

# Flight Data Analysis – An Airline Perspective



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# Biography

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Neil has over 17 years experience in the field of aviation safety and is a member of the International Society of Air Safety Investigators (ISASI).

After graduating in 1983 with a Bachelor of Engineering degree (Electronics) from the University of Western Australia, Neil joined the Department of Defence (Navy Office) as a civilian engineer. He worked in the Directorate of Naval Electrical Design and the Directorate of Naval Weapons Design.

In 1986 Neil joined the Bureau of Air Safety Investigation, now known as the Australian Transport Safety Bureau (ATSB), as an Air Safety Investigator and flight data recorder specialist. While at the ATSB he replayed, analysed and presented recorded data in support of accident/incident investigations and also conducted flight data recorder readouts on behalf of government authorities and airlines in the Asia-Pacific region including Singapore, Indonesia, New Zealand, Sri Lanka, New Guinea and the Philippines.

During 1998 he was a member of the ICAO Flight Recorder Panel which developed changes to ICAO Annex 6.

In February 2000, Neil joined the Corporate Safety Department of Cathay Pacific Airways Limited in Hong Kong. During 2001 and 2002 he held the position of Manager Air Safety. His duties included incident investigation, flight crew safety awareness briefings, participating in safety review committee meetings and managing the flight data analysis program.

# Acknowledgement:

Photographs courtesy of Samuel Lo

(email: [samuel\\_lo@cathaypacific.com](mailto:samuel_lo@cathaypacific.com)).

# Airline Use of Recorders

- Cockpit Voice Recorder (CVR)

Replayed annually: 0

- Flight Data Recorder (FDR)

Read out annually: 12

- Quick Access Recorder (QAR)

Read out annually: 3,500 (80% of all sectors flown)

# History of QAR

- 1964 First autoland achieved
- QAR developed to meet regulatory requirements to validate autolands



# B777

- 60,000 parameters available
- 2,000 recorded by QAR
- 700 recorded by FDR



# A340-600



- DAR records 600 parameters
- Data stored on magneto-optical disk
- Removed manually (every 5 days)

Space Shuttle Columbia  
OEX Recorder



# Uses of QAR Data

- Engineering Analysis/Troubleshooting
- Regulatory Requirements  
eg. Autoland validation
- Incident Analysis  
eg. Data supplied to manufacturer
- Flight Data Analysis Program

# Flight Data Analysis Program

- Flight Data Analysis (FDAP)
- Flight Operations Monitoring (FOM)
- Flight Data Monitoring (FDM)
- Flight Operations Quality Assurance (FOQA)
  
- ICAO Annex 6 Standard:  
From January 1<sup>st</sup> 2005 an operator of an aeroplane of a MCTM 27 tonnes shall establish and maintain a flight data analysis program ...

# Flight Data Analysis Program

- Identify and quantify existing operational risks
- Identify and quantify changing operational risks
- Formally assess the risk to determine which are not acceptable
- Where risks are not acceptable, put in place remedial activity
- Measure the effectiveness of action and continue to monitor risks

