

Extend the Network and Exploit Available Resources

~ Lessons Learnt from Two Major Investigations ~



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Outline

"Every link is important"

- ◆ **About the Aviation Safety Council**
 - ◆ Technical capabilities
 - ◆ Technical research project & exercise
 - ◆ International collaboration
- ◆ Challenges in conducting two major investigations
 - ◆ ATR 72-500 (CFIT)
 - ◆ ATR 72-600 (LOC-I)
- ◆ Lessons learnt

About the Aviation Safety Council

ASC was established in 1998 :
an independent safety agency

Seven board members

+

Twenty investigators

Since 1998 ASC has investigated
118 cases and
issued **937 safety recommendations**



Technical capabilities at ASC

ASC Investigation Laboratory

5 investigators

No. of readout in 2014 :

103 for investigative purpose

34 for technical assistance purpose

Flight Recorders
Readout

GPS & NVM Readout

Site Survey
&
Underwater Searches

Performance Analysis
&
Visualization

Technical Research
& Exercise

Technical research & exercise

high mountain
physical training



site survey training



underwater search and recovery
of flight recorders



Int'l collaboration- Damaged Recorders Training

Enlarge knowledge to handling damaged flight recorders and data analysis



3- 5 days

- ◆ Basic training
- ◆ On-the-job training
- ◆ Advanced training



3- 5 days



10 + 3 days

Challenges in conducting two major investigations

◆ 1ST CFIT (2014.07.23)

SOP non-compliance →
organizations factors
(FOQA, SMS, CAA
oversight)

ARs: BEA, NTSB, TSB

9 group, 56 people

Factual report- 6 months

Final reports - 19 months

◆ 2nd LOC-I (2015.02.04)

Uncommanded autofeather →
PF shutdown wrong engine,
ATPCS policy and training

ARs: BEA, NTSB, TSB

7 group, 38 people

Factual report- 6 months

Final reports - 17 months

ATR 72-500 accident

Synopsis

- ◆ ATR72-500 crash on July 23, 2014
- ◆ TransAsia Airways passenger flight from Kaohsiung to Makong, in stormy weather
- ◆ NPA to RWY 20, limits:
VIS 1,600 m, MDA 330 ft.
- ◆ No. of fatalities: 48



ATR 72-500 accident



- 1) FDR data correction and performance analysis
- 2) FDA is a key tool for SMS investigation
- 3) Emerging technologies - UAV and Flight Animation

#1 FDR data correction and performance analysis

Assistance from BEA and ATR advisors included :

