

INCIDENT

Aircraft Type and Registration:	Boeing 747-443, G-VLIP
No & Type of Engines:	4 General Electric CF6-80C2B1F turbofan engines
Year of Manufacture:	2001 (Serial no: 32338)
Date & Time (UTC):	14 November 2013 at 0400 hrs
Location:	North Atlantic Airspace, about 300 nm south of St John's, Newfoundland
Type of Flight:	Commercial Air Transport (Passenger)
Persons on Board:	Crew - 18 Passengers - 400
Injuries:	Crew - 1 (minor) Passengers - 9 (minor)
Nature of Damage:	None
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	43 years
Commander's Flying Experience:	11,072 hours (of which 7,853 were on type) Last 90 days - 75 hours Last 28 days - 27 hours
Information Source:	Air Safety Report Form submitted by the flight crew, aircraft flight data provided by the operator and crew interviews

Synopsis

The aircraft encountered a brief period of severe turbulence during the cruise portion of flight, resulting in injuries to nine passengers and one cabin crew member. The flight crew had left the intended track to avoid significant weather which they had detected on weather radar. However, at the time of the incident, there was no significant weather indicated on radar.

Aircraft commander's report

The incident occurred during a scheduled passenger service from Montego Bay, Jamaica, to London (Gatwick) Airport. There were three flight crew, 15 cabin crew and 400 passengers on board. The flight progressed normally until approximately its mid point, when the aircraft was about 350 nm south of Newfoundland, flying at FL370. The flight crew had been monitoring light to moderate intensity weather radar returns, which appeared to indicate a line of weather across the aircraft's intended track. The commander's weather radar display was set to a tilt angle of 1° down, the co-pilot's to 2° down.

The flight crew requested a track deviation to the left (north) of track to avoid the weather. This was not approved but a deviation to the right of track was, and the crew altered course

accordingly. The wind at this stage was from astern, so the crew were not concerned that their new track would be downwind of the observed weather and thus possibly subject to turbulence. As the aircraft flew abeam the line of weather, returns on the radar reduced and disappeared altogether.

The commander reported that the aircraft was flying in smooth air, probably just above the cloud tops. The aircraft started to encounter turbulence and the flight crew switched the cabin seat belt signs on. The commander recalled seeing a flash outside, which he thought may have been lightning associated with a thunderstorm cell beneath the aircraft. Suddenly, the turbulence increased markedly and became severe for a while. The flight crew felt that the aircraft climbed suddenly, and there was a brief activation of the stick shaker, although attitude remained normal and the autopilot and autothrottle remained engaged (the latter requiring some manual inputs to avoid exaggerated throttle position changes). Engine ignition systems were turned on as a precaution.

The aircraft had earlier been instructed to descend to FL360 for Air Traffic Control purposes, but the descent had not been started. The commander therefore initiated a slow descent to the new level. Aircraft attitude remained within normal values, although the vertical speed showed significant momentary climbs and descents.

It was subsequently established that several passengers and one crew member had suffered injury in the cabin and crew rest areas, the most significant being a reported laceration injury to a passenger's knee.

Following an assessment of the situation by the commander, which included a consultation by radio with specialist medical advisers, the aircraft continued to London Gatwick. The cabin crew attended to the injured passengers and crew member, assisted by medically qualified volunteers from among the passengers. After landing, medical staff boarded the aircraft and treated the injured passengers. Two passengers and the cabin crew member were taken to hospital.

Cabin crew reports

Two senior cabin crew members were asked to provide an account of their experience in the passenger cabin. They recalled that the aircraft had initially been flying in smooth air, the evening meal service had just been completed, and most passengers were seated. There was a light rumble of turbulence and the passenger seat belt signs illuminated. One crew member in the relatively small forward cabin was able to complete a check of the passengers' seat belts before she sat down, although the turbulence increased as she did so and had become significant by the time she returned to her seat. The turbulence became more severe, such that she had some difficulty securing herself in her harness, by which time it became very severe for a while.

Another crew member had been attending to passengers in a cabin further aft. She also recalled that the seat belt signs illuminated at the first sign of light turbulence, and that she made a standard passenger address for the situation. She was aware that the turbulence was increasing in severity as she did so, so she included the instruction that other cabin

crew members take their seats¹. As she took her own seat there was a significant jolt of turbulence.

The cabin crew reported that, because of the recent cabin service and the stage of flight, most passengers were already seated with their seat belts fastened. All the passengers who suffered injury were in the rear right side of the aircraft. The cabin crew member who suffered a head/neck injury was on a horizontal bunk in the crew rest area, which was also at the rear right.

Meteorological information

The flight crew received a briefing pack before flight which included meteorological reports and forecasts for their pre-planned route. It included two charts, issued by the Met Office's World Area Forecast Centre in London, depicting areas of forecast significant weather and turbulence. These charts, valid at times 0000 hrs and 0600 hrs on the day of the flight, showed that the incident area would have been just to the south of a jetstream of fast flowing upper air with speeds of about 120 kt at its core. Moderate turbulence, associated with the jetstream, was forecast in the area up to about FL420. At about the same point, the intended track crossed an extensive area of significant weather, with isolated, embedded cumulo-nimbus clouds extending between FL360 and FL410.

Recorded flight data

Data from the aircraft's Flight Data Recorder (FDR) showed that the aircraft had been cruising at FL370 in calm conditions until 0349 hrs when it started to encounter light turbulence. At 0358 hrs there was a marked increase in turbulence (indicated by increased normal acceleration values). The aircraft began a descent almost immediately but two minutes later, at 0400 hrs, experienced a short but severe period of turbulence. The peak acceleration value was minus 0.7 'g', with a highest positive value of plus 1.7 'g', both of which occurred as the aircraft descended. After about five minutes at FL360 in moderate turbulence, the aircraft climbed again to FL370. The turbulence was much reduced, although still observable on the data, for about a further 15 minutes.

Footnote

¹ If safe to do so, cabin crew would normally ensure that passengers in their cabin areas had their seat belts fastened and the areas were secured for turbulence before sitting down themselves.