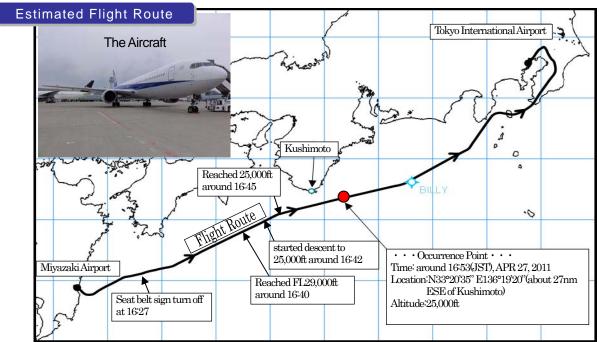
Case 2

Serious injuries suffered by one FA and slight injuries suffered by four passengers from the shaking of the aircraft caused by locally-occurring clear-air turbulence

Summary: On Wednesday April 27, 2011, a Boeing 767-300, operated by Company A, at 16:16 Japan Standard Time (JST: UTC+9hr, unless otherwise stated, all times are indicated in JST on a 24-hour clock), took off from Miyazaki Airport for Tokyo International Airport as a scheduled flight. While flying at 25,000 ft, 27 nm east-southeast of Kushimoto, around 16:53, the aircraft encountered turbulence and one cabin attendant was seriously injured in front of the left aft lavatory. Four other people consisting of passengers and cabin attendants were slightly injured. There were 119 people on board: a Pilot in Command (PIC), seven crew members and 111 passengers. The aircraft was not damaged.



Events leading to the Accident

Around 16:16

The aircraft took off from Miyazaki Airport.

Around 16:26

The aircraft maintained the cruising altitude of 27,000ft.

Around 16:27

The seat belt sign had been turned off.

Around 16:40

The aircraft reached and levelled off at around 29,000ft.

Around 16:45 The size of accordance in the description of the control of the con

The aircraft received permission It descended and levelled to descend to 25,000ft from ATC off at around 25,000ft.

16:52:38

The aircraft was shaken when it encountered strong turbulence at 27nm east-southeast of Kushimoto.

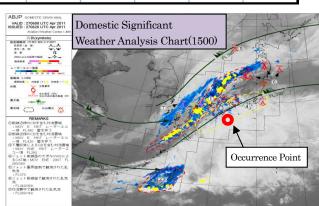
16:52:41

The seat belt sign had been turned on.

16:52:58

The First Officer (FO) reported to the Tokyo Area Control Center that the aircraft had encountered turbulence.

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A radar echo area which developed along the forefront of the cold front extending from the low spread like a belt and was advancing to the east at 15kt. The area of strong radar echo intensity and high top radar echo altitudes were observed along the area off the coast of Shikoku, Chugoku Region and off the coast of Hokuriku. However, there were very few echoes present with 5mm/h or less in the airspace where the accident occurred, and their tops were as low as 2 to 4km high.

Statements of Flight Crew Members (PIC)

He felt a "floating" sensation as if he had been riding on a big wave. Although the shaking was a light one, the PIC retarded the thrust lever to reduce speed as a precaution. Immediately following that, the aircraft was thrust upward all of a sudden, and then was violently thrust downward. The shaking lasted only an instant, and the suddenness and the intensity of the shaking was far greater than any other shaking he had experienced before.

Around 16:55

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Cabin attendant (CA) reported to the PIC the situation observed in the cabin.

Around 16:56

The FO reported with company radio that the aircraft had encountered turbulence, and that several persons were injured.

Around 17:22

The PIC informed passengers over the Passenger Address (PA) system that the aircraft had encountered turbulence and it would not affect the scheduled flight.

Around 17:43

The aircraft landed at Tokyo International Airport.

