

Wake Vortex Incident Analysis in the UK

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NATS



Outline

1. Background to the UK wake encounter reporting scheme.
2. What happens when we receive an encounter report?
3. Regular monitoring and examples of analysis.
4. Steps taken to improve reporting.

1. Background to the UK wake encounter reporting scheme

- Voluntary wake vortex reporting scheme established in the UK in 1972.



- Purpose of the reporting scheme is to:
 1. Identify particular aircraft pairs that have a significantly higher encounter rate compared with other pairs.
 2. Understand operational conditions that result in a wake encounter.
 3. Understand the affect of an encounter on civil aircraft.

2. What happens when we receive an encounter report?

- » Revised Form: SRG1423
- » Published on internet
 - » <http://www.caa.co.uk/SRG1423>
- » Provides information to understand effect of vortices
- » Additional information with regards to location and Lead aircraft

UK Civil Aviation Authority **NATS** Civil Aviation Authority

WAKE TURBULENCE REPORT FORM - PILOT (SRG 1423)

Please complete the form online or in BLOCK CAPITALS using black or dark blue ink and submit as instructed.
Generating aircraft report: omit Sections 4, 5, 6 and 12.

For use by pilots involved in wake turbulence encounters in any phase of flight, including those hazardous cases that qualify as Reportable Occurrences under Article 142 of the Air Navigation Order and the EU Directive 2002/42. The report form may be used for all wake turbulence encounters or by aircraft generating wake turbulence.

1. IS THIS INCIDENT REPORTABLE UNDER THE MOR SCHEME?
Yes No If YES, this form should be sent to CAA Safety Data (Full address is given at the end of this form).

2. WERE YOU ENCOUNTERING OR GENERATING THE WAKE TURBULENCE?
Encountering Generating

3. AIRCRAFT FLIGHT DETAILS
This information is requested in support of investigations into the phenomenon of Wake Vortices and to support flight safety.
Date of incident: 14/07/08 Time (UTC): 15:45 Operator: BAW Callsign: 538W123
Registration: G-BLYM Type & series: 747-400 Departure airport: EGLL Destination airport: JSTJK
SSP code: 0592 Flight phase: OUTBOUND Altitude or flight level: 2000ft Speed: 175 kts
Weight: 285 tonnes Heading: 270 Fwy designation: 271 Fwy state: _____
Geographical position: _____

4. WAKE TURBULENCE EFFECT ON AIRCRAFT
Altitude change (including rate of change): _____ Pitch (degrees): 5 Rate of change: _____
Roll (degrees): 20 Rate of change: _____ Yaw (degrees): 0 Rate of change: _____
Speed change (ft/s): _____ Altitude change (ft/s): 0 Heading change (degrees): _____
Was tailing experienced? Yes No Was there stall warning? Yes No
Describe: AT APPROX 2000ft IN CLIMB, LAGS TO VORTEX, FELT QUICK FOLLOWED BY VIBRATIONS AND BIG BOWEL AFFECT APPROX 20 DEGREE NOSE CLIMB CANON WAS AT DISCOMFORT REQUIRED DURING INITIAL CLIMB.
What recovery actions did you take if any? M.C. APPLIED CORRECTIVE ACTION AND MODERATE CLIMB RESUMED APPROX 5 SECS. V.A. MADE TO REASSURE PASSENGERS (NO PASSENGER COMPLAINTS OR INJURY BELTS)
What made you suspect Wake Vortices the cause of the disturbance? HEAVY (B747) AHEAD (2 MIN SEP)