# Flight Data Analysis Program

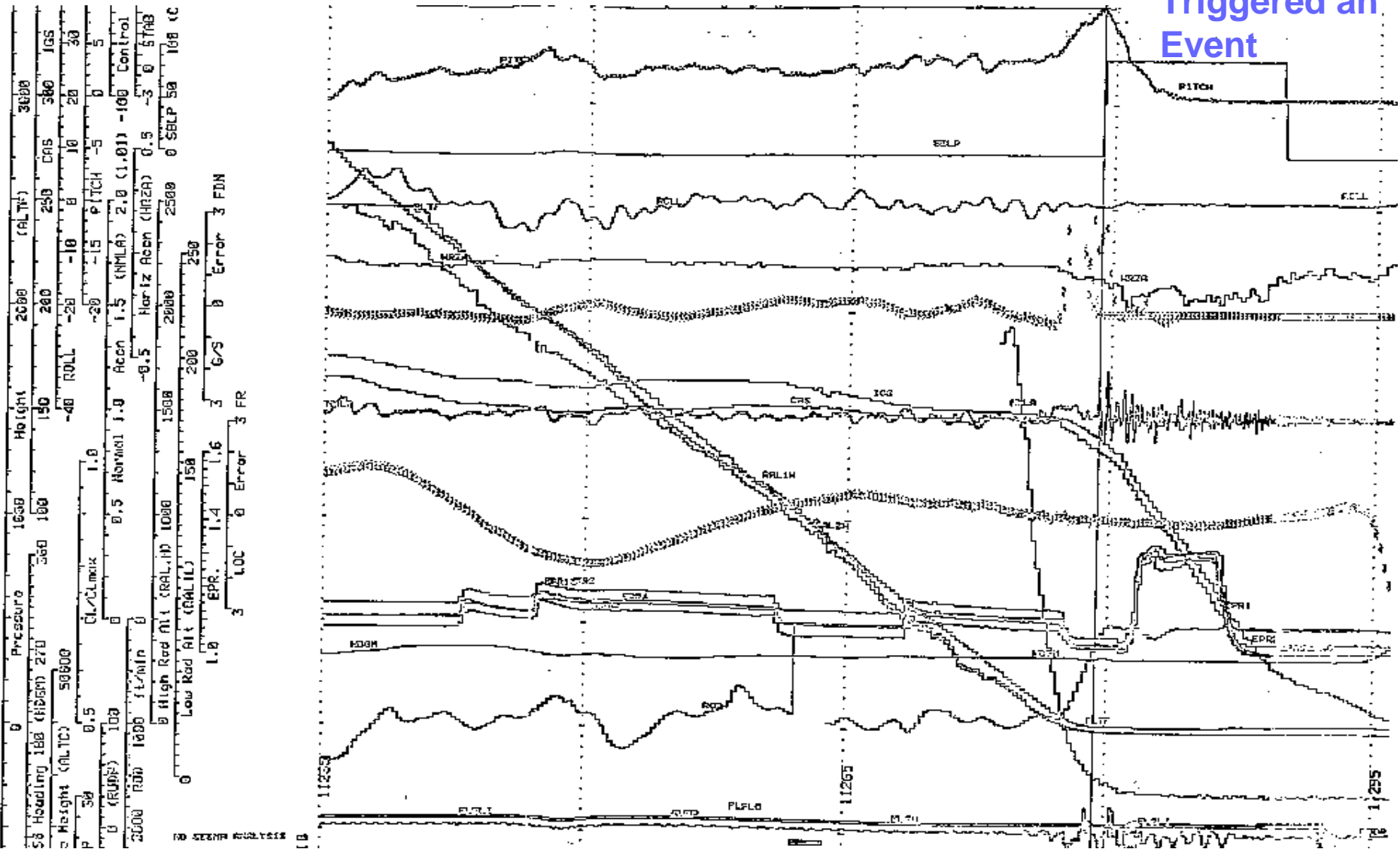
- Event Detection
- Data set from every flight (typical operating boundaries)
- On request provide direct feedback to crews

