Large ASE in the US: ASE-Rs, Trends, etc.

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Federal Aviation Administration

Overview

1. ASE Calculation
2. Large ASE: Detection and Reporting
3. Large ASE Case Examples
4. Resolutions

ASE Technical Interchange Meeting

ASE Calculation

Altimetry System Error (ASE): Determined by comparing the identified geometric height of the aircraft and the geometric height of the barometric pressure surface associated with the altimetry measurement

- Automatic Dependent Surveillance- Broadcast (ADS-B) Out provides a source of aircraft position data for use in ASE calculations.

Meteorological (MET) Data: Downloaded from the US National Oceanic and Atmospheric Administration (NOAA).

- MET data is processed using accepted models to determine the true altitude of barometric pressure surfaces

Matching Process: Automated processing matches a modeled pressure altitude surface with the location of an aircraft for ASE calculation.

Using ASE Data Samples

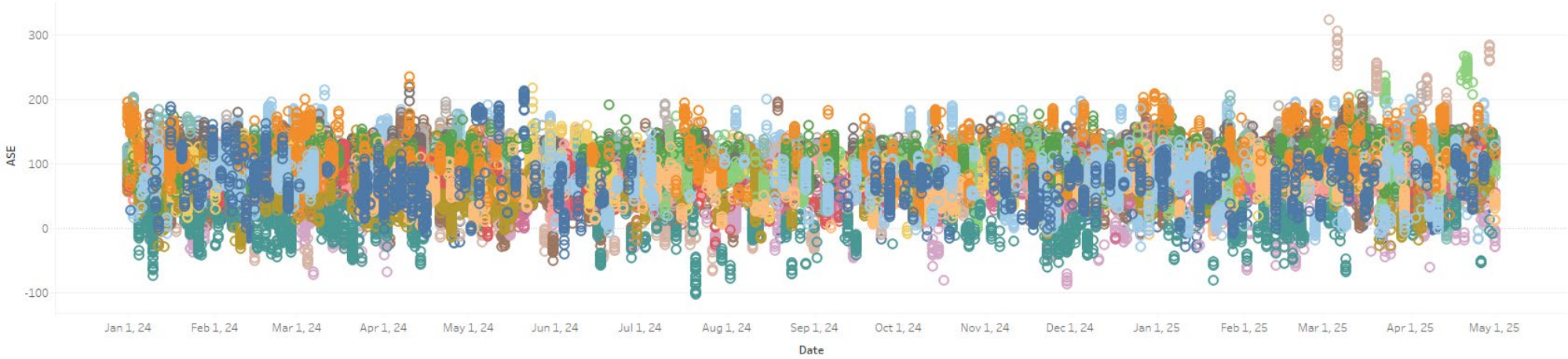
Data Import: NAARMO imports each day of ASE data into their performance database

Analysis Platform: This serves as a platform for data sorting, trend detection, daily large ASE screening, and long-duration AAD events

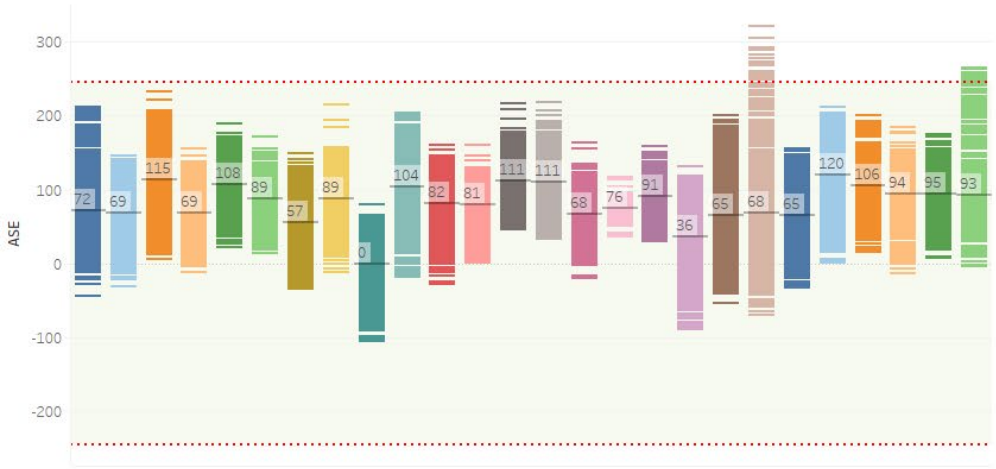
Comprehensive Processing: Analyzing all flights on every processing day provides an excellent view of RVSM performance

Fleet Analysis: Exploring a single operator's aircraft of a specific type.