◆ *Flight data analysis*

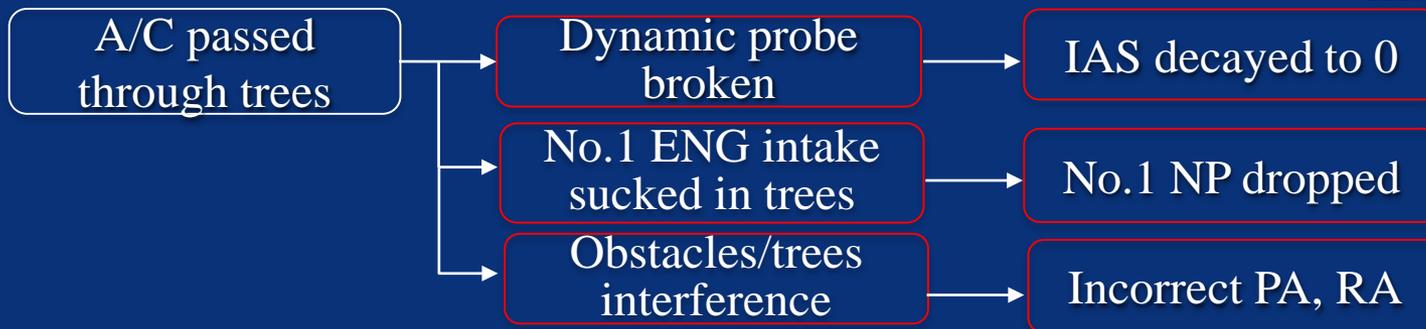
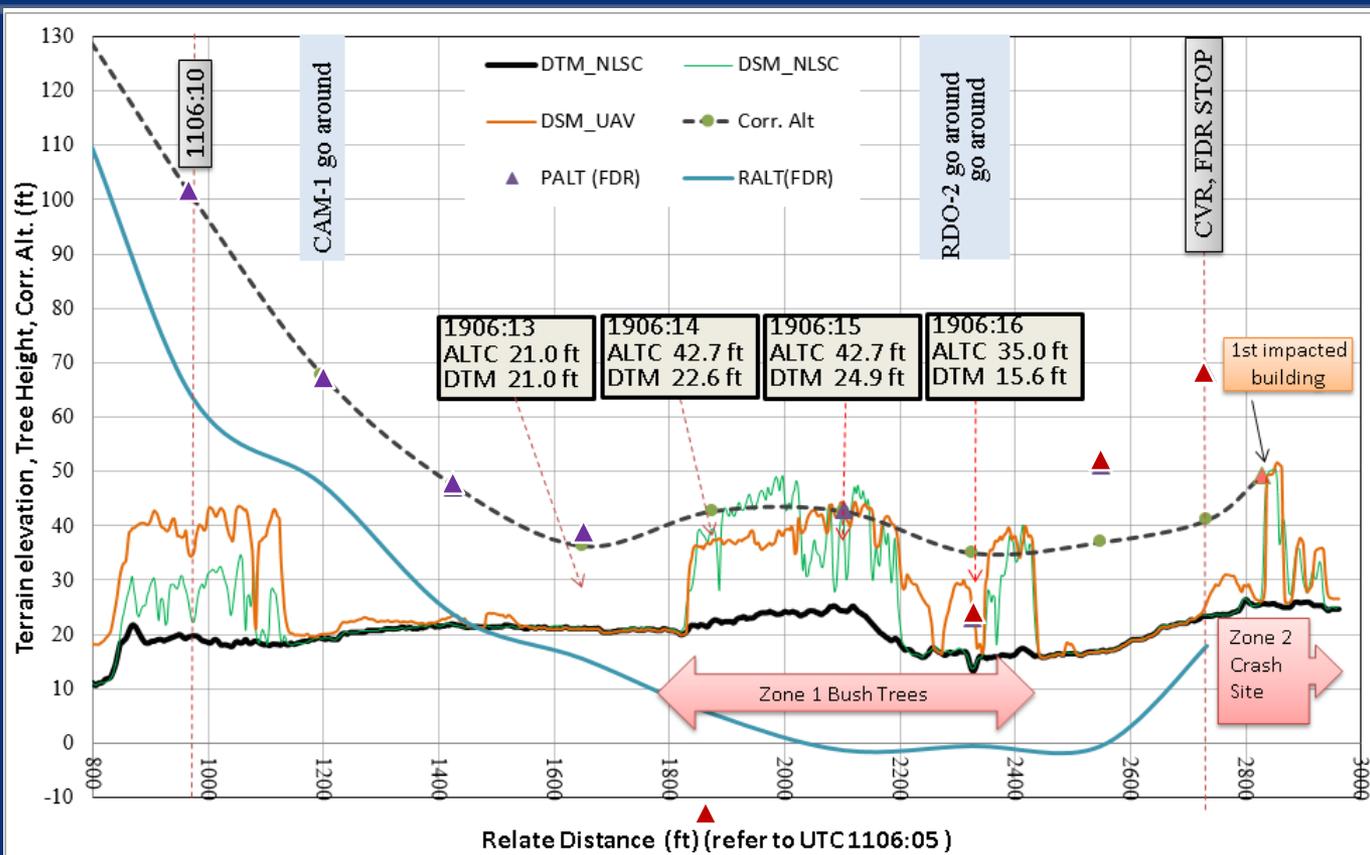
◆ *TNA's FOQA issue*

Conclusion of ASC investigation :