# Typical Events

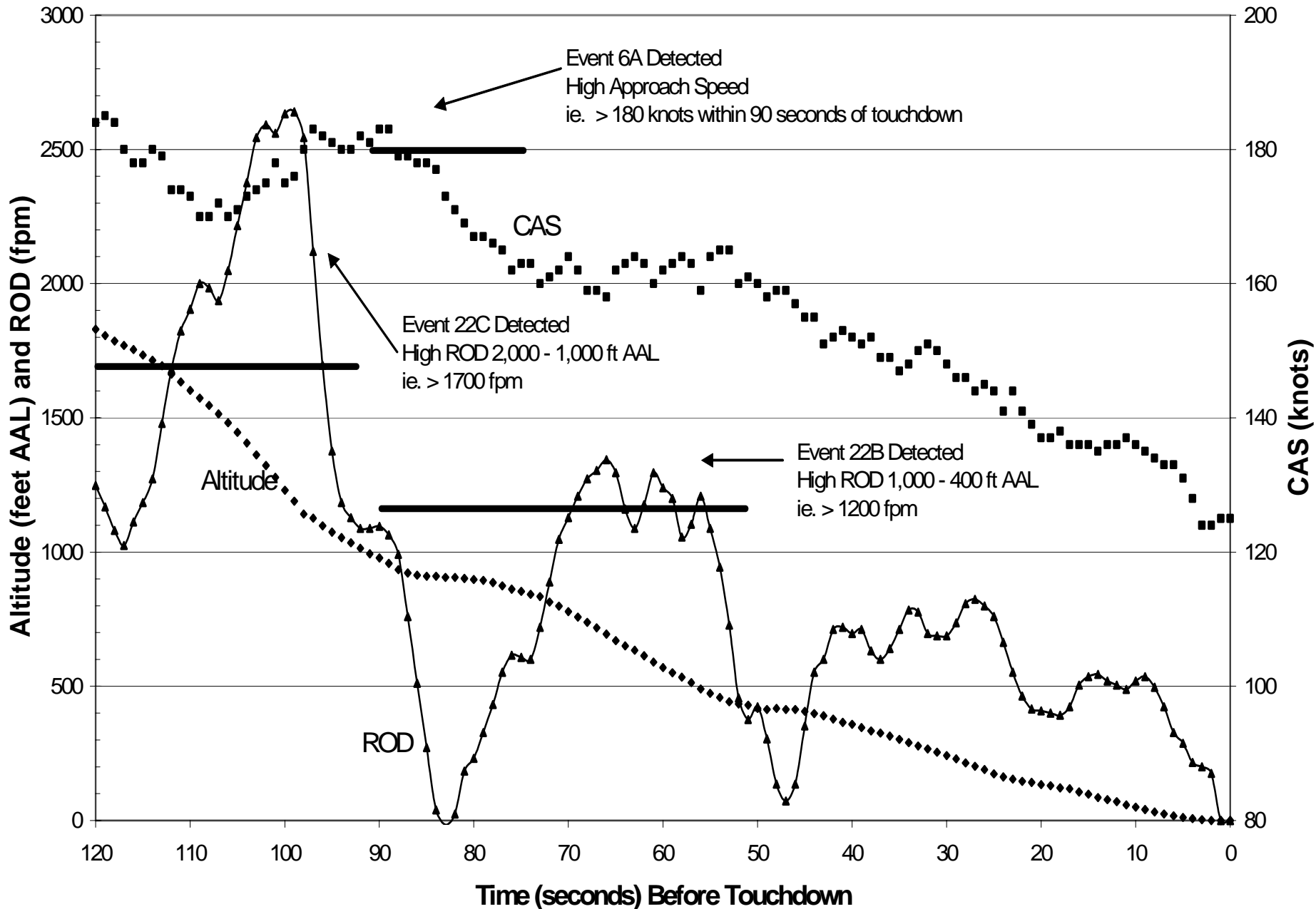
- GPWS / TCAS Warnings
- Limit Speeds (VMO, MMO, Flap & Gear)
- Take-off/Landing Speeds
- Pitch/Roll Limits
- Rushed Approaches (Late Landing Flap, High ROD's)

