



NTSB National Transportation Safety Board

Office of Aviation Safety

**2016 Friends and Partners In
Aviation Weather Meeting
NTSB Weather Related Accidents**

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NTSB Senior Meteorologist

2015 Preliminary Accident Statistics

- **1,279** U.S. Civil Aviation Accidents
- **237** Fatal Accidents
- **404** Total Fatalities

- **Part 91 – General Aviation;**
 - 1,208 accidents (94%) with 229 fatal, total fatalities 376 (95%)
- **Part 135 – Commuter/On-Demand;**
 - 43 accidents, 8 fatal, 28 total fatalities
- **Part 121 – Air Carrier;**
 - 28 accidents, no hull loss or fatalities
 - 14 weather related (50%); turbc, windshear, contaminated surfaces – snow/ice

Defining Fatal Accident Events

Leading cause factors of accidents:

- *Loss of Control (LOC) in flight/ground (~38% wx)*
 - *Adverse winds*
 - *Spatial Disorientation*
 - *Thunderstorms*
 - *In-flight icing*
- *System/component failure – Powerplant*
 - *Carburetor icing major contributing factor light aircraft*
- *Controlled Flight Into Terrain (CFIT)*
 - *Low ceilings & visibility*
- *Collision with terrain/object*
- *VFR encounter with IMC*
- *System/component failure – Non-Powerplant*



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MOST WANTED

TRANSPORTATION SAFETY IMPROVEMENTS

PREVENT LOSS OF CONTROL IN FLIGHT IN GENERAL AVIATION



NTSB Recommendations & Products

- Numerous safety recommendations and safety alerts
 - Hazardous weather encounters
 - Pilot in-cockpit NEXRAD latency
 - Mastering Mountain Flying
- NWS Consistency between non-aviation & aviation products
- Primary aviation product for mountain wave activity
- Inclusion of significant AWOS/ASOS Remarks
- Weather camera's for Hawaii similar to Alaska
- Establish standardized **guidance for PIREPs**

