ANSV AGENZIA NAZIONALE PER LA SICUREZZA DEL VOLO

PRELIMINARY REPORT

SERIOUS INCIDENT
Airbus A320-214 registration marks CN-NML,
Catania Fontanarossa International Airport (Italy),
20th of September 2025

GLOSSARY

(A): Aeroplane.
ACCEL ALT: Acceleration Altitude
ANSV: Agenzia nazionale per la sicurezza del volo (Italian Civil Aviation Safety Authority).
A/P or AP: Auto Pilot.
ASR: Air Safety Report.
ATIS: Automatic Terminal Information System.
ATPL: Airline Transport Pilot Licence.
ATS: Air Traffic Services.
BEA: Bureau d'Enquêtes et d'Analyses pour la sécurité de l'aviation civile.
BEA Morocco: Bureau d'Enquête Technique sur les accidents et incidents d'aviation civile marocain.
CAM: Cockpit Area Microphone.
CAS: Computed Air Speed.
CG: Centre of Gravity.
CPL: Commercial Pilot Licence.
CRM: Crew Resource Management.
CVR: Cockpit Voice Recorder.
EASA: European Union Aviation Safety Agency.
EFB: Electronic Flight Bag.
EGPWS: Enhanced Ground Proximity Warning System.
FCOM: Flight Crew Operating Manual.
FD: Flight Director.
FDM: Flight Data Monitoring.
FDR: Flight Data Recorder.
FLEX o FLX: flex takeoff, an Airbus technique where pilots set a hypothetical "flex temperature" higher than the actual outside air temperature to reduce engine thrust during takeoff.
FMA: Flight Mode Annunciator.
FPM: feet per minute.
GPWS: Ground Proximity Warning System.
GW: Gross Weight.
LOFT: Line Oriented Flight Training.
MCT: Maximum Continous Thrust.
METAR: Meteorological Aerodrome Report.
MSAW: Minimum Safe Altitude Warning.
MTOW: Maximum Take Off Weight.
NLG: Nose Landing Gear.
NOTAM: notice to airmen.
NTSB: National Transportation Safety Board.
MCDU: Multi-Function Control and Display Unit.
OP CLB: open climb.
PIC: Pilot in Command.
PF: Pilot Flying.
RA: Radio Altitude.
RWY: Runway.
S/N or SN: Serial Number.
SRS: Speed Reference System.
TCAS: Traffic Collision Avoidance System.
TO: take off.

TOGA: Take-Off Go Around.
UTC: Universal Time Coordinated. Local time, at the time of accident, was UTC+2 hour.
VERT: vertical.
VFE: maximum flap extended speed.

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ANSV safety investigations are conducted in accordance with Annex 13 to the Convention on International Civil Aviation and EU Regulation No 996/2010. The sole objective of the safety investigation of an accident or incident under these Regulations is the prevention of future accidents and incidents. It is not the purpose of such an investigation to apportion blame or liability. Accordingly, it is inappropriate that ANSV reports should be used to assign fault or blame or determine liability, since neither the investigation nor the reporting process has been undertaken for that purpose.

This Preliminary Report is published to provide details of the initial facts. It contains facts which have been determined up to the time of issue and contains neither conclusions nor safety recommendations. It is published to inform the aviation industry and the public of the general circumstances of the accident or incident and should be regarded as tentative and subject to alteration or correction if additional evidence becomes available. The investigation is continuing and a final report will be published in due course.

Narrative

On the 20th of September 2025 the A320-214 registration marks CN-NML, Air Arabia Maroc flight MAC991, from Catania (LICC, Italy) to Amman (OJAI, Jordan) for a positioning flight, took off from runway 08 at 21.56 UTC. Shortly after, the aircraft started to descend and GPWS alerts triggered. The aircraft trajectory was recovered when it was close to the sea surface. The minimum recorded RA was 41 ft (12,5 m).

The flight continued to the destination, where an uneventful landing was performed.

The event was reported to the ANSV by the operator after their FDM analysis, following an ASR from the captain of the flight.

The Italian Civil Aviation Safety Investigation Authority (ANSV) classified the event as serious incident and launched a safety investigation.

The event was notified to the States of the aircraft manufacturer (France, BEA), of the engine manufacturer (United States and France, NTSB and BEA respectively) and to the State of the operator (Morocco, BEA Morocco). All the above appointed an accredited representative. EASA also appointed a technical adviser to the Italian investigator-in-charge, in accordance with Regulation (EU) 996/2010.

Photo 1: A320-214 marks CN-NML (archive photo, source www.planespotters.net).

Aircraft information
Airbus A320-214 registration marks CN-NML S/N 4848, Certificate of airworthiness dated 8.6.2017. Airworthiness Review Certificate dated 7.4.2025.
At departure of the flight of the event, the Load sheet reported:

Zero Fuel Weight Actual: 42541 kg;
Take off fuel: 11400 kg;
Take off weight actual 53941 kg.

Post flight computation made with the *Flysmart* (Figure 1) EFB software led to the following TO speeds:

V1: 131 kt
VR: 131 kt
V2: 133 kt
Flex: 68°

Figure 1: *flysmart* TO speed computation.

Based on the preliminary information available to the ANSV, these were not inserted in the MCDU. Therefore, the following information from the FCOM is considered important in order to understand the event.
The SRS is the AP/FD vertical mode used at takeoff, or go around, to maintain the reference speed (V2, V2+10 kt, Vapp, etc.). The mode (managed) is triggered by the thrust levers at FLEX or TOGA position and it automatically disengages at the ACCEL ALT or when another VERT mode is engaged.

On takeoff, in order to engage SRS mode, the V2 has to be inserted in the PERF TAKEOFF page of the MCDU.
If V2 has not been inserted, V/S mode engages 5 seconds after lift-off on the current V/S value.

A320 FLIGHT CREW OPERATING MANUAL	AIRCRAFT SYSTEMS AUTO FLIGHT - FLIGHT GUIDANCE AP/FD MODES - GENERAL

AP/FD VERTICAL MODES

Applicable to: ALL

MODE	TYPE	GUIDANCE	REMARK
Ident.: DSC-22_30-40-10-B-00025217.0001001 / 04 MAY 23			
SRS	MANAGED	Speed Reference System mode Mode used at takeoff, or go-around to maintain SRS speed (V2, V2+10, VAPP...).	Triggered by the thrust levers at FLX or TOGA position. Automatically disengages at ACCEL ALT, or when another VERT mode is engaged.

A320 FLIGHT CREW OPERATING MANUAL	AIRCRAFT SYSTEMS AUTO FLIGHT - FLIGHT GUIDANCE AP/FD MODES - TAKEOFF

- V2 is inserted in the PERF TAKEOFF page

L2 If V2 has not been inserted, V/S mode engages 5 s after lift-off on the current V/S value.