# Event Detection

High Pitch  
on Landing  
Triggered an  
Event



# An Approach with 3 Events



### B747- 400 Nov 97 - Mar 98

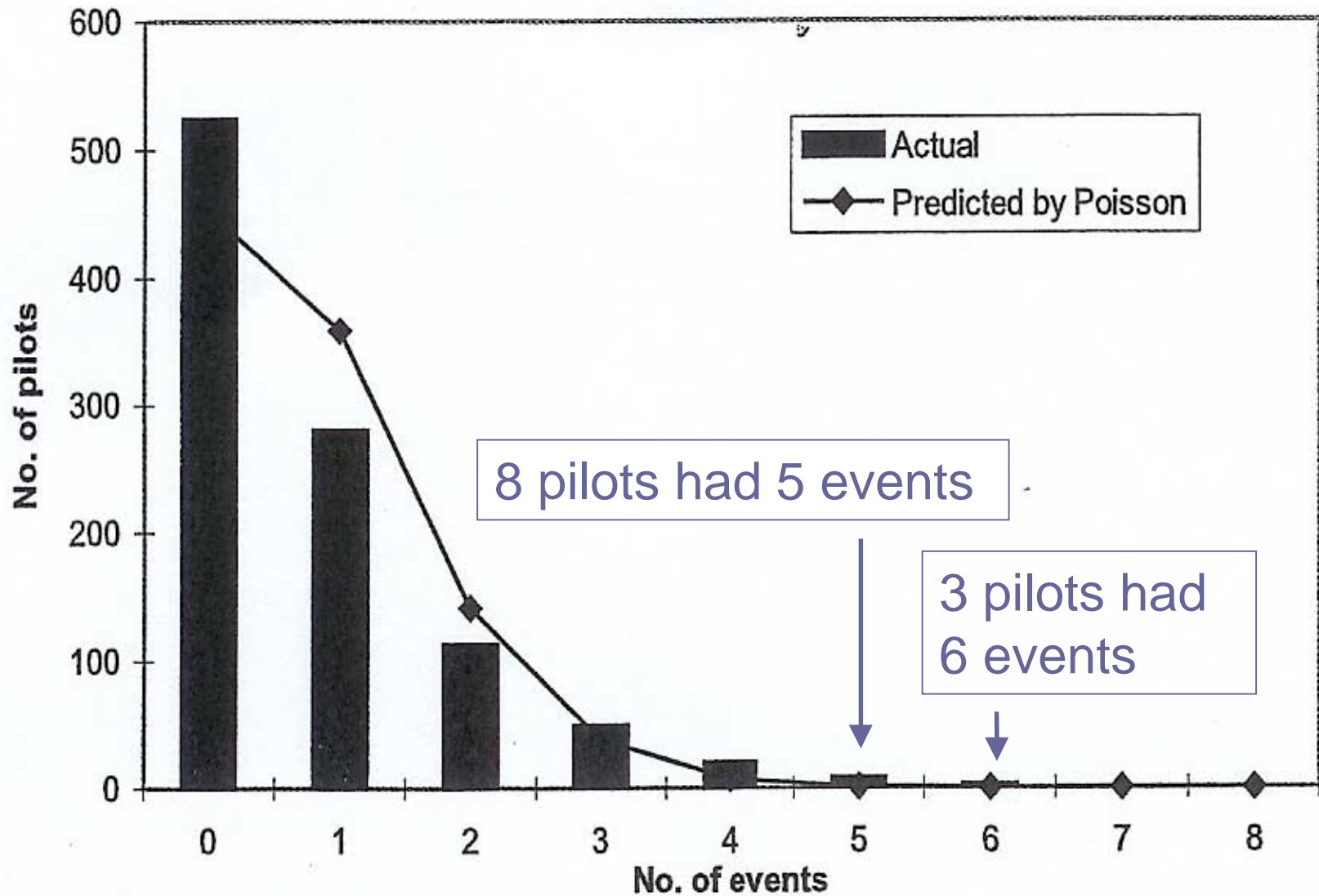


Figure 3: actual and predicted distribution of events amongst 747-400 pilots

# Event Issues

- False/Reject Events
- Turning Data into Information
- Cost
- Lack of standards
- Event Rates