NTSB Pilot Report Initiative

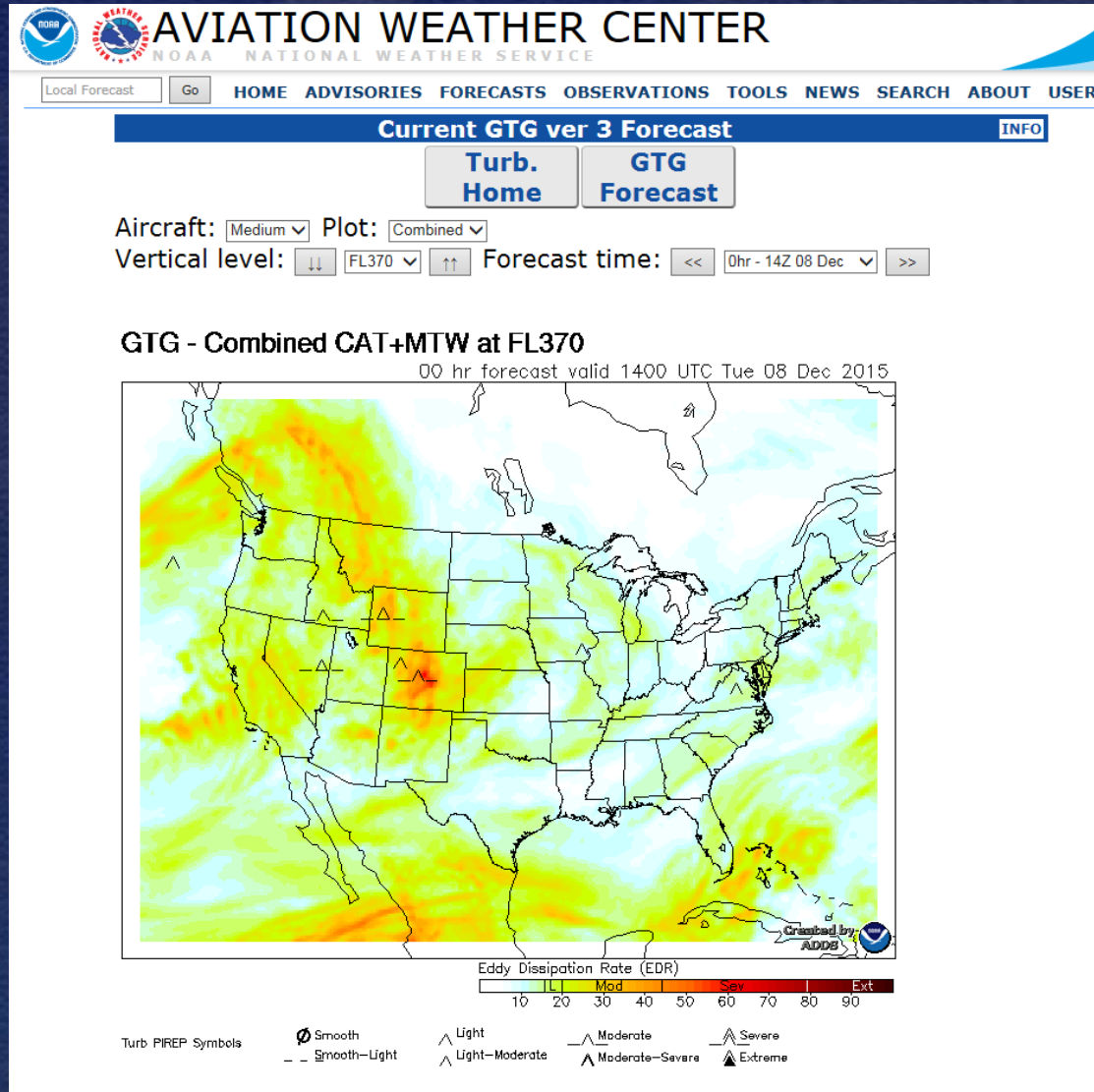


NTSB Forum June 21-22, 2016

- Several accidents noted where a PIREP may have provided critical information of the environmental conditions prior to the accident
- Improve the dissemination, solicitation, and transmission of PIREPs
- Increase situational awareness
- Critical need in **observing icing & turbulence conditions**

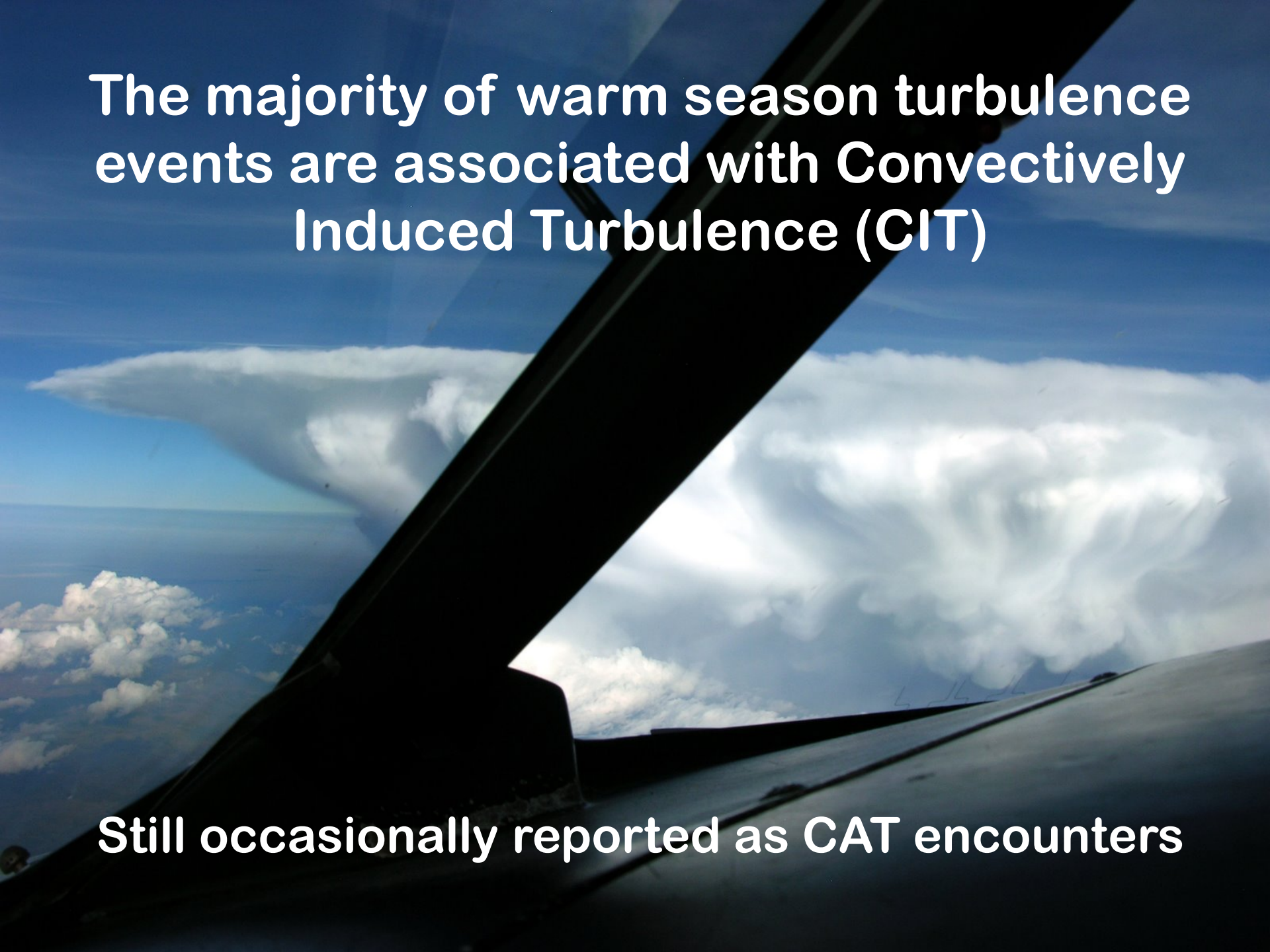
Graphic Turbulence Guidance (GTG)