L1 - The flight crew sets at least one thrust lever:
  - To the TOGA detent, or
  - To the FLX-MCT detent, when a FLX TO temperature or a Derated Takeoff is entered in the PERF TAKEOFF page.

Note: When V2 is inserted, or SRS TO is engaged, the speed automatically becomes managed. For more information about engagement conditions of managed speed, Refer to DSC-22_30-60-20 Engagement Conditions.

The A320 CN-NML was equipped with FMS2 Thales release 1A software operational program.
When the FMS2 release 2 software operational program modification is applied instead, in case the take-off speeds are not inserted, caution message “TO speeds not inserted” will be triggered at the first engine start and inhibited above 80 kt.
The CN-NML at the time of the event did not have the modification fitted.

Operator
Air Arabia Maroc.

Date & Time of the event (UTC)
20th of September 2025, 21.57’.

Location
Catania Fontanarossa International Airport (LICC), Sicily, Italy.

Airport information

Designazione NR RWY Designation	QFU	Dimensioni RWY Dimension of RWY (M)	Resistenza e superficie di RWY Strength and surface of RWY	Coordinate THR THR coordinates	THR ELEV, MAX TDZ ELEV della RWY per APCH di precisione THR ELEV, MAX TDZ ELEV of precision APCH RWY
1	2	3	4	5	6
08	082°	2435 x 45	PCN 50/F/B/W/T ASPH	37°27'56.59"N 015°03'13.66"E	37.7 FT / 38 FT
26	262°	2435 x 45	PCN 50/F/B/W/T ASPH	37°28'04.27"N 015°04'44.90"E	17.6 FT / 18 FT

Designazione NR RWY Designation	Pendenza di RWY-SWY Slope	Dimensioni SWY SWY dimension (M)	Dimensioni CWY CWY dimension (M)	Dimensioni strip strip dimension (M)	Dimensioni RESA RESA dimension (M)
1	7	8	9	10	11
08	Longitudinale/longitudinal: -4 per mille / per thousand Trasversale/trasversal: NIL Vedi anche/See also AOC	NIL	60 x 300	2555 x 300	90 x 90
26	Vedi/see AOC	NIL	60 x 300	2555 x 300	90 x 90

Designazione NR RWY Designation	OFZ Obstacle free zone (OFZ)	Note Remarks
1	12	13
08	Non applicabile Not applicable	1) DTHR 95 m 2) Testate in calcestruzzo/heads in concrete
26	NIL	1) DTHR 85 m 2) Testate in calcestruzzo/heads in concrete

13	DISTANZE DICHIARATE	DECLARED DISTANCES

Designazione RWY RWY designator	TORA (M)	TODA (M)	ASDA (M)	LDA (M)
1	2	3	4	5
08 Start Point INT TAKE-OFF B*	2435 2130	2495 2190	2435 2130	2340 -
26 Start Point INT TAKE-OFF F*	2435 1925	2495 1985	2435 1925	2350 -

At the date of the event the NOTAM B41725 was in force: from 25.8.25 to 25.10.25 night closure RWY 08/26 from 22.00' to 4.59'.

Type of Flight
Positioning flight for scheduled maintenance.

Persons on Board
2 pilots, 4 cabin crew and 0 passengers.

Injuries
None.

Nature of Damage
None.

Flight crew information
The duty of the crew for the day of the event was scheduled to start at 16.15'.
A first flight Casablanca (GMMN) – Catania (LICC) was scheduled at 17.15'. At 16.40' it was rescheduled at 17.40' due to late arrival of the aircraft. The actual departure of the flight Casablanca (GMMN) – Catania (LICC) occurred at 18.01'. The CN-NML landed in LICC at 20.51'.
The turnaround time in Catania[1] was 53'.

[1] Turnaround time: time between on-block and off-block.

Captain	Age 47 years, Tunisian. ATPL (A). A320 Rating, Instrument Rating. Class 1 Medical Certificate. Total flight experience 14396h. Rest time before the event day: 27h 25’
First Officer	Age 36 years, Moroccan. CPL (A). A320 Rating, Instrument Rating. Class 1 Medical Certificate. Total flight experience 3696h. Rest time before the event day: 18h 02’.

Weather Conditions

Following the METAR at the time of the serious incident in LICC.

21:50 30005KT CAVOK 23/20 Q1021=
22:20 30003KT CAVOK 23/20 Q1020=

The reported sea conditions for Southern Ionio Sea applicable at the date and time of the event were:

Level 4 – moderate[2].

At the date and time of the event the Moon was under the horizon, not visible. It would have been anyway a new Moon phase, 0.8% visibility.

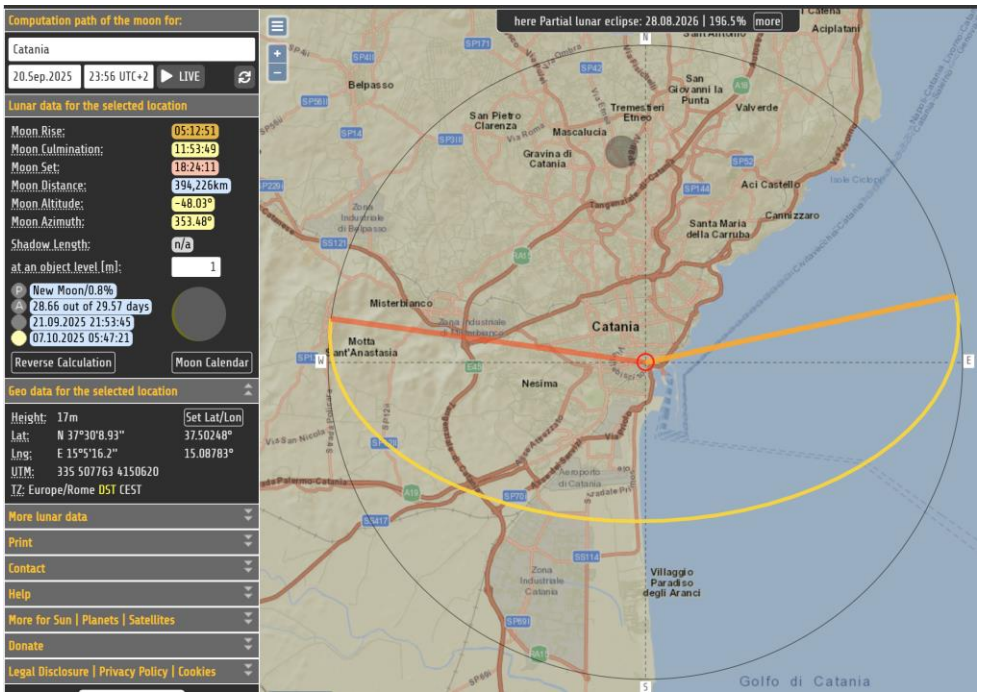

Figure 2: Moon elevation and brightness at the time of the event (source www.moonclac.org).

