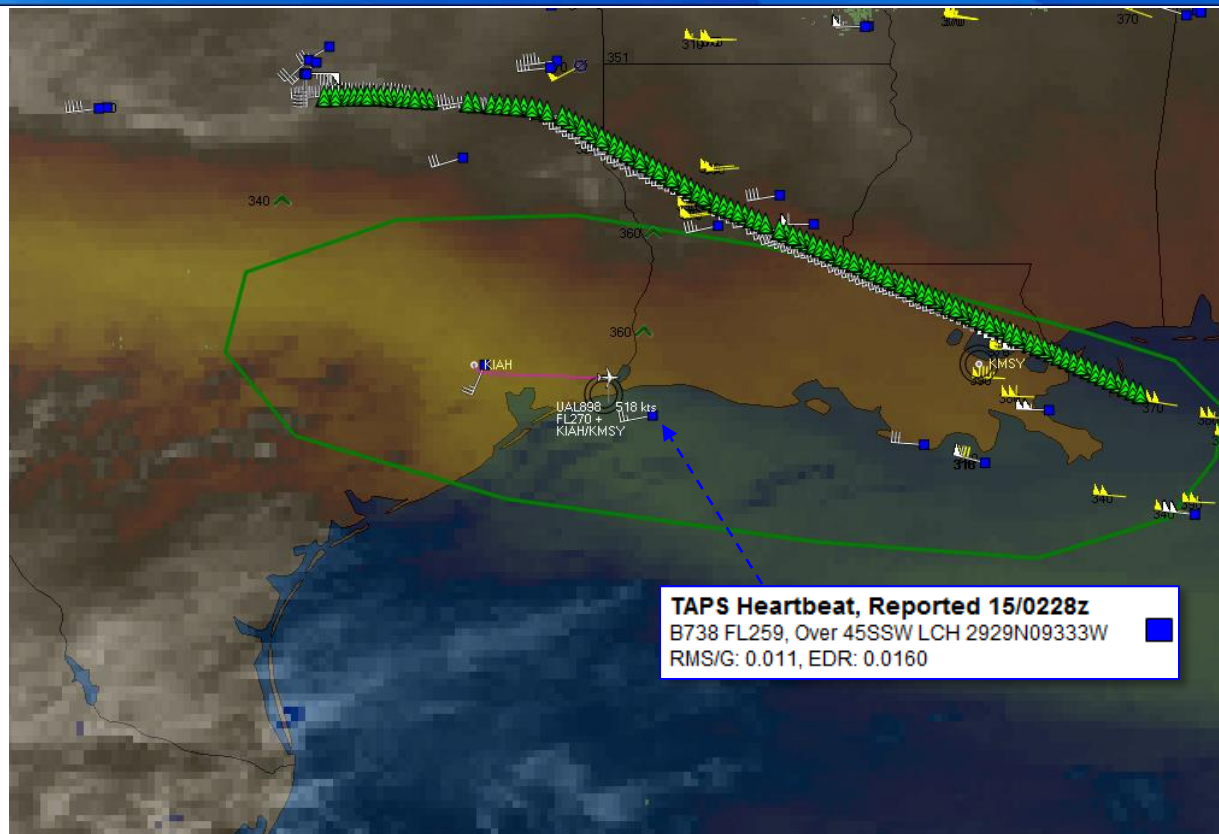


00Z 15 Mar 2016 300 hPa

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Fusion Replay screen shot - valid 15/0250z:

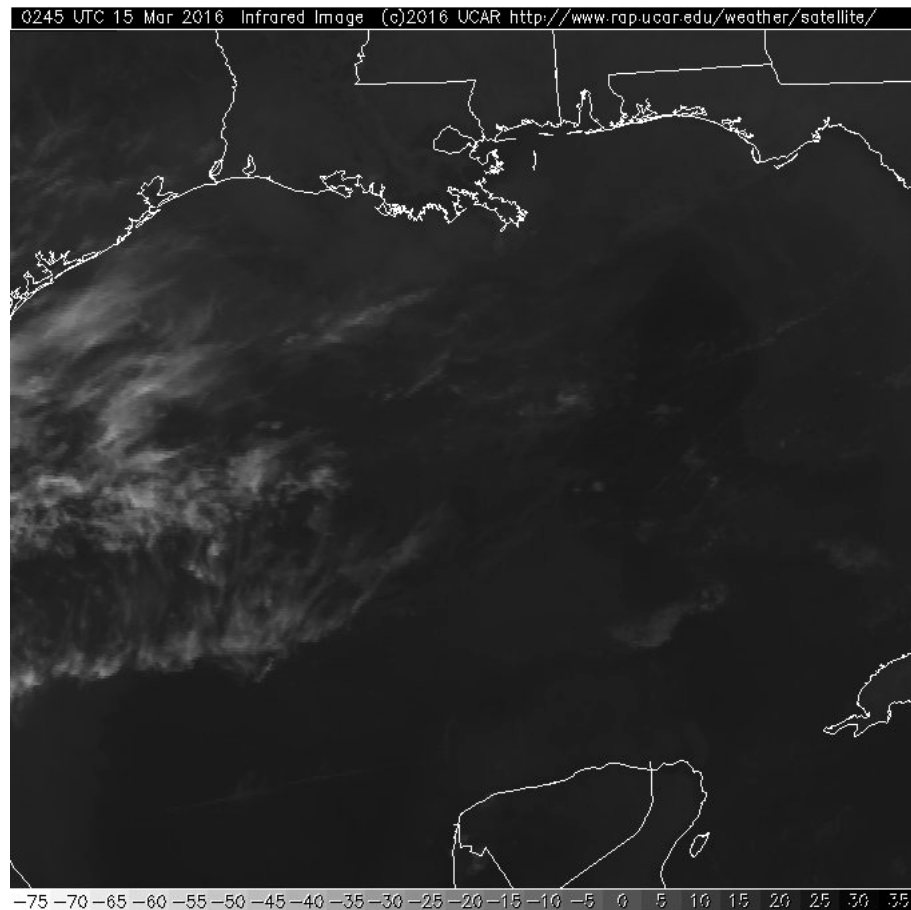
- Satellite image shows mid level tropospheric moisture. Over the SBI area (highlighted with the double circle) the brown enhancement indicates dry, sinking air.
- Note the LGT PIREP at FL360 about 30nm north of the aircraft at the incident time and the TAPS heartbeat report at FL270 just southeast of UAL898 position.
- There were no reports of anything more than light turbulence across the whole image domain, though this does not mean there couldn't be something stronger.



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Standard IR imagery (10.5 micron):

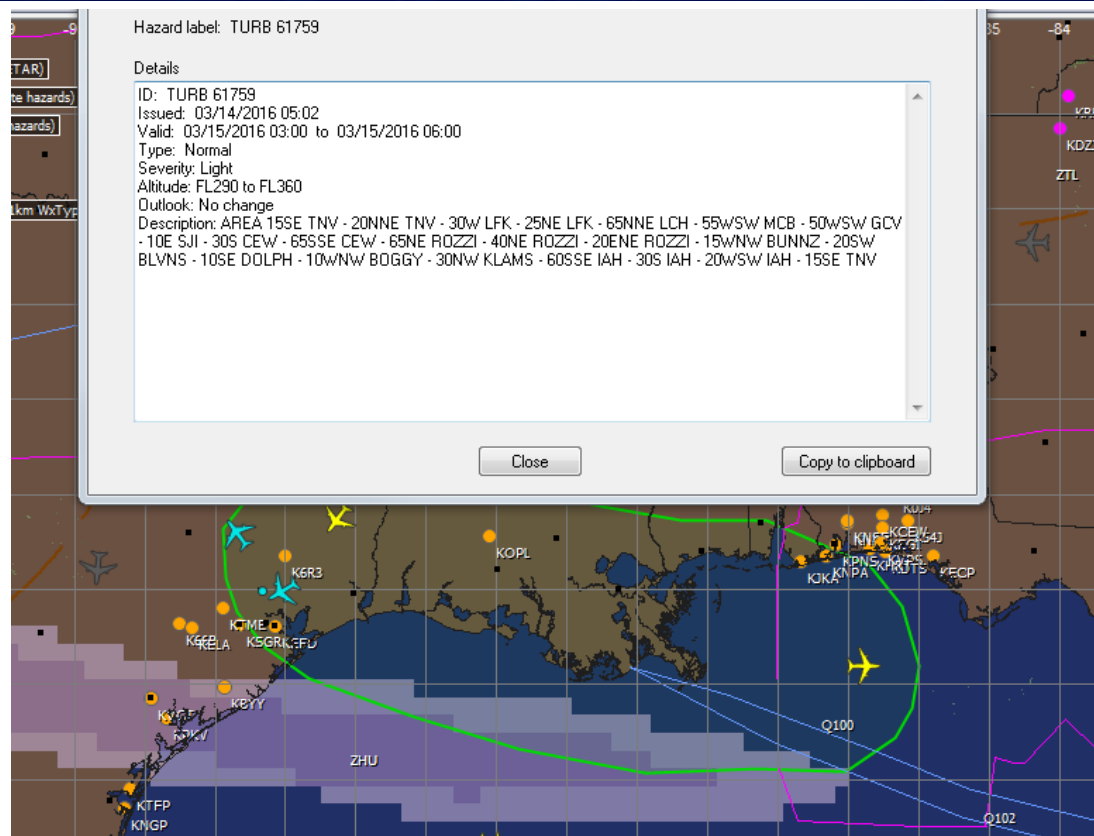
- This infrared image was valid at 0245z
- The cloud signatures are nothing special and did not offer any glimpse of turbulence of something more than light across the northern Gulf and coastal areas.