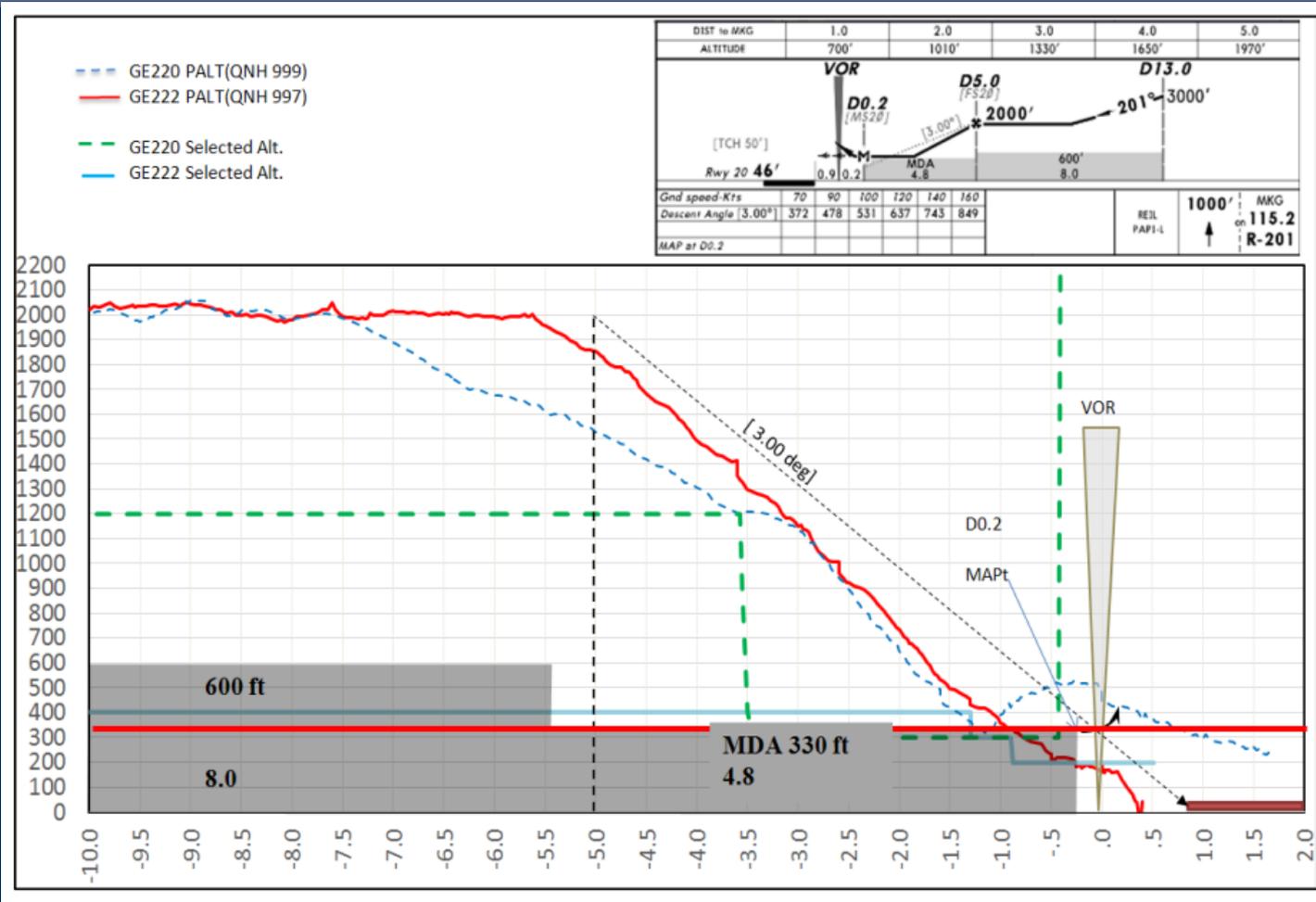
1. FDR readout document contained unclear information.
2. FDR contained spike data when a/c passed through trees.
3. TNA's FOQA program was unable to readily identify those risks involving SOP non-compliance.
4. Last 2 min, "light to moderate" turbulence

→ 6 findings + 4 safety recommendations

FDR Data Correction – Alt.