[2] Douglas Sea Scale.

ATIS and ATS
ATIS has reported for departure RWY08 in use, with 4 knots to zero tailwind.
Radio communications did not highlight anything, apart from two reminders from TWR to speed up operations due to the imminent closure of the airport. The airport TWR was not equipped with MSAW.

Preliminary FDR and CVR analysis
The recorders were downloaded successfully at the ANSV laboratories on the 4th and 5th of November 2025.

FDR
Following the sequence of the event as recorded by the FDR (Figure 3). This will be commented also by images from the 3D reconstruction[3] of the event.
At 21:53:56 the aircraft started taxi (groundspeed increasing).

At 21:56:24 the aircraft was lined up for take-off on RWY 08. The data allowed to establish the PIC was the PF.

Both FDs were engaged with no associated mode on the FMA.
Slats/Flaps were CONF 1+F.
CG was 24.8%.
STAB position was -0.8° (nose-up).
EGPWS terrain was displayed on first officer side.
Weather radar was displayed on captain side.
The take-off speeds MCDU entries are not included in the FDR recorded parameters.

At 21:56:28 the thrust levers were moved initially to FLEX and after 4 seconds (at CAS of about 50 kt) the TOGA was set (21:56:32). FDs mode changed and engaged to RWY mode. SRS mode was not engaged. Auto-thrust was not armed.

From 21:56:43 to 21:56:46 the CAS was between 127 and 144 kt. While no sidestick input was applied, the NLG was recorded uncompressed twice (Figure 4).

At 21:56:46 the rotation was initiated at CAS 144 kt.

At 21:56:49 the aircraft lifted off at CAS 157 kt and pitch +7°.

At 21:56:52 CAS was 167 kt increasing, RA 37 ft and the gears selected UP. V/S +1520 fpm.

At 21:56:53 FDs lateral mode changed from RWY (LOC SUB MODE RUNWAY) to NAV (TRAK SUB MODE NAV), Figure 5. RA was 62 ft, CAS 168 kt, pitch +10,5°[4].

At 21:56:54 RA 91 ft, 5 secs after lift-off, FD vertical mode was in "V/S" (target V/S +1900 fpm). Current V/S was +1968 fpm. AP was not engaged.

At 21:56:55 aircraft pitch reached a maximum of +11°. Sidestick input at that time increased to about 9 ° pitch down. RA was 123 ft.

[3] The 3D reconstruction of the event is based on the FDR data and it is only produced to provide the reader with some easy-to-understand visual representations. Details of the aircraft and of the instruments represented may differ from the reality. The event is shown in daylight instead of nighttime for clarity.
[4] As per FCOM the pitch in this phase should be 15°.

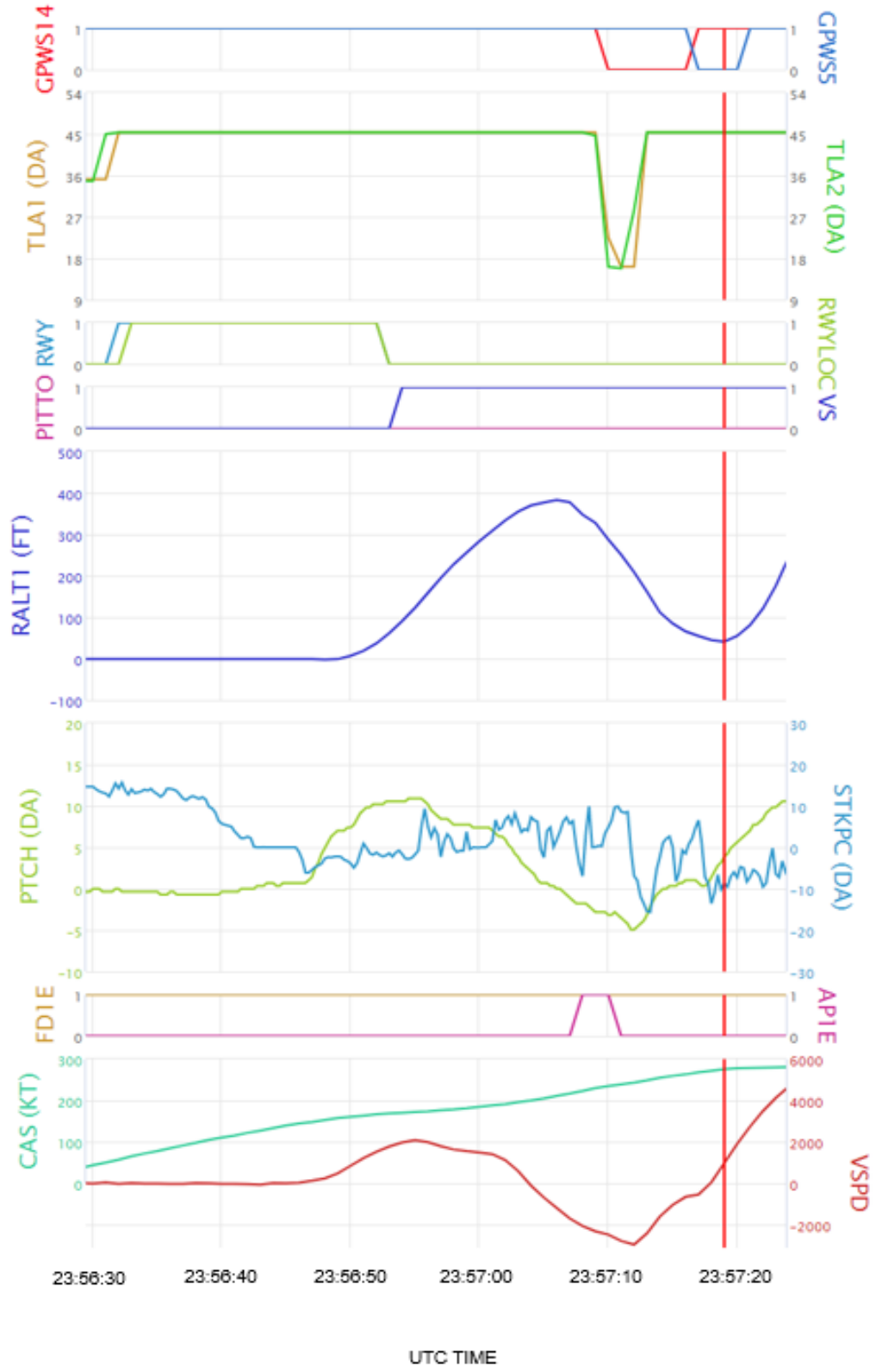

Figure 3: selection of FDR parameters. GPWS 5 and 14 (GPWS alert parameters), TLA (Throttle Lever Angle 1-left, 2-right), RWY and RWY LOC (FD lateral modes), PITTO (corresponds to SRS mode), VS (FD vertical mode), RALT (Radio altitude), pitch (aircraft pitch), STKPC (captain stick position, >0 pitch down input), FD1 (Flight Director 1 ON/OFF), AP1 (Auto Pilot 1 ON/OFF), CAS (Computed Air Speed), VSPD (Vertical speed).