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Flight Explorer screen shot from NOC:

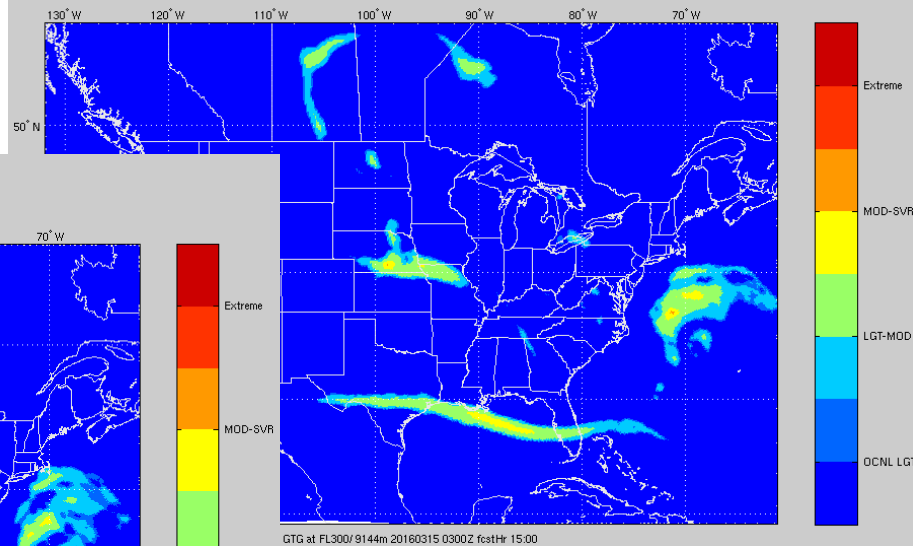
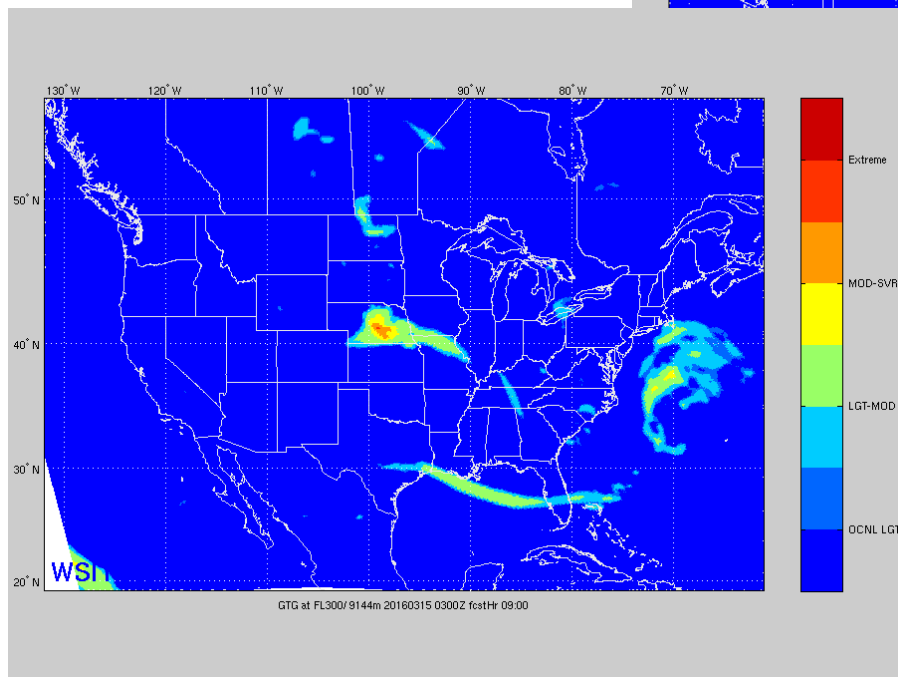
- Based on PIREPs and TAPS reports that showed all intensities at light or less, The Weather Company only had out a light turbulence FPG over the area.
- The purple shades show the RPM Turbulence guidance of LGT to MDT turbulence from the Corpus Christi area eastward into the Gulf about a degree of latitude south of SBI.