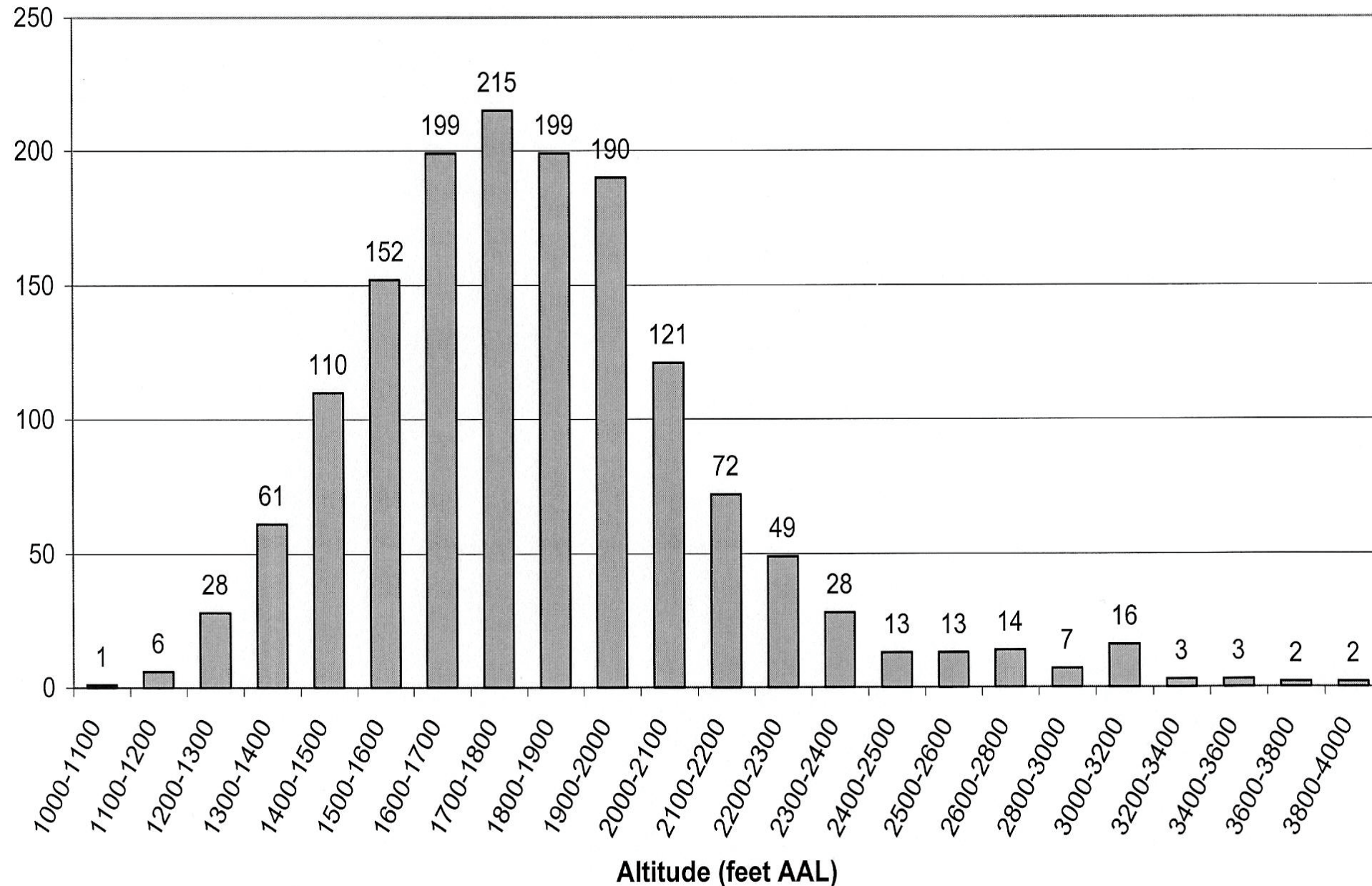
# Event Analysis Issues

- What are the most significant events?
- No details from crew
- Easy to identify trends?
- Tackling systemic problems?