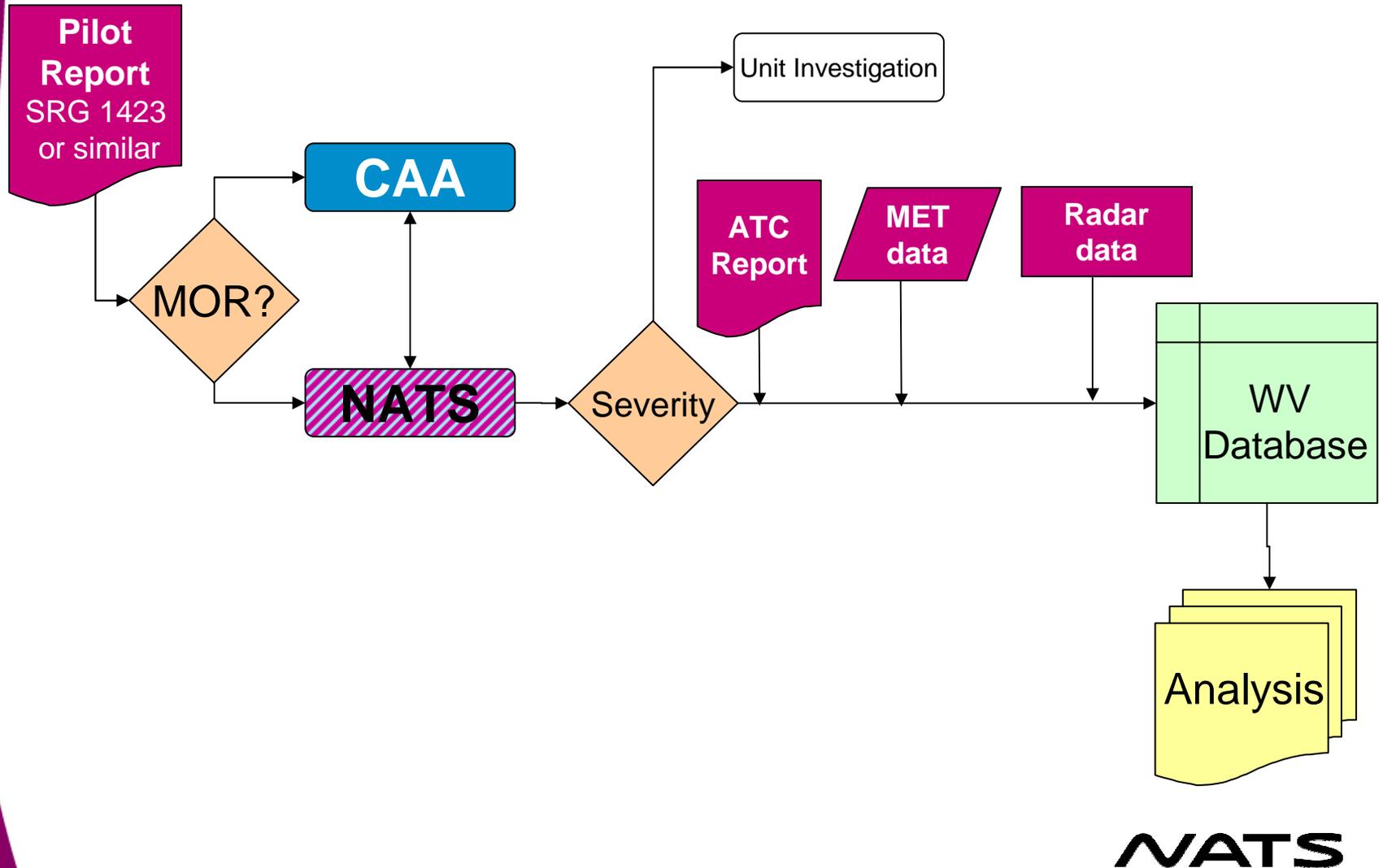
5. CONSEQUENCES OF THE WAKE TURBULENCE ENCOUNTER
No significant consequences Terminated approach or executed a 'go around' Unsettled engine
Unsettled approach Loss of aircraft control CPWS activation
Contact with other aircraft Physical injury Aircraft damage
Level change request Heading change request Other (please state below)
Other (eg. Autopilot disengaged): _____

6. ENCOUNTER OCCURRED IN DEPARTURE PHASE
What SID were you on? _____
Were you turning? Yes No Did you use a reduced thrust take-off? Yes No

7. ENCOUNTER OCCURRED IN ARRIVAL PHASE
What STAR were you on? _____ Was the aircraft turning? Yes No

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2. What happens when we receive an encounter report?