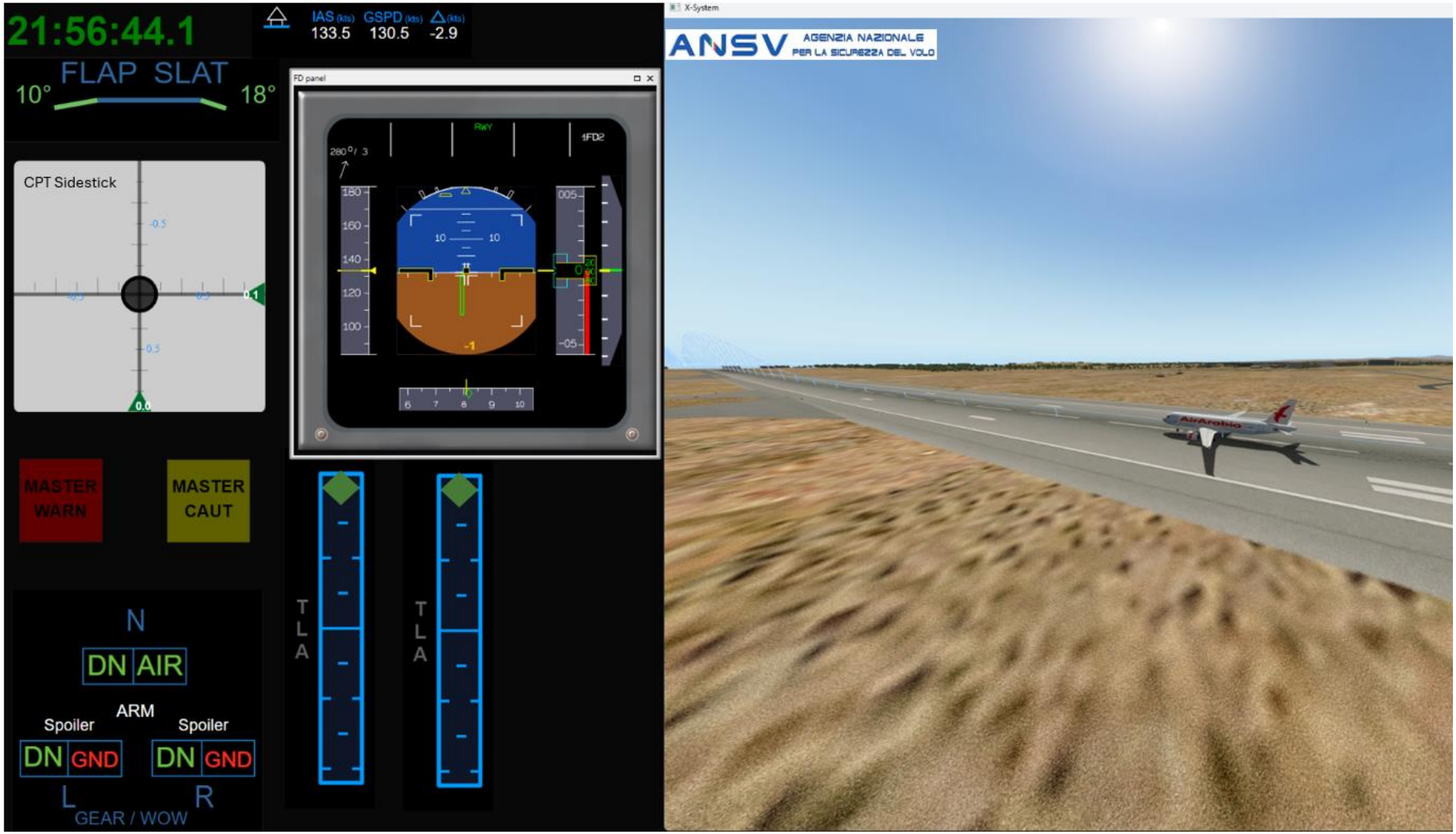

Figure 4: 3D representation of the event based on the FDR data. 21:56:44, NLG uncompressed, RWY mode engaged.