TNA's FOQA issue

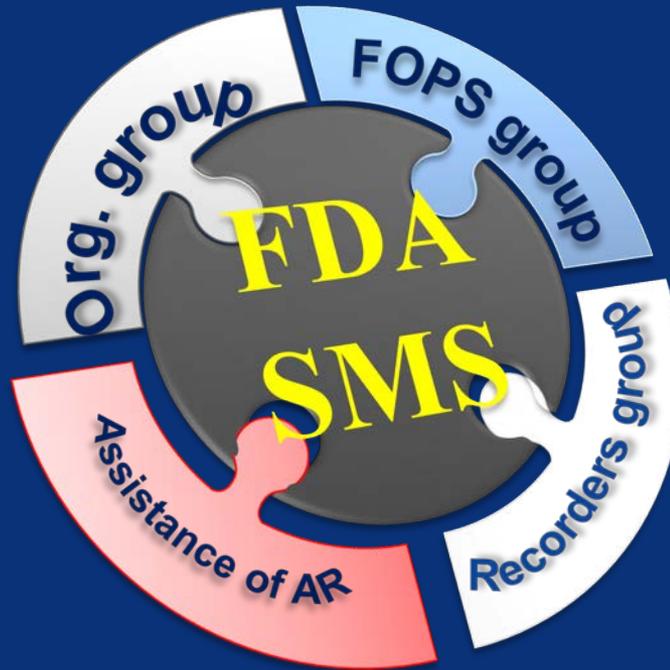


GE220 vs. GE222 Flight Path Profiles During Approach Operation

#2 FDA is a key tools for SMS investigation

- ✓ Interviews (45)
- ✓ TNA's SMM & FOQA program,

- Technical support
- ✓ AFM limitation
- ✓ Simulator Flight
- ✓ Human performance



- ✓ Interviews (30)
- ✓ Obs. Flight (20)
- ✓ Simulator Flight (5 days)

- ✓ Accident flight data
- ✓ Previous flight data
- ✓ CVR transcripts
- ✓ TNA's FOQA events (+100)

Focus on systematic factors:

Flightcrew Fatigue, SOP non-compliances

Operator's SMS, CAA's safety oversight

#3 Emerging technologies- UAV and Flight Animation

~ **25 GB** UAV collected geo-data

~ **10 GB** Archived sat. image + aerial image
+ terrain data

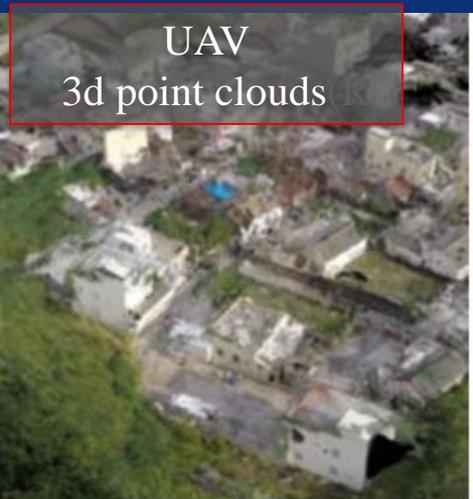
Flight animation superposing with geo-data
(accuracy **10 cm**)



DTM only
(R/S 1m)



DTM +DSM
(R/S 8 cm)



ATR 72-600 accident

Synopsis

- ◆ ATR72-600 crash on 4th Feb. 2015
- ◆ TransAsia Airways passenger flight from Taipei to Kinmen
- ◆ No.2 engine flameout during initial climb after takeoff, PF shutdown wrong engine
- ◆ No. of fatalities: 43



ATR 72-600 accident

- 1) **To secure perishable evidence is a top priority**
- 2) **An intermittent signal discontinuity between the no.2 AFU and the torque sensor**
- 3) **Teamwork on the AFU & TQ sensors examination**

#1 To secure perishable evidence is a top priority

Assistance from TWN gov. agencies included :