Anticipate reduced accidents with improved forecast and analysis techniques



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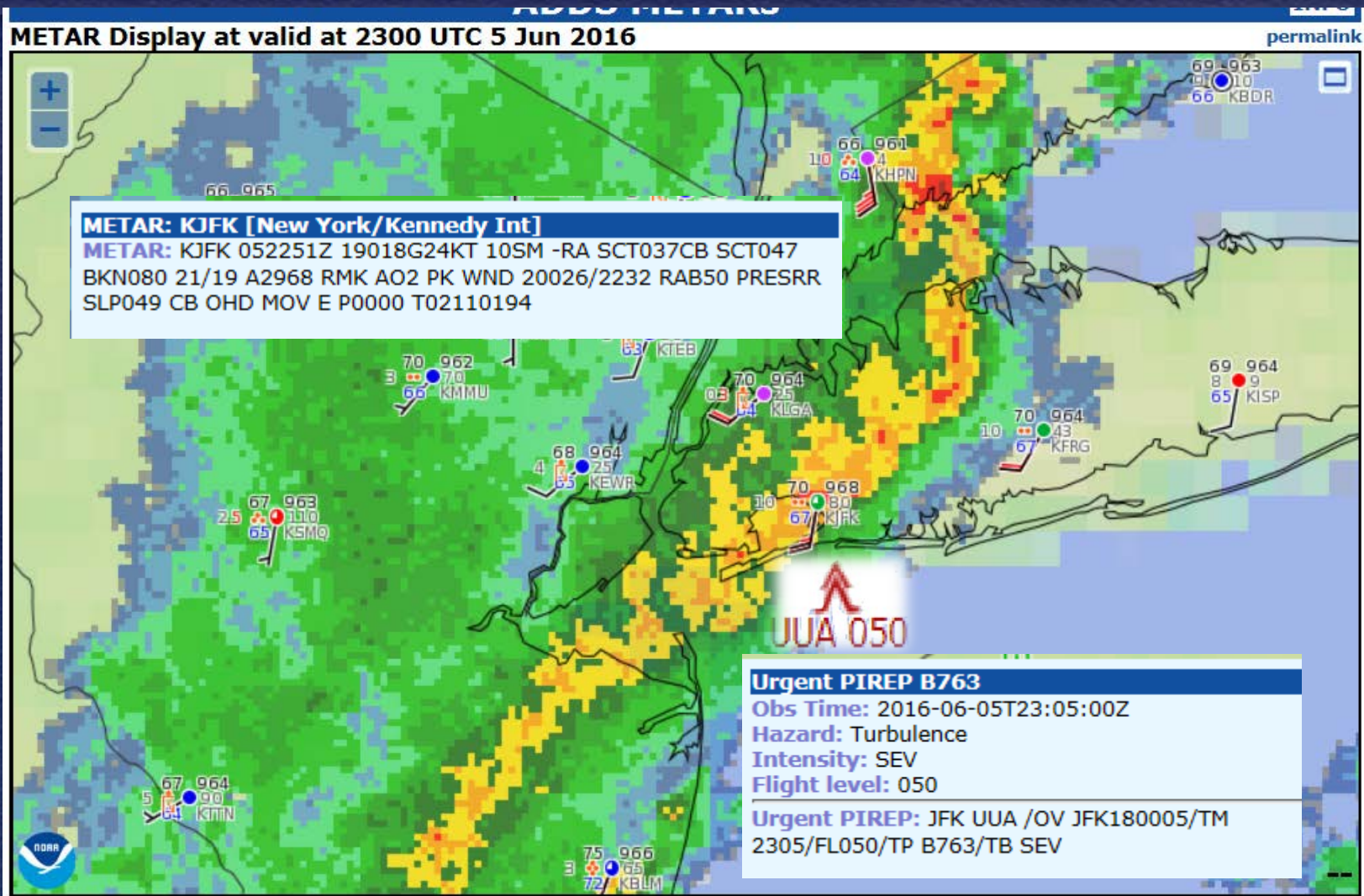