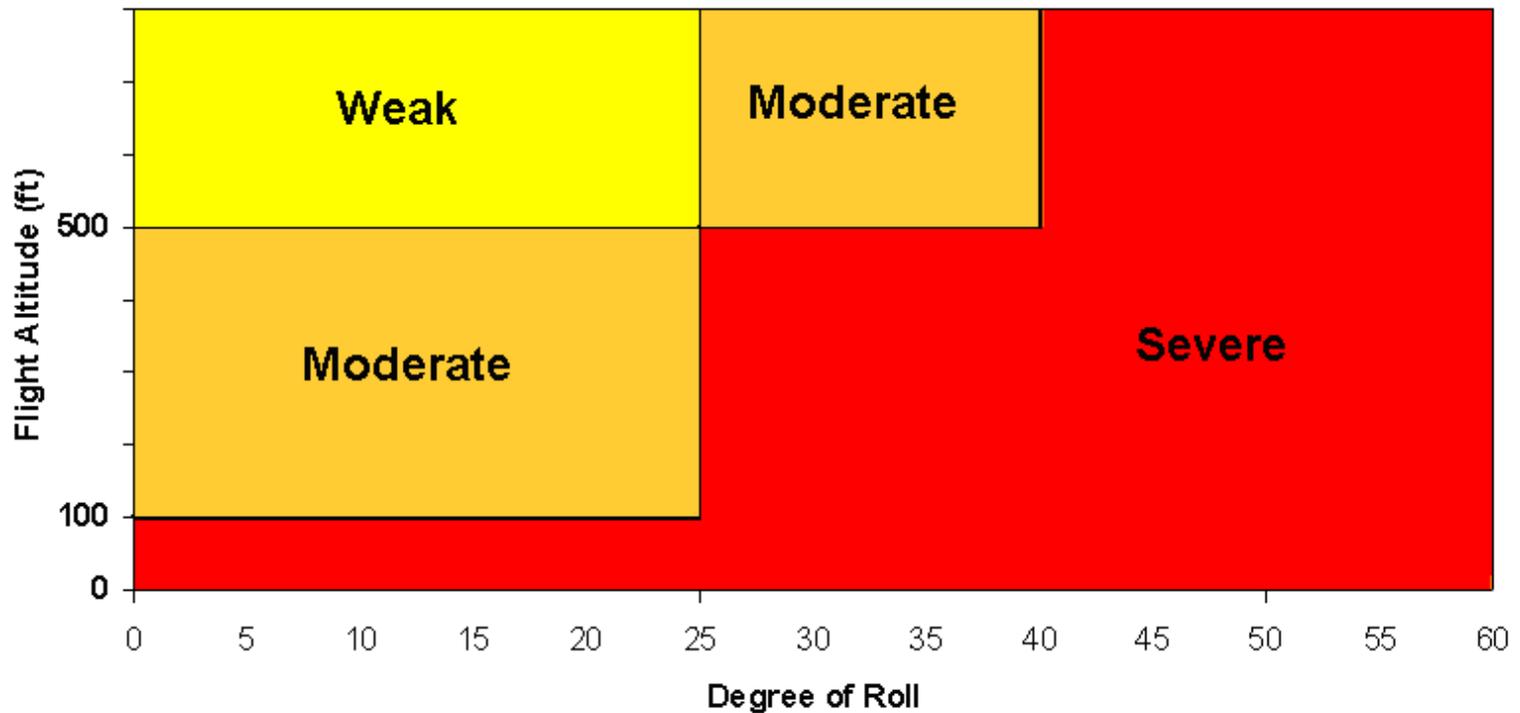


2. What happens when we receive an encounter report?

- All Severe wake vortex reports sent to appropriate ATC unit for investigation and can also be checked by Wake Vortex Team.
- Inconsistent wake vortex reports checked by NATS Wake Vortex Team.
- Use plots of radar data to visualise tracks of leader and follower aircraft – helps to verify time when encounter occurred.
- If not reported, the aircraft separation at the time of the encounter can be determined.