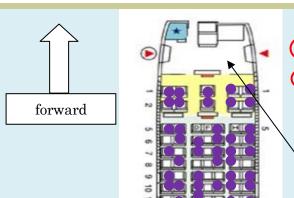
Statements of Cabin Attendants (Chief Purser)

She felt like she was lifted up very softly. Although the chief purser instantaneously grabbed a curtain in front of her, she was lifted up by 20 cm only to be dropped to the floor with the hem of the curtain over her arm. There was no report of damage observed in the cabin, though most of the in-flight magazines and headphone sets in the seat pockets were found scattered over the floor in the aft cabin.

Statements of Passengers (Passenger A)

Before the strong shaking she felt rolling and she anticipated another shaking in the aft lavatory, but her anticipation was betrayed by the pitching by which she was thrown upward to have her head hit against the ceiling, and was dropped on the floor.

Locations of injured persons



location of the CA seriously injured

location of the slightly injured

Seat occupied by passengers

Chief Purser

on the floor

CA-B head, bruised

Passenger C both shanks, bruised

CA-A right pubis, fractured

Passenger A (in a right aft lavatory) head, bruised

The area where in-flight magazine in the seat pockets escaped from and scattered



CA-C both knees and head, bruised

Left aft lavatory

Causal Factors of the Accident

Convective Clouds

observing no clouds at their altitudes while flying between the thin cloud layers.

It is highly probable that the aircraft was not shaken by the influence of convective clouds judging.

Winds

The existence of layers in the accident airspace, whose temperature and atmospheric pressure values were different, accompanied by wind velocity difference (wind shear), generated the unsteady air conditions where turbulence was likely to occur near the layer boundary.

While the aircraft was flying in the vicinity of the boundary, it is possible that the unsteady airspace generated the turbulence and shook the aircraft with a downdraft, judging from the fact that at the moment of the turbulence.

The Turbulence

The aircraft gradually approached the frontal zone under the jet stream.

Nothing more than a weak vertical shear with 0 to 6kt was analyzed at the occurrence point.

The strong shaking lasted only for a very short period and ended without recurring.

The flight encountered it while flying through cloudless airspace.

It is highly probable that the aircraft encountered a local and temporary, strong CAT induced by wind shear judging from the findings.

The Shaking

The combination of the aircraft motion around the center of gravity caused by the increase in the pitch angle and the sharp descent of the aircraft by 80 ft gave the aft section of the aircraft a sudden lowering.

It is highly probable that the CA near the left aft lavatory flew up into the air and suffered a serious injury upon the fall to the floor.

Probable Causes: It is highly probable that the accident occurred as follows:

The aircraft encountered atmospheric disturbance all of a sudden during flight, and was shaken so severely that one of the cabin attendants in the aft section of the aircraft was seriously injured when she was thrown up in the air and fell on the floor.

It is possible that the atmospheric disturbance the aircraft encountered were CAT which was created locally and temporarily by a wind shear in the vicinity of frontal zone beneath a jet stream.

In order to Prevent Recurrence

- > It would be recommended to continue to examine the effectiveness of measures such as the installation of handrails at locations where passengers pass by and consider taking further safety measures to prevent accidents.
- ➤It is desired that the Company's adoption of such a procedure should be considered as advising passengers in advance of preventive measures in case of a shaking.
- > It would be recommended to promote studies on and development of an airborne Doppler light detection and ranging (LIDAR) to detect CAT.
- >It is expected that providing meteorological organizations with access to analyze more detailed information including accelerated velocity suffered by the aircraft involved in a turbulence of MODERATE intensity or more, will contribute to the improvement of more accurate CAT prediction.

The investigation report of this case is published on the Board's website (issued on Jun. 29, 2012). http://www.mlit.go.jp/jtsb/eng-air_report/JA8569.pdf

 $(This\ report\ is\ a\ translation\ of\ the\ Japanese\ original\ investigation\ report. The\ text\ in\ Japanese\ shall\ prevail\ in\ the\ interpretation\ of\ the\ report.)$