The majority of warm season turbulence events are associated with Convectively Induced Turbulence (CIT)

Still occasionally reported as CAT encounters

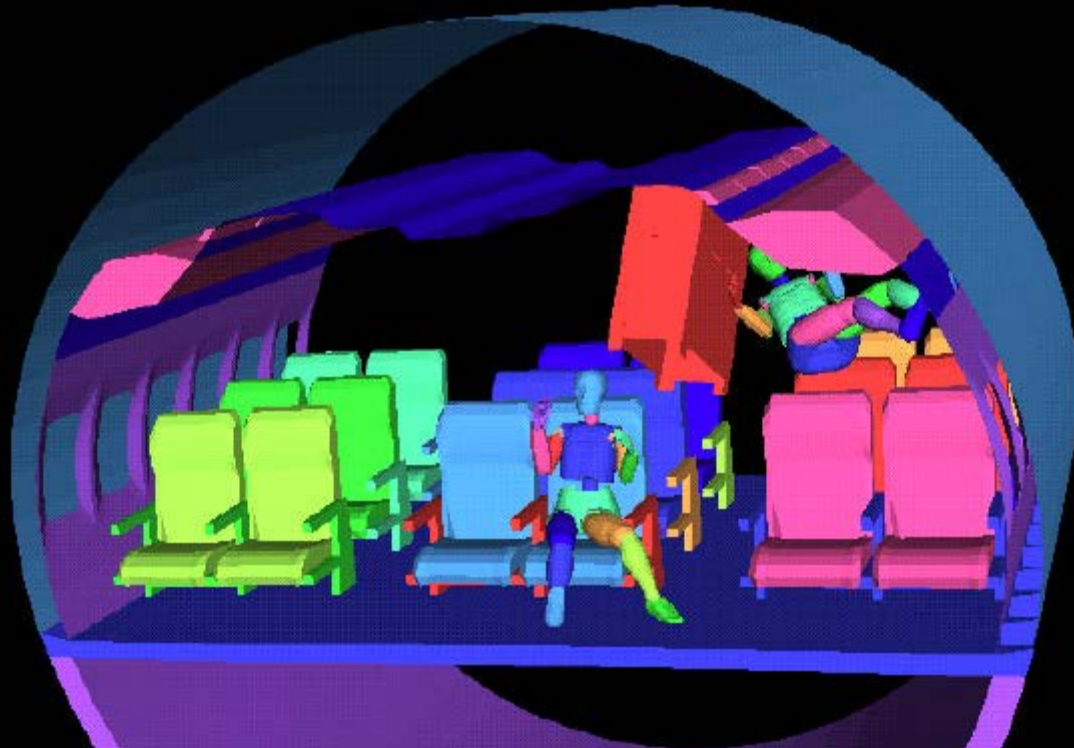
Convectively Induced Turbulence (CIT)



Note – No injuries reported

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***Turbulence continues to be the largest
cause of injuries to air carrier
operations***

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2015 NTSB Part 121 – Turbulence Events

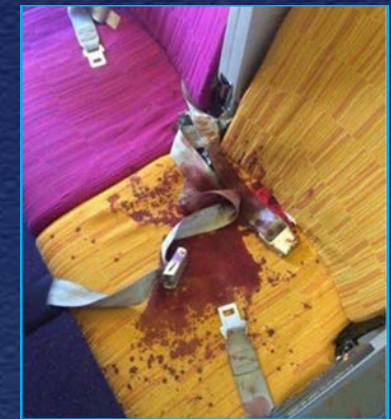
NTSB 12 Part 121/129 accidents with injuries, several other incidents with flight crew incapacitation (concussions, head/neck injuries):