2. What happens when we receive an encounter report?

NATS Internal Severity Scheme



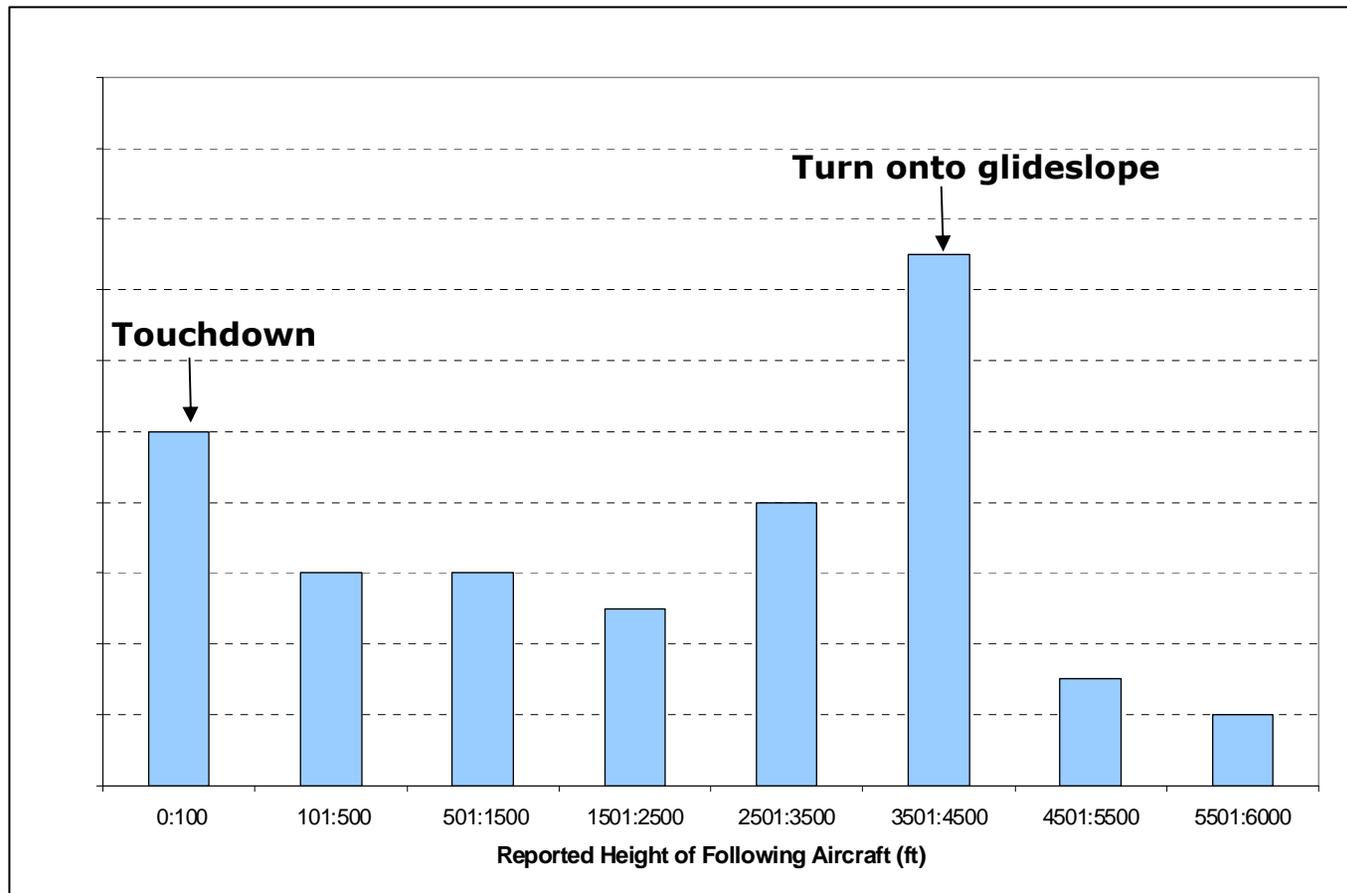


2. What happens when we receive an encounter report?

- NATS use the UK wake encounter database to monitor current performance by producing quarterly and annual analysis.
- Objective is to monitor the effectiveness of current spacing minima.
- Report aims to identify any significant change in rate of reported wake vortex encounters for that year compared with previous years – any significant changes raised with the CAA.
- Look for trends in the data (e.g. aircraft types, location, altitude, etc).
- Analysis reports sent to CAA and NATS operations managers.
- Wake turbulence reports sent to ATC ops units as learning points.
- Feedback sent to airlines.