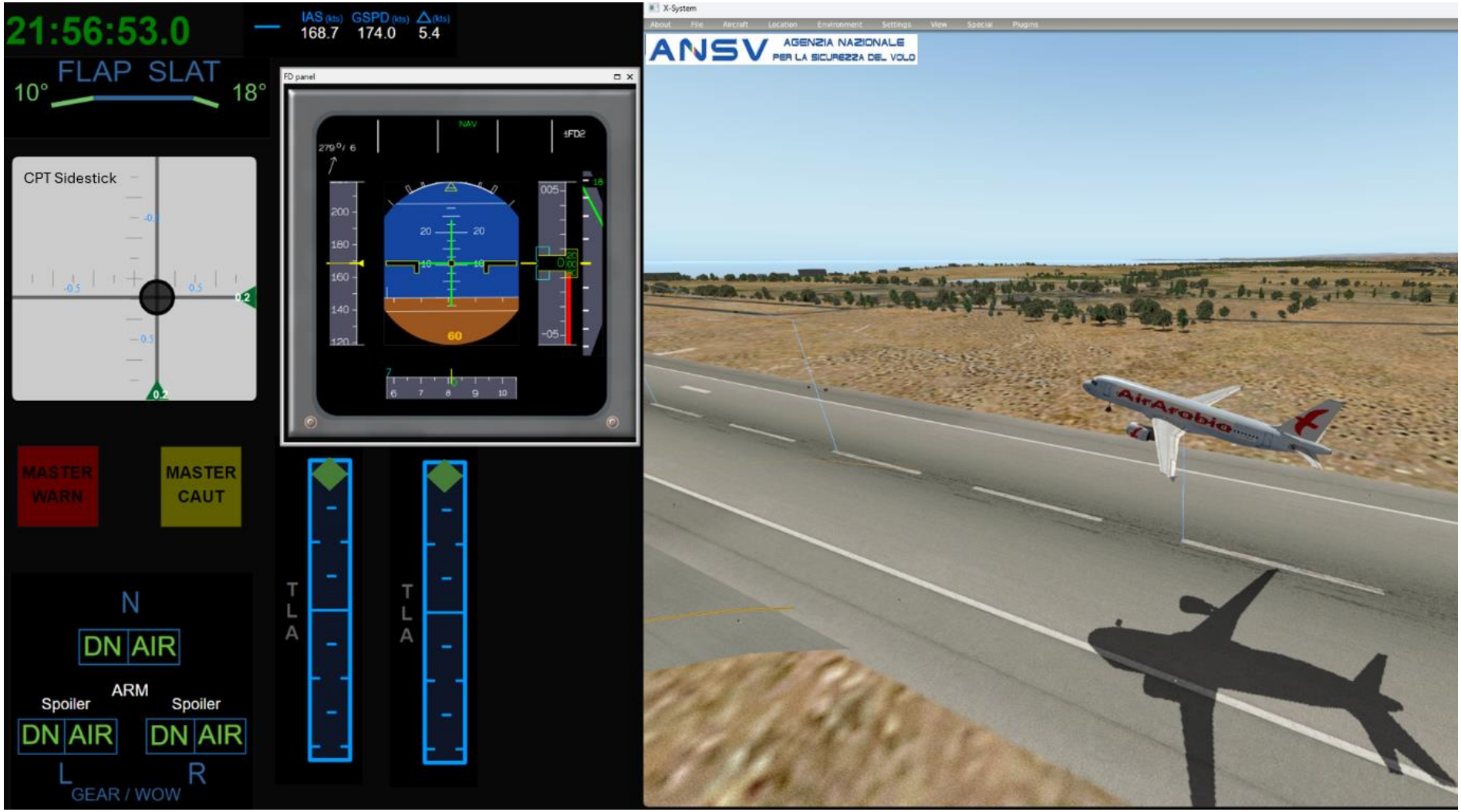

Figure 5: 3D representation of the event based on the FDR data. 21:56:53, Aircraft lifted off, NAV mode engaged.

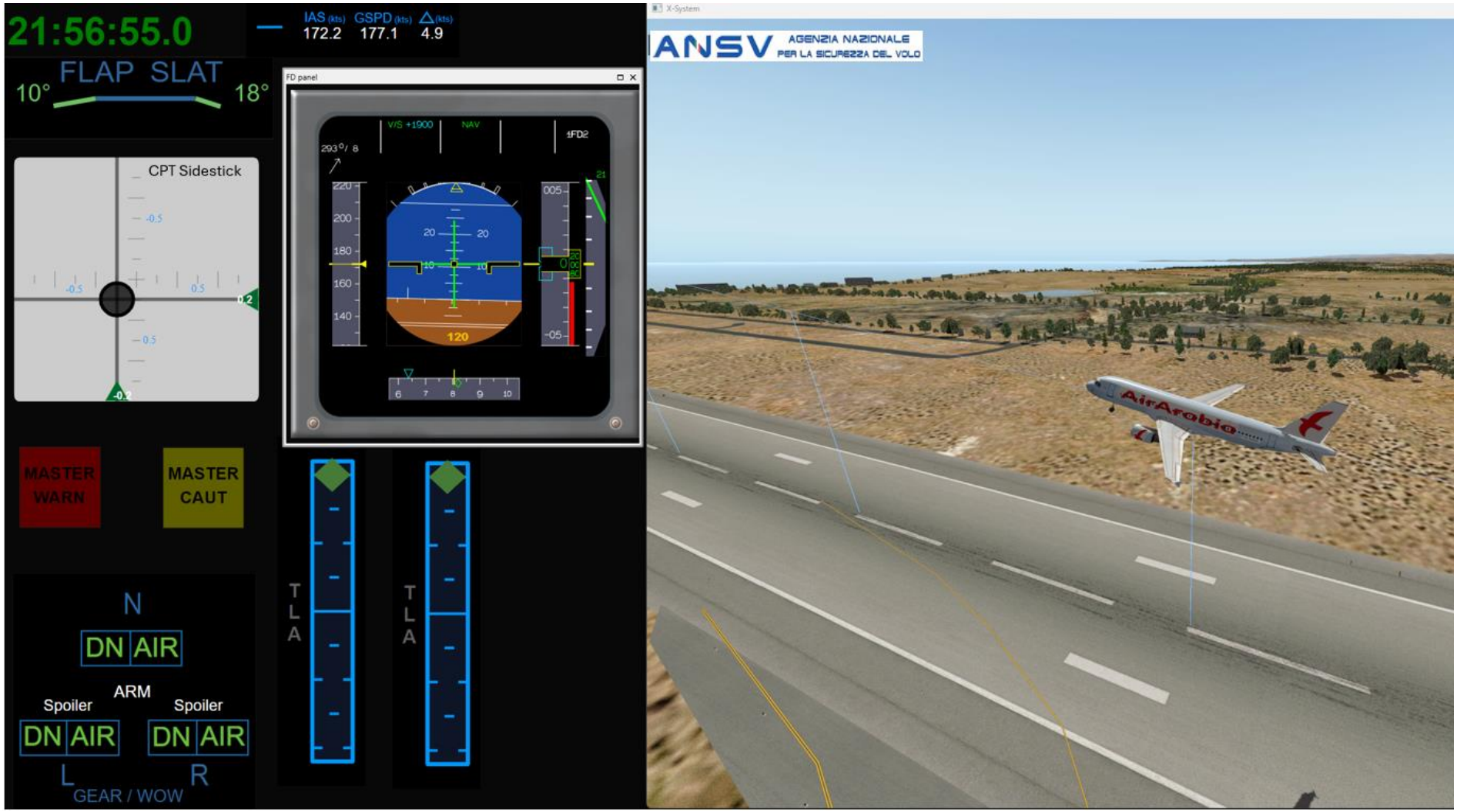

Figure 6: 3D representation of the event based on the FDR data. 21:56:55, vertical mode in V/S, target speed +1900 fpm, AP not engaged.

At 21:57:01, at 309 ft (RA), while CAS was 188 kt, V/S +1408 fpm, and pitch 7°, pitch down was commanded from captain sidestick.

At 21:57:04, at 370 ft (RA), CAS was 200 kt, V/S +112 fpm, and pitch +2.1°, flaps config 0 selected, while pitch down command 7.2° was still observed from captain sidestick.

At 21:57:06, at 383 ft (RA), while CAS was 211 kt, V/S -1200 fpm, and pitch 0° (aircraft started descending), pitch down command still observed from captain sidestick.