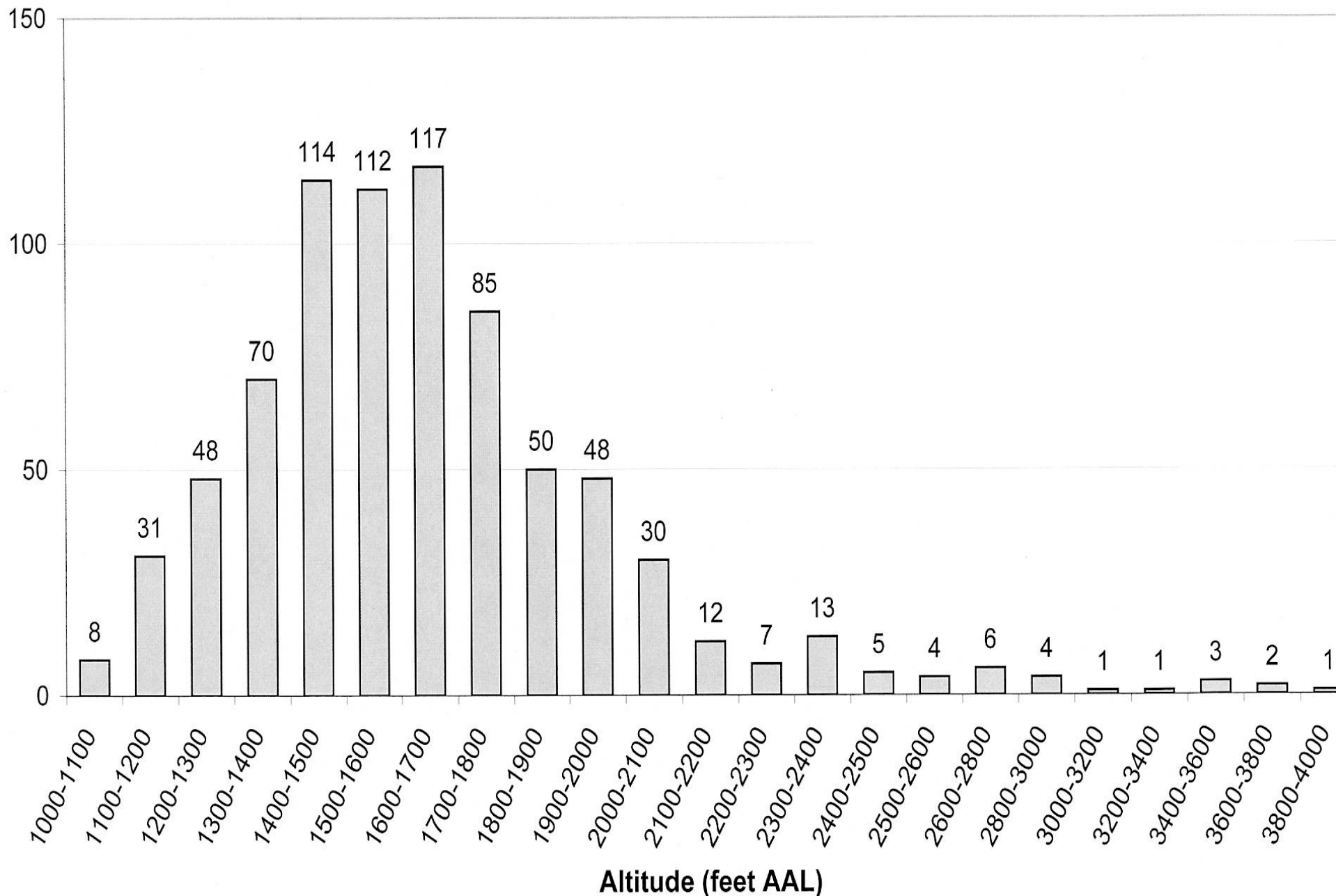
# Flight Data Analysis Program

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# Altitude At Which Landing Flap Is Set



# Altitude At Which Landing Flap Is Set



# Flight Data Analysis Program

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# Engine Shutdown

- A330 In-flight Engine Shutdown
- ECAM “ENG 1 OIL LOW PRESS.”
- QAR “Low Oil Pressure ENG 1” parameter indicated “Not Low Pressure”

# Engine Shutdown

- FWC/EEC software mismatch
- Complex aircraft - need a lot of data from multiple sources
- Software configuration control

# References:

- *“Flight Data Analysis Program at Cathay Pacific Airways”*

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**Author: Neil Campbell  
Manager Air Safety  
Cathay Pacific Airways**

2. *“British Airways’ Flight Data Analysis Programme 1969 – 1999”*

International Symposium on Transportation Recorders  
Arlington, Virginia USA during May 1999.

**Author: Captain Mike Holtom  
Senior Manager Safety Services  
British Airways**

- *“SESMA: Are Some Pilots More Equal Than Others?”*

**Author: Captain John Savage  
Flight Manager SESMA  
British Airways**