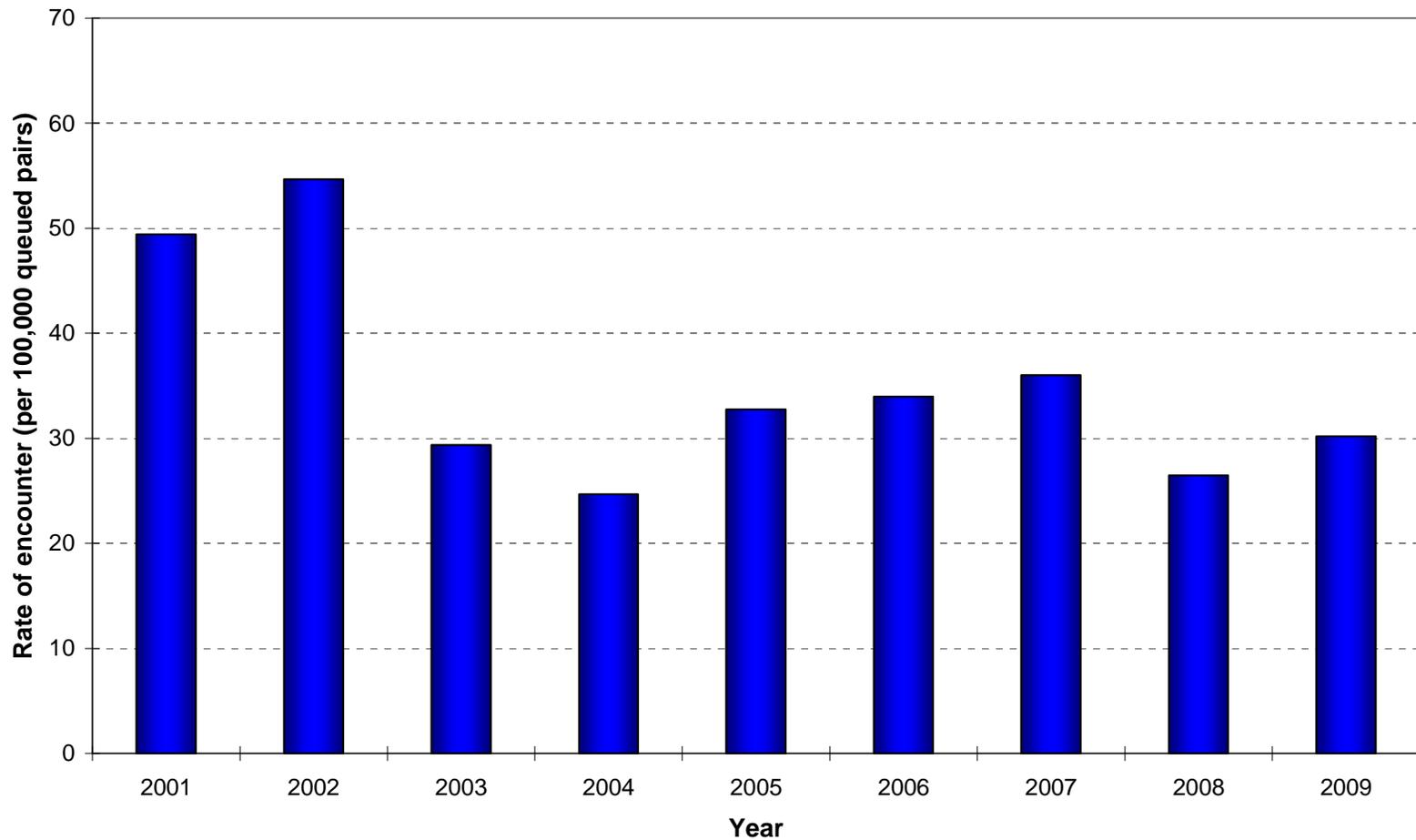
3. Regular monitoring and examples of analysis

- Receive approximately 200 reports per year.
- Majority are reported inbound to airports.