At 21:57:08, at 348 ft (RA), AP1 engaged (for only 3 seconds) in NAV / V/S. The vertical speed target changed to "V/S -1900", CAS was 222 kt, V/S -2064 fpm, aircraft pitch -1.75°. During the timeframe the AP1 was engaged, sidestick movements from Captain side were recorded.

At 21:57:09, at 328 ft (RA), V/S -2320 fpm. At CAS 230 kt, thrust reduction started from TOGA to 16° (position between “climb” and “idle” detent) in one second (at 21:57:13 TOGA again).

At 21:57:10, at 288 ft (RA), a first GPWS parameter triggered for 7 seconds, V/S -2480 fpm, pitch -3.2°.

At 21:57:11 AP1 disengaged, flaps angle 0° (fully retracted), slats were still retracting, CAS 239 kt, (VFE 230 kt), V/S -2784 fpm, FD target V/S -1920 ft/min, RA 251 ft.

At 21:57:13, at 162 ft (RA), TOGA was applied while CAS was 249kt, V/S -2416 fpm, pitch -3.2°, and pitch up command was observed from captain sidestick (full deflection, Figure 8).

At 21:57:17, at 55 ft (RA), a second GPWS parameter triggered for 4 seconds, while CAS was 268 kt, V/S -544 fpm, pitch 0.7° and momentary pitch down followed by pitch up command observed from captain sidestick.

At 21:57:18, at 45 ft (RA), CAS was 271 kt, pitch 1.4° and pitch up command was observed from captain sidestick 13.5° (2/3 of full deflection).

At 21:57:19, at 41 ft (RA), Figure 9, CAS was 275 kt, pitch 3.8° and pitch up command was observed from captain sidestick 8.6°.

At 21:57:29, auto-thrust and OP CLB mode engaged at 737 ft (RA), CAS was 283 kt, V/S 5800 fpm and pitch 12.7°, while AP was still not engaged.

At 21:57:50, thrust in climb detent then AP1 engaged at baro-altitude 2619 ft (QNH 1021), CAS was 265 kt, V/S 5900 fpm.

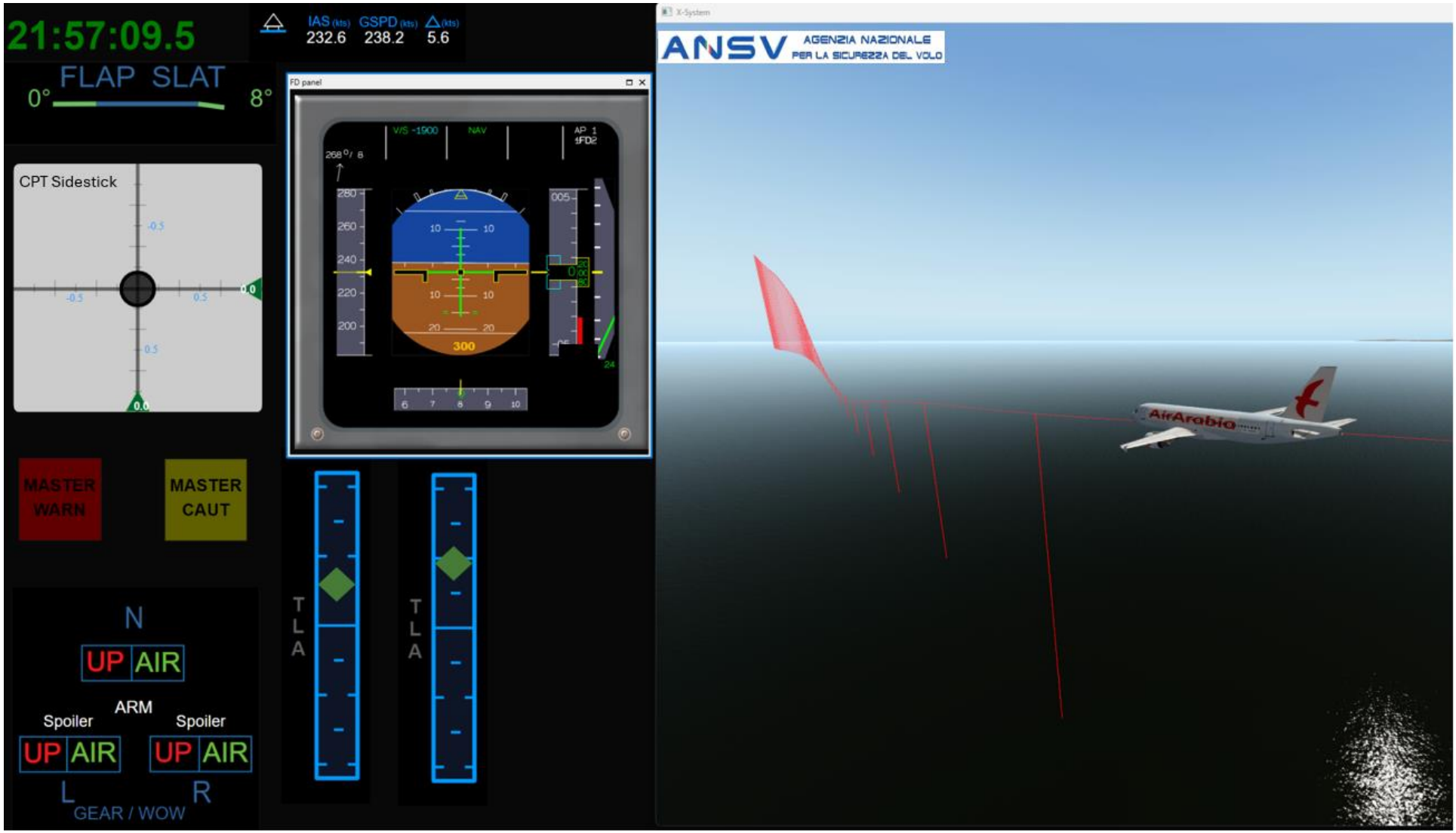

Figure 7: 3D representation of the event based on the FDR data. 21:57:09,5, AP1 engaged, target V/S to -1900 fpm. Thrust reduction started from TOGA to 16° (position between "climb" and "idle" detent) in one second (at 21:57:13 TOGA again).