◆ *Secure perishable evidences* ◆ *Autopsy*

Day 2: **85%** of a/c wreckage

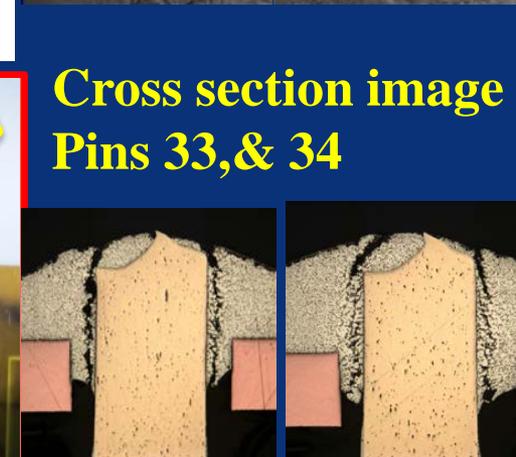
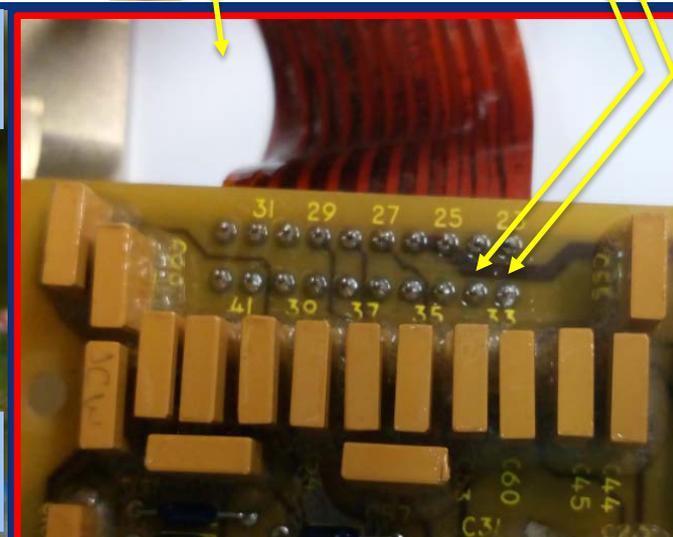