| | | | | |
|-----------------------------------|------|--------|--------|-----|
| • DCA16CA052 – San Diego, CA | B737 | Dec.26 | 1S | CAT |
| • DCA16CA053 – Charlotte, NC | B737 | Dec.24 | 1S | CAT |
| • DCA16CA050 – Buenos Aires | B777 | Dec.12 | 1S/12M | CIT |
| • DCA16CA030 – Great Falls, MT | A319 | Dec.10 | 1S | CAT |
| • DCA16CA026 – St. Louis, MO | B737 | Nov.29 | 1S | CAT |
| • DCA16CA023 – Philadelphia,PA | A319 | Nov.11 | 1S | CAT |
| • DCA16CA021 – Beaumont,TX | B787 | Nov.7 | 1S | CIT |
| • DCA16CA010 – Plevna, KS | B737 | Oct.24 | 1S/1M | CAT |
| • WPR15LA239 – Lake Tahoe,CA | E175 | Aug.7 | 1S | CIT |
| • DCA15CA131 – McCook, NE | CRJ | Jun.10 | 1S/6M | CIT |
| • *DCA15CA136 – Windsor Locks, CT | B777 | May 27 | 1S/1M | CIT |
| • DCA15LA067 – Honolulu, HI | B767 | Feb.15 | 1S/4M | CAT |

2015 Turbulence Incidents

Severe turbulence events noted but due to minor injuries not included in database:

- Anchorage, AK B777 Dec.30 22M
- Chicago, IL B757 Nov.18 2M
- Kalispell, MT A319 Nov.13 1M
- Caribbean B757 Nov.3 3M
- Atlanta, GA A320 Oct.20 1M
- Cincinnati, OH B737 Oct.2 2M
- Caribbean A319 Oct.1 4M
- **Burbank, CA** B737 Sept.9 2M
- **Narita, Japan** B767 Sept.6 Unk
- New York, NY B777 Aug.31 12M
- Cont...



Thai Airways B777

* NTSB case numbers assigned but not documented

2015 Turbulence Incidents

- Meridian, MS B737 Aug.19 6M
- Great Falls, MT B757 Aug.15 1M
- Las Vegas, NV B737 Aug.13 1M
- Reno, NV E170 Aug.12 1M
- **Max, NE** A320 Aug.7 3M
- Gulf Mexico B737 Aug.4 1M
- Albuquerque,NM A319 Aug.3 1M
- Kansas City,MO A319 Aug.2 1M
- **Norfolk, VA** B737 July 14 1M
- **Salt Lake City,UT** E175 July12 1M
- Cont...



Hail/CIT



MTW encounter over Denver, Dec. 9, 1992

* Incidents noted and NTSB case numbers assigned

2015 Turbulence Incidents

| | | | |
|---------------------------|------|--------|----|
| • Seattle, WA | E175 | July11 | 1M |
| • Sterling, VA | B737 | July11 | 3M |
| • New Orleans, LA | CRJ7 | Jun.27 | 2M |
| • Norfolk, VA | B737 | Jun.14 | 1M |
| • Indianapolis, IN | E175 | May15 | 1M |
| • Newark, NJ | B767 | Apr.22 | 5M |
| • Denver, CO | DHC8 | Apr.7 | 1M |
| • Philadelphia, PA | B737 | Apr.5 | 1M |
| • Washington, DC | E175 | Mar.31 | 2M |



Avianca A330



- **Total 41 turbulence events with over 118 injuries (12/106)**

Significant Turbulence Incidents & Accidents

Part 121 Air Carriers 1998-2015

| Year | Events | Serious | Minor |
|------|--------|---------|-------|
| 2015 | 41 | 12 | 106 |
| 2014 | 5 | 6 | 24 |
| 2013 | 11 | 3 | 37 |
| 2012 | 33 | 10 | 83 |
| 2011 | 26 | 19 | 32 |
| 2010 | 13 | 11 | 73 |
| 2009 | 21 | 15 | 106 |
| 2008 | 12 | 12 | 43 |
| 2007 | 11 | 12 | 10 |
| 2006 | 28 | 9 | 49 |
| 2005 | 33 | 9 | 42 |
| 2004 | 36 | 12 | 50 |
| 2003 | 36 | 24 | 83 |
| 2002 | 29 | 14 | 74 |
| 2001 | 33 | 17 | 53 |
| 2000 | 40 | 21 | 82 |
| 1999 | 36 | 16 | 181 |
| 1998 | 34 | 22 | 111 |
| 18 | 478 | 244 | 1240 |

Averages

- Events 27 annually
- Serious injury 14
- Minor injury 68

2009 significant events:

B747 over Pacific Ocean 42 injuries

B767 over Atlantic Ocean 33 injuries

Sources: *NTSB, FAA incident & accidents, The Aviation Herald, Curt Lewis LLC briefs*

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Part 135 – Accidents 2010-2014

