

Key factors from the crash of Air France Airbus 330-200, South Atlantic, 1st June 2009

(adapted from the 3rd interim report, Bureau d'Enquetes et d'Analyses, 29th July 2011)

It was about midnight and therefore completely dark (instrument flying)

Aircraft was operating at close to its upper ceiling, with a narrow speed envelope between stall and buffeting

The stall began after a co-pilot took avoiding action around an area of high-altitude turbulence

About the same time, airspeed indications failed due to blockage of pitot tubes (which give airspeed indication) with ice crystals; this led to automatic disengagement of autopilot and auto-thrust, and auto-control changed to 'alternate' mode

Co-pilots did not follow 'loss of IAS' (indicated airspeed) procedure (they had not received training on loss of IAS at high altitude)

There were repeated and lengthy 'stall warning' alarms (one lasted for 54 seconds continuously)

One co-pilot apparently thought there was a risk of over-speed and kept pitching upwards

High-altitude stall leading to impact with ocean at about 10000 ft/min after about 4 minutes

Complete loss of situational awareness

"Despite several references to the altitude, which was falling, none of the three crew members seemed to be able to determine which information to rely on: for them, the pitch attitude, roll and thrust values could seem inconsistent with the vertical speed and altitude values."

Other factors

The aircraft was in mid-Atlantic beyond radar range – it just 'vanished'

The Captain was not in the cockpit until after the stall had begun
- two co-pilots were in control
- handover had been inadequate
- the captain was unable to assess the situation when he returned to the cockpit

No emergency signals were sent

No announcements were made to passengers

Engines functioned normally throughout

The situation should have been recoverable