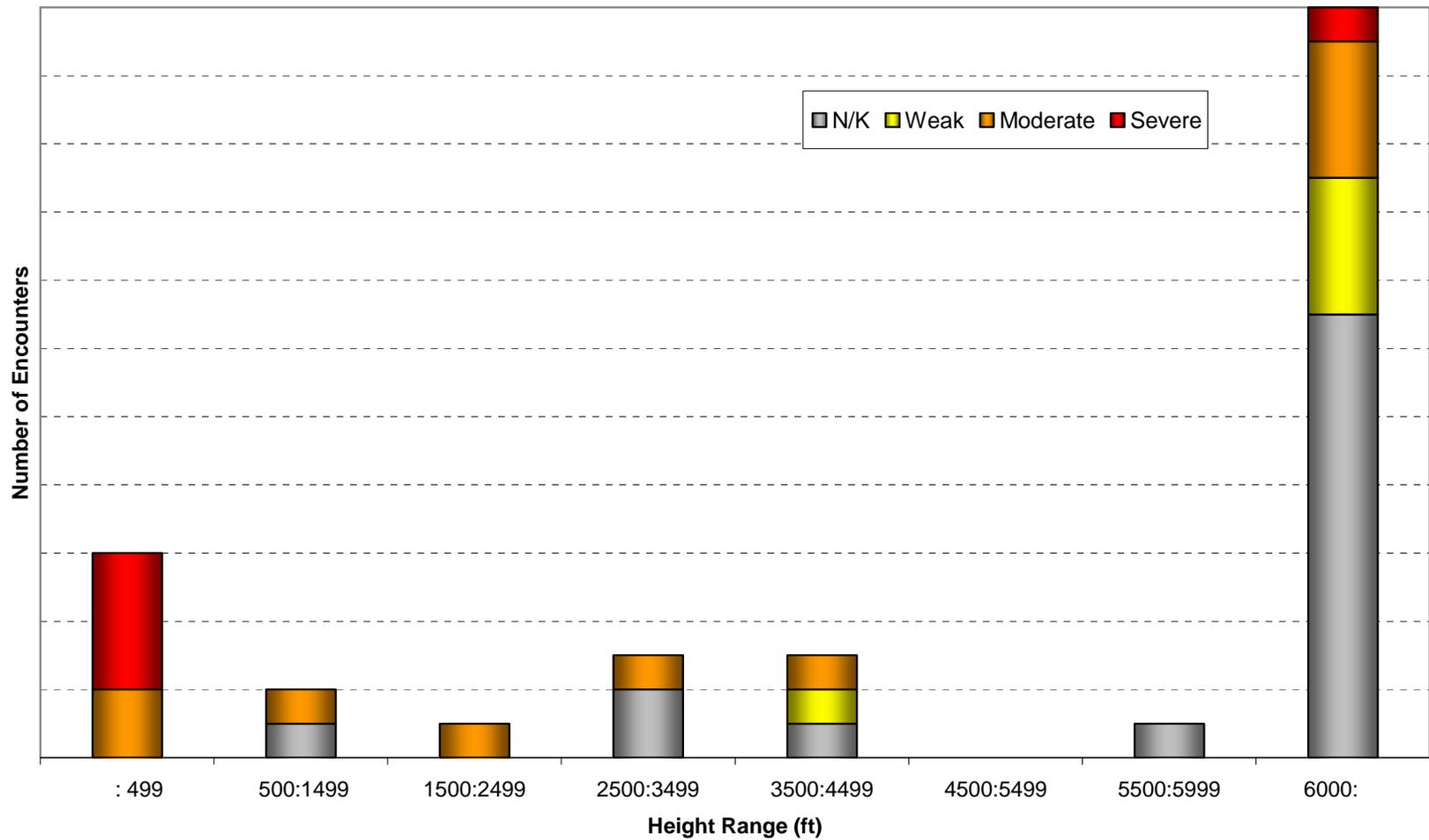
3. Regular monitoring and examples of analysis

- Affect of traffic levels on number of reported encounters.



3. Regular monitoring and examples of analysis

- Encounter Severity.





3. Regular monitoring and examples of analysis

- Received 215 wake turbulence encounter reports in 2009.
- Of these, 56 occurred in the en-route flight phase (i.e. >6000ft).
- A study of encounters in Oceanic airspace (NAT) revealed that in the last 10 years, no encounters occurred between aircraft pairs that were at the same flight level – follower always below leader.
- Encounters reported where aircraft separated up to 15Nm.
- Currently very few encounters between Heavy and Small/Light aircraft en-route.



4. Steps taken to improve Reporting

- Sending feedback to pilots when they report an encounter.
- Presenting at annual UK Wake Encounter Working Group meeting.
- Attending and presenting at pilot forums, e.g. Gatwick pilots forum.
- Issuing guidance material to ATC units and airlines on reporting procedures and the essential information required in a report.
- Publishing articles in aviation magazines, e.g. in Summer 2010 edition of FOCUS magazine.



Summary and Conclusions

- A voluntary wake turbulence reporting scheme can be used to:
 1. Monitor the effectiveness of current separation minima and file for changes against the current ICAO wake vortex categories, e.g. splitting of the Medium category
 2. Highlight specific areas of concern, e.g. turn onto glideslope
 3. Highlight potential wake turbulence risk areas in new procedures or airspace changes.
- An effective wake turbulence reporting scheme requires feedback to the pilots and airlines to encourage them to continue reporting.
- NATS and the CAA are continually coming up with strategies in order to increase ATC awareness and effective WT reporting.

Any questions?



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