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More RPM Turbulence forecasts...

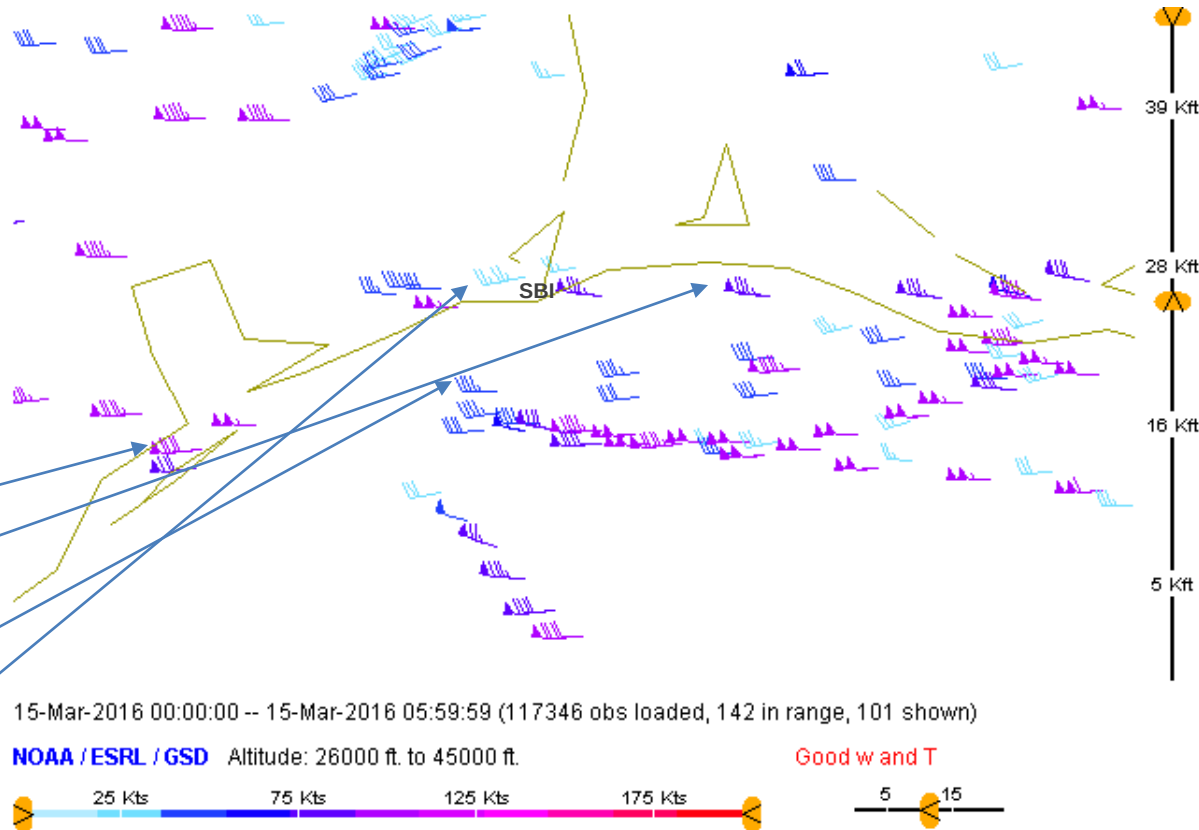
- The 15 hour forecast generated at 14/1200z (upper right image) called for a small narrow area of moderate turbulence from just south of MSY east-southeastward to west of TPA.
- By the 1800z (lower left image) forecast period, the forecast had dampened to LGT-MDT.



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AMDAR Winds between FL260-410:

- The AMDAR winds on this slide and the next offer the first glimpse of why there may have been stronger turbulence around the incident region.
- The colored wind barbs shows wind reports from various flight levels. What we see from these are much higher wind speed in the mid-upper FL300's.
 - Purple bars represent FL370+
 - Darker blue bars represent winds at FL330
 - Medium blue bars represent FL280-300
 - Light blue bars cover reports from FL260-270



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HOU AMDAR Ascent Sounding valid 0114z:

- This aircraft sounding from Houston Hobby shows westerly winds at FL270 between 30-40kts.
- However, much stronger westerlies can be seen at the 250mb level (~FL340) where winds are 95+kts.
- Between 300mb-250mb there is significant vertical wind shear with winds rapidly increasing with altitude. Such a vertical wind speed change often can be accompanied by moderate or greater turbulence.
- This sounding supports the wind barb reports in the previous slide where winds across the northwestern Gulf of Mexico are significantly stronger above the FL300 (~300mb) level.