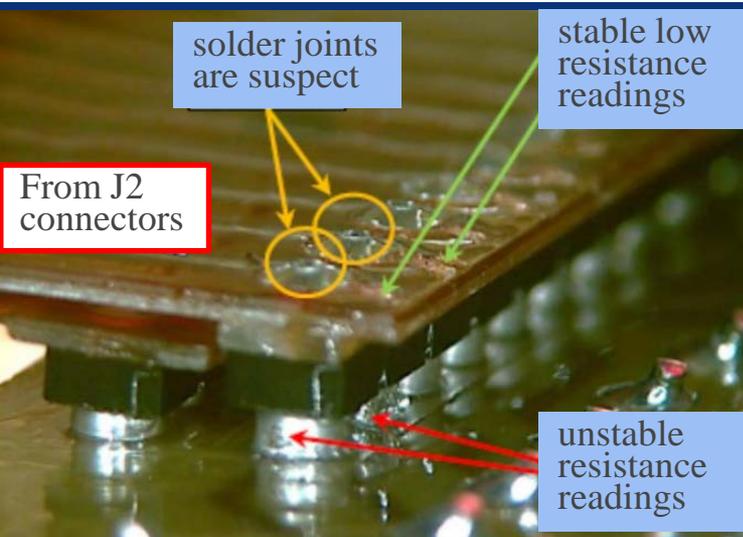
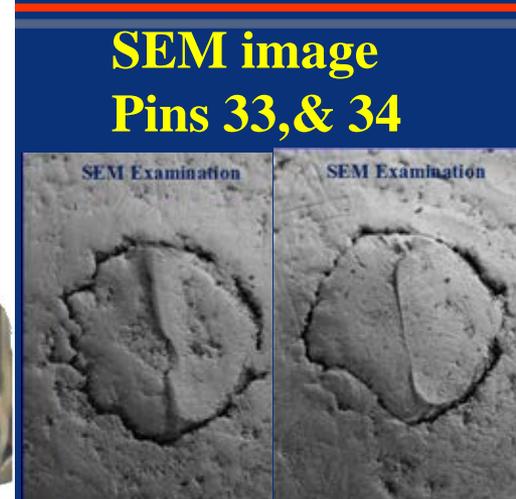
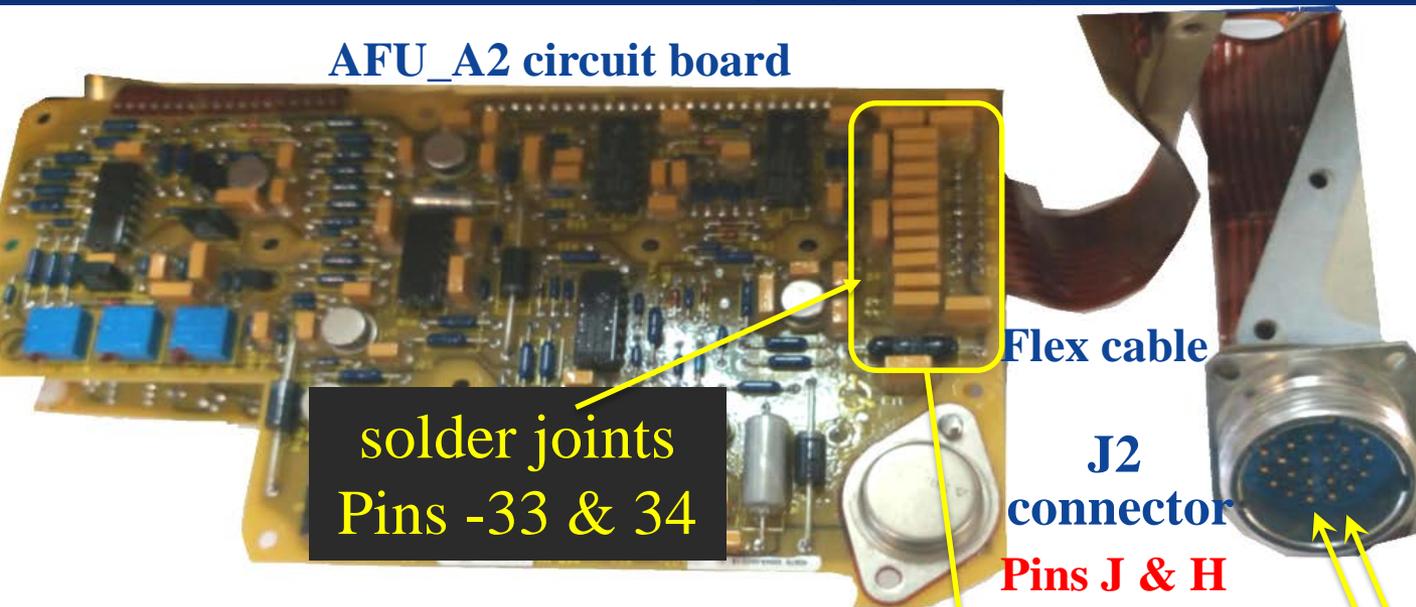
Day 3: **3** dashboard videos and **7** security camera videos