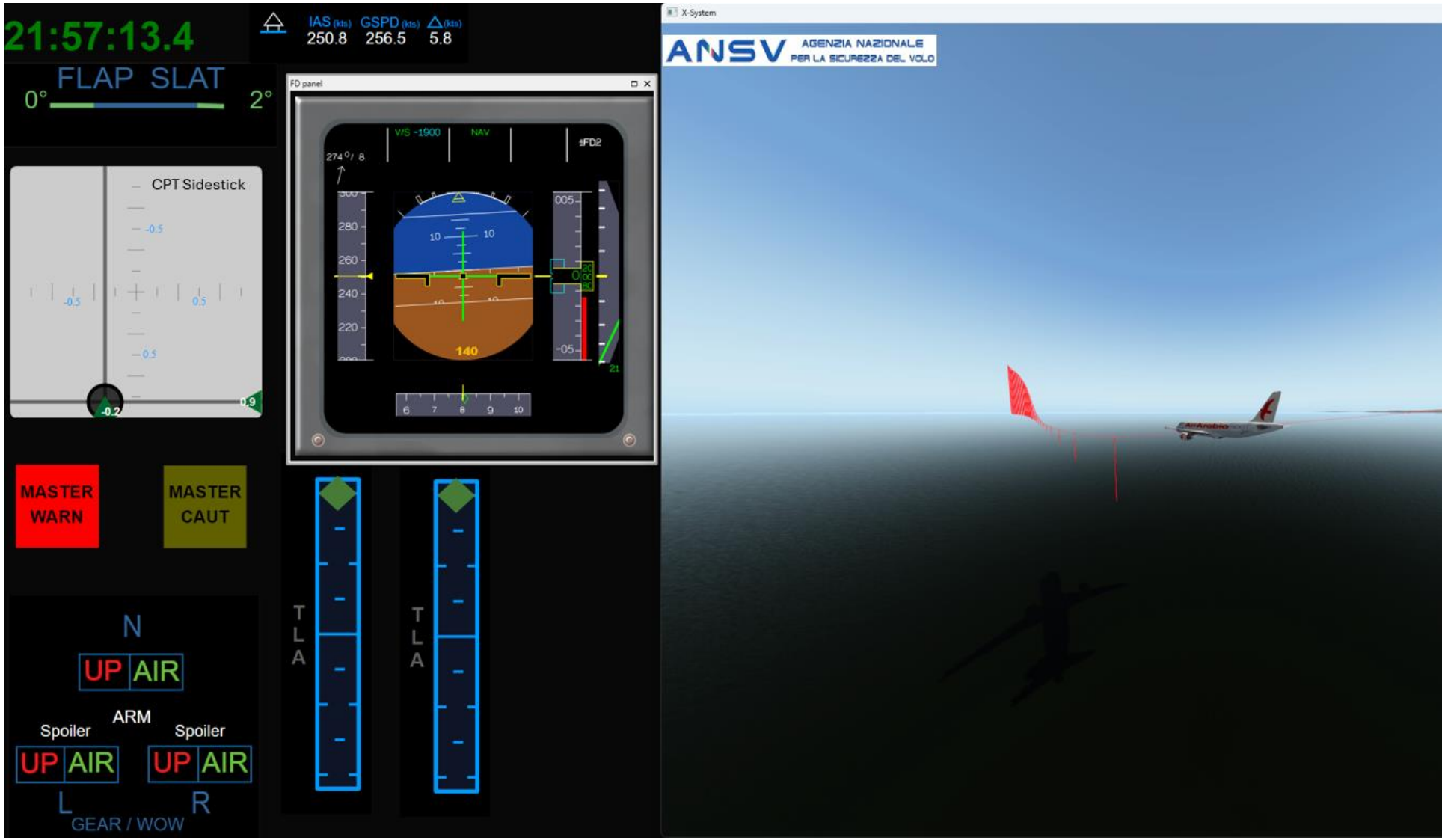

Figure 8: 3D representation of the event based on the FDR data. 21:57:13, GPWS Warning "Pull Up, Pull Up" on (see also following paragraph on GPWS data analysis). Captain sidestick full deflection (in the representation ±1 value corresponds to ±16°, full deflection in pitch).