Day 4: **1000** items of autopsy and examination

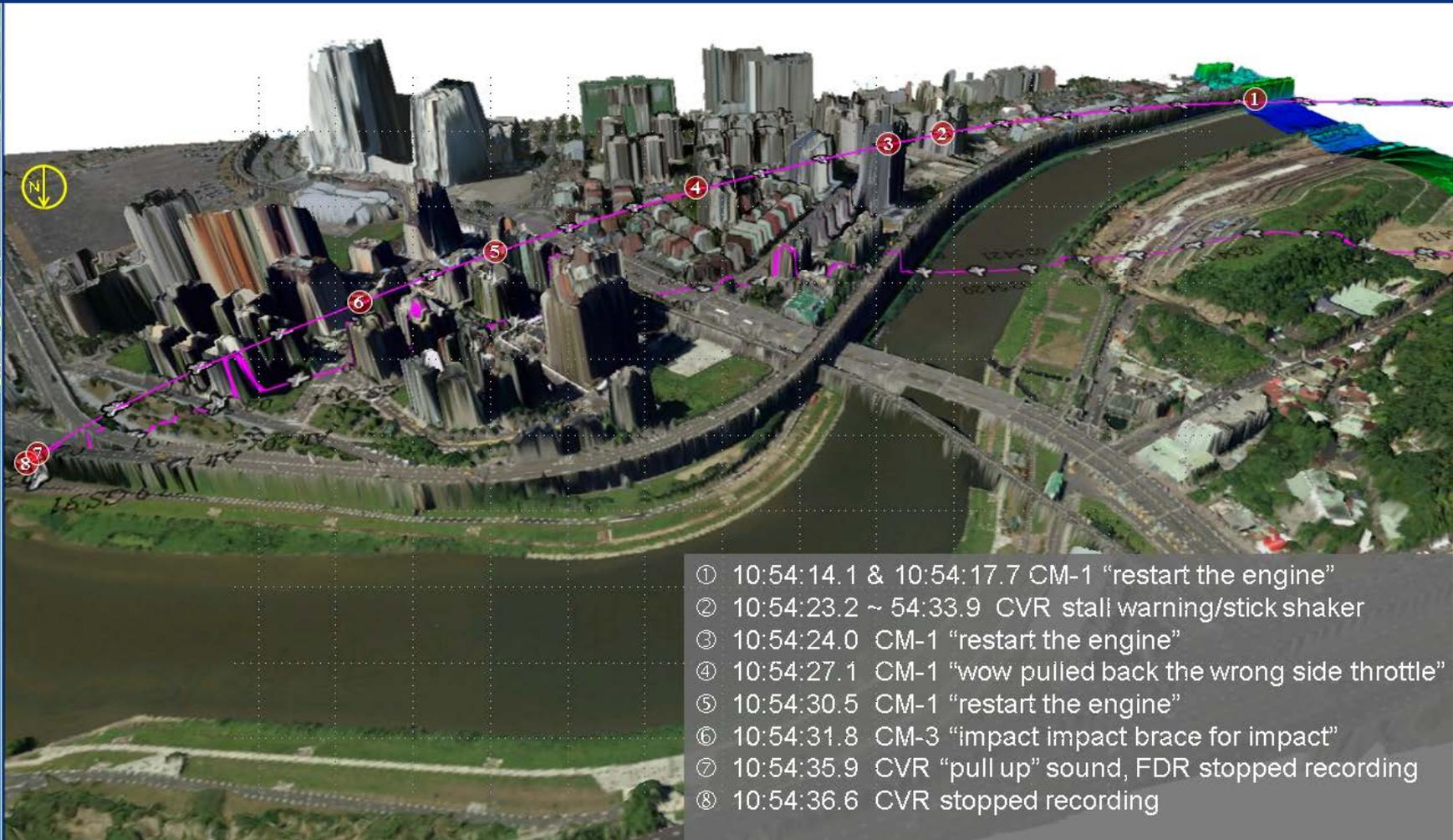
Day 5: **66** items of NVMs and engine components



#3 Teamwork on the AFU & TQ sensors examination



Emerging technologies - LIDAR and Flight Animation



Lessons Learnt

- ◆ **Int'l collaboration is the key to success**
 - ◆ Use all available tools and resources
 - ◆ Good chance to share and learn from other parties
 - ◆ Assess emerging technologies into investigation
- ◆ **Facilitate and maintain procedures to handle damaged flight recorders and NVMs**
 - ◆ Contacts AR to have a list of available NVMs at early stage
 - ◆ Validated FDR database and qualified investigators are keys to fulfil readout schedule as soon as possible
 - ◆ FDA is one of the systematic tools for SMS investigation

Thank you for your attention

GE235 Timeline for Recorders Group