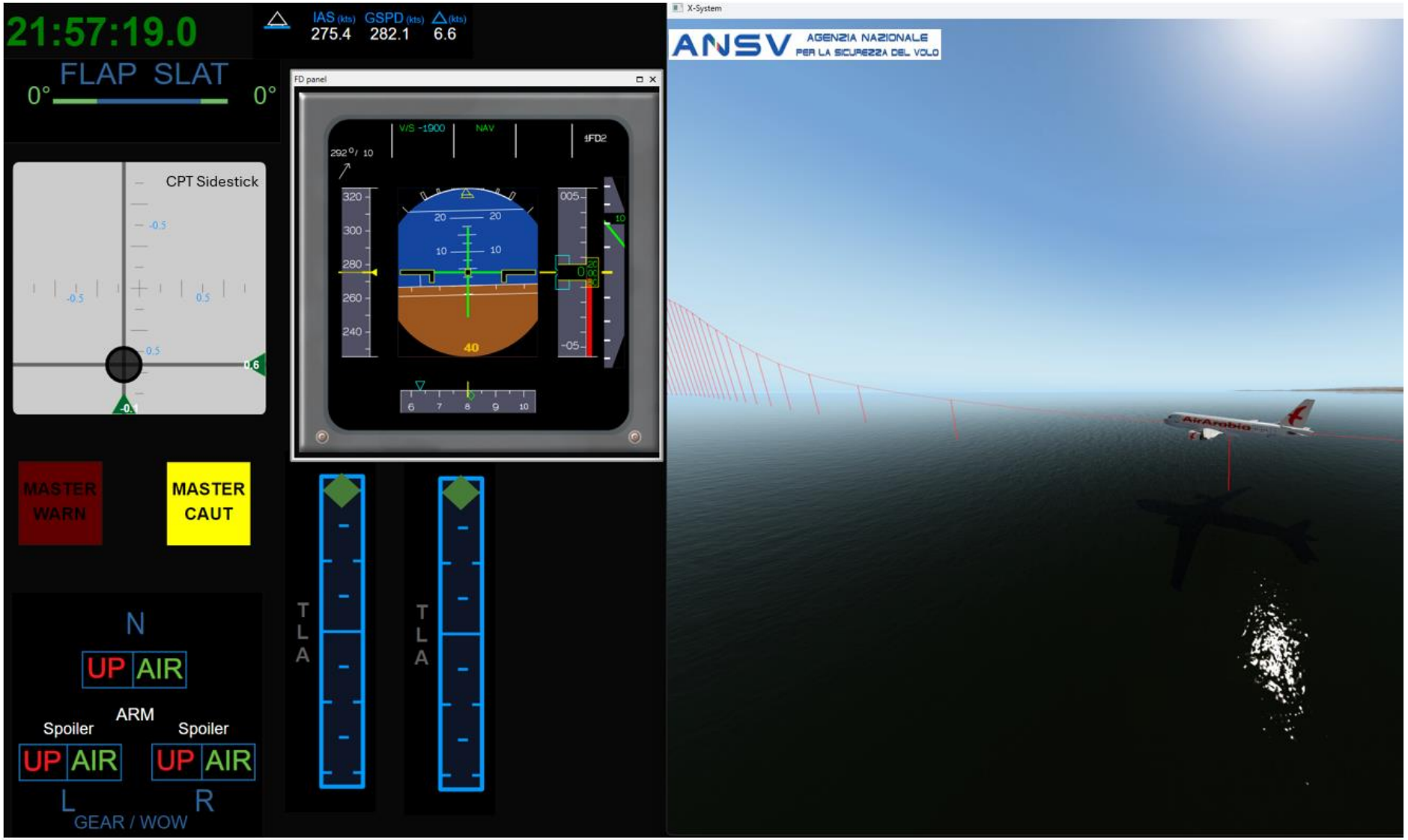

Figure 9: 3D representation of the event based on the FDR data. 21:57:19, closest point to the sea surface 41 ft, GPWS Caution "Don't Sink message" on (see also following paragraph on GPWS data analysis). Captain sidestick transitioning from 13.5° (2/3 of full deflection) to 8.6° full deflection (in the representation ±1 value corresponds to ±16°, full deflection in pitch).

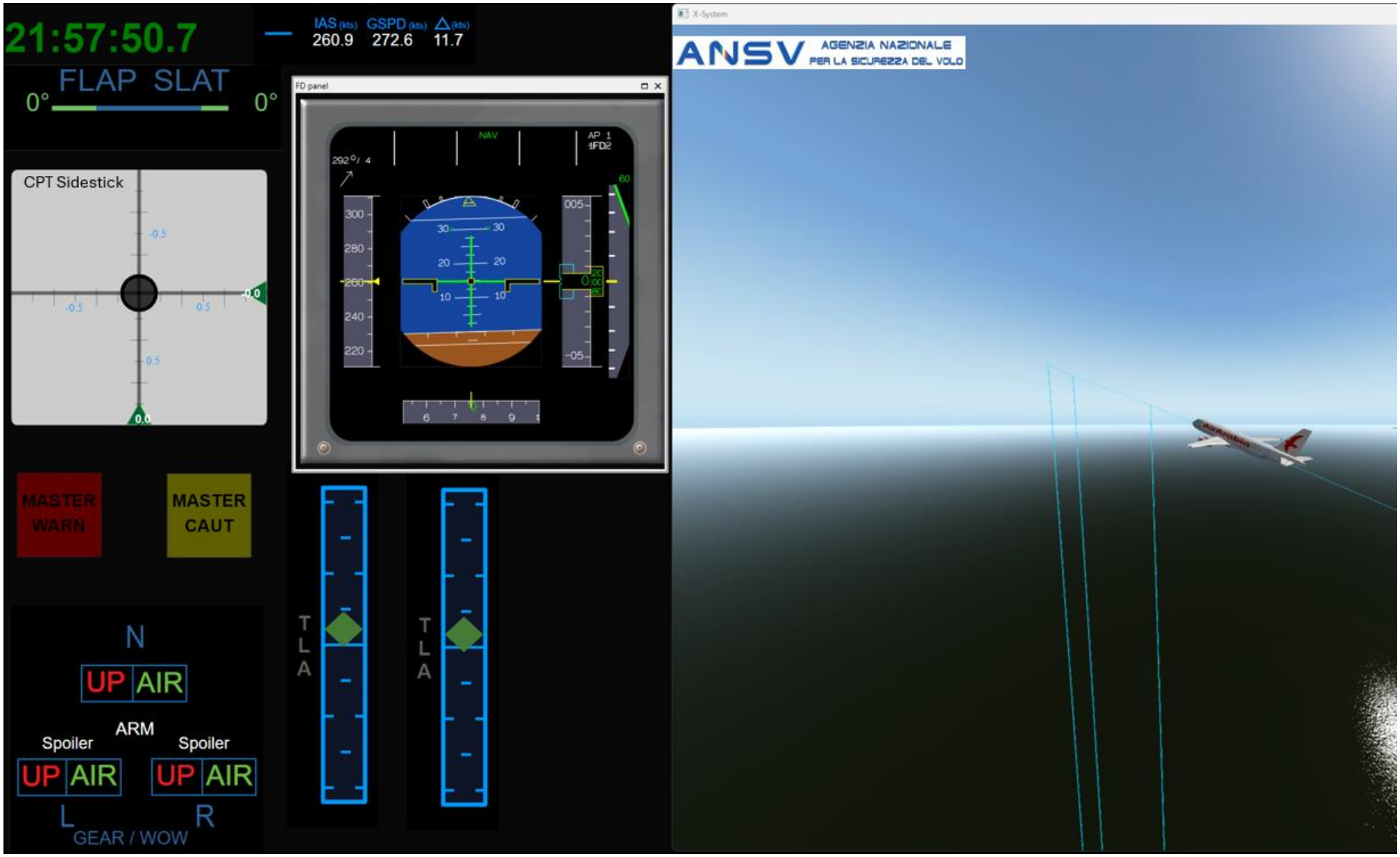

Figure 10: 3D representation of the event based on the FDR data. 21:57:50, AP1 engaged, thrust in climb detent CAS was 265 kt, V/S 5900 fpm.

CVR recordings
The CVR installed in the CN-NML was able to record 4 tracks, 3 of them lasting 2 hour 10' and the fourth (CAM) maximum 3 hours 12'.
The recordings of the flight event were overwritten due to the length of the flight itself (2h 57') followed by taxi and different powering ups during maintenance activity.

Detailed analysis of the GPWS data
The TCAS unit, also providing function of GPWS, was downloaded in order to receive more information on the alerts received.
Indeed, it was possible to ascertain that the GPWS alerts were actually the following:

- 21:57:10 a Mode 1 "Sink Rate" Caution alert for 1.5 seconds;
- 21:57:12 Mode 1 "Pull Up Pull Up" Warning alert for 4-5 seconds;
- 21:57:17 a Mode 3 "Don't Sink" Caution alert for around 4 seconds, occurred while the aircraft was changing vertical speed to the pull up maneuver.

Safety actions from the operator
Among several safety initiatives taken by the operator in the aftermath of the event, the following are considered of high relevance:

- the complete implementation of FMS2 release 2 software operational program has been expedited for the whole A320 fleet;
- CRM/LOFT scenario in simulator sessions were integrated with a focus on early recognition and intervention for "takeoff with no speeds inserted" events.

Further investigation
The ANSV safety investigation continues exploring all the possible factors contributing to the event. In particular, is foreseeable that the following will be mostly discussed:

- possible spatial disorientation occurred during the event;
- possible organizational factors;
- possible human-machine interface issues;
- possible technological barriers implementation.