ASE Performance



Average Aircraft ASE Performance



Location

Large ASE Detection

- ASE Watch List: Developed to establish criterion for identifying aircraft for ASE-Rs.
  - ADS-B data processed daily for ASE
- Large ASE-Report (ASE-R): The means by which NAARMO informs states, operators and other RMAs of large ASE events of concern.
  - US aircraft are reported to Flight Standards
  - Foreign aircraft are sent to the responsible RMA or state authority.

Large ASE Watch List

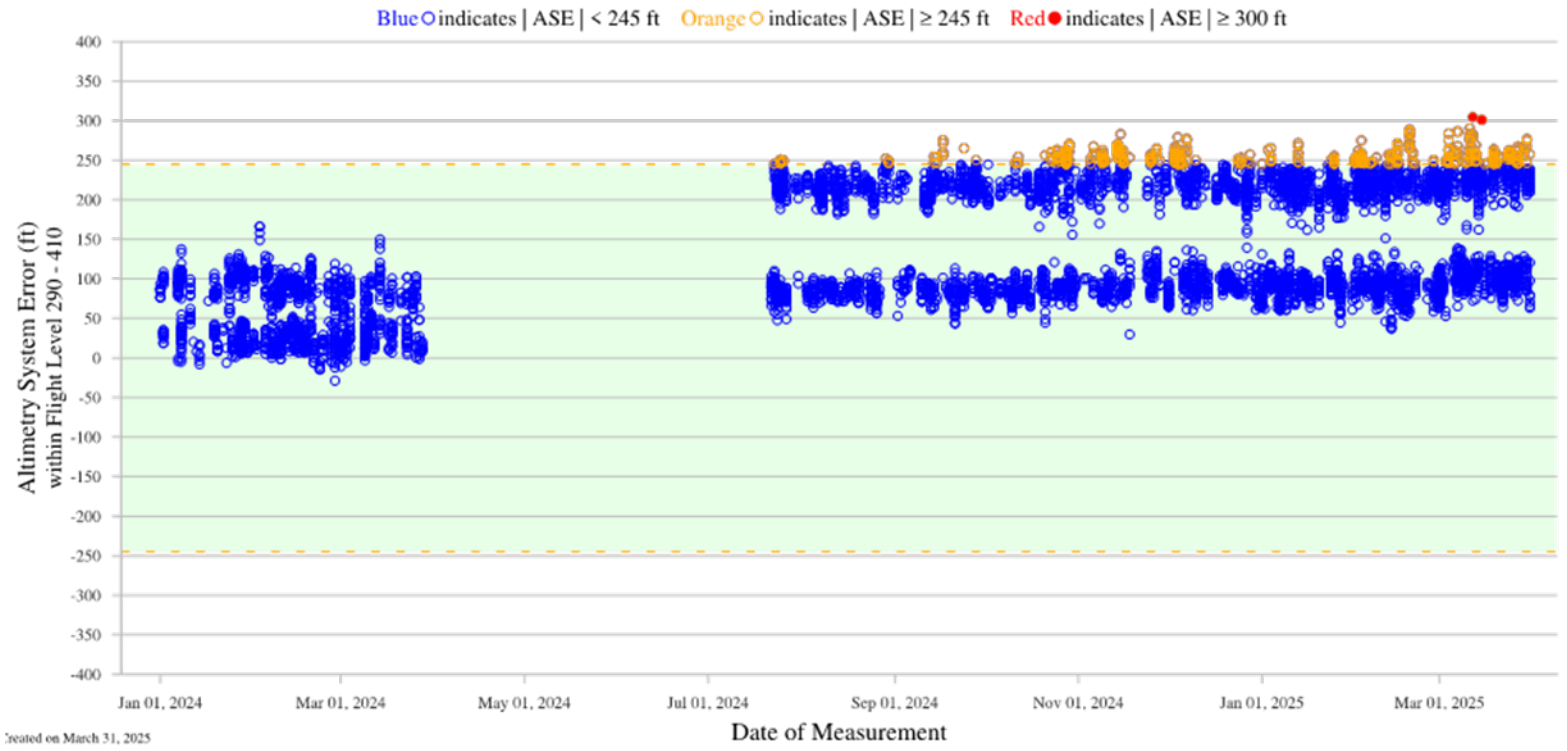
Database Scan:

ASE ≥ |300| feet

QC: Verify accurate MET match

Cross-check: Ensure aircraft details and RVSM filing status are accurate

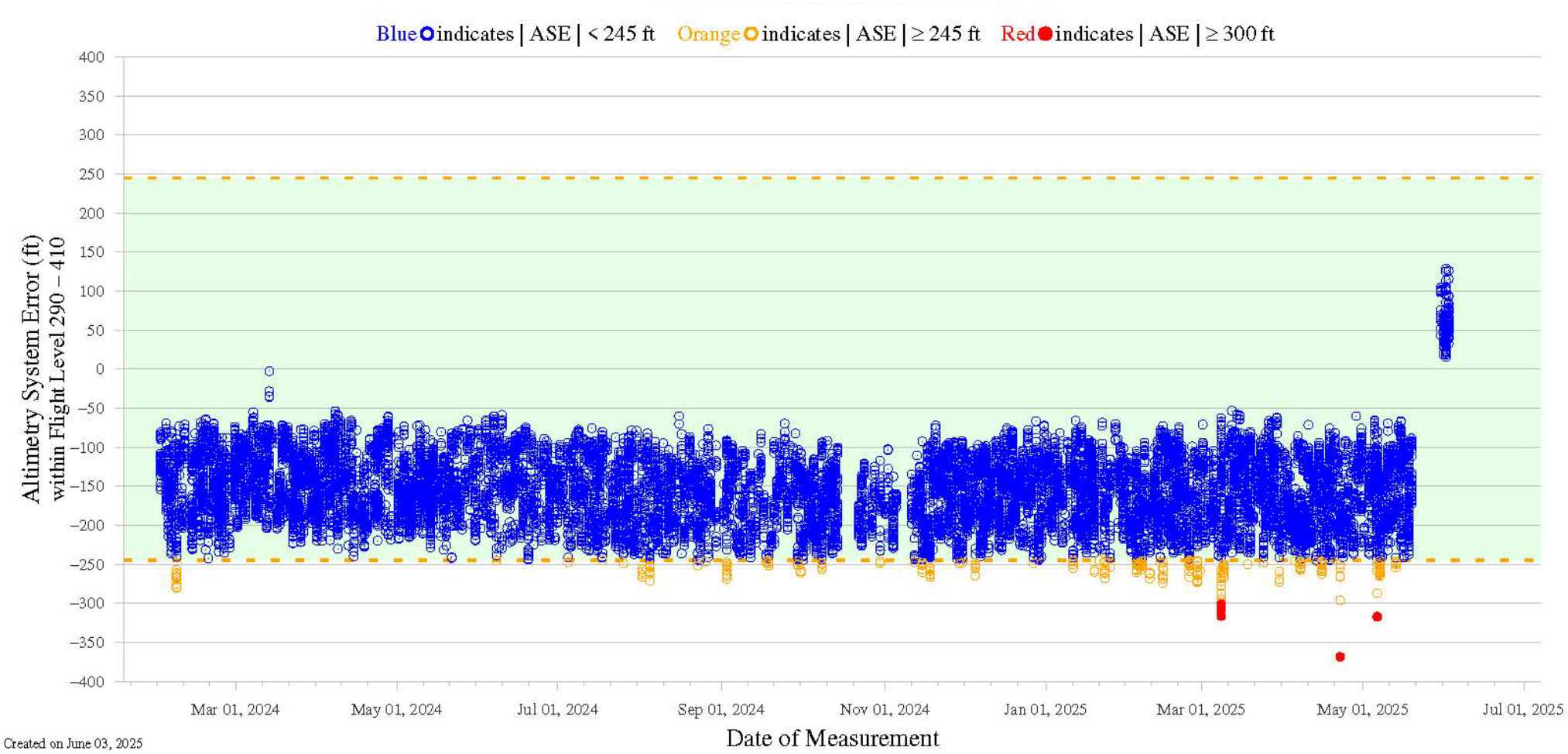
Protocol: Notify State Authority or responsible RMA by means of ASE-Report (ASE-R)



Output Statistics:

Mode S, Annual ASE Count, Annual ≥245’ ASE Count, Annual ≥ 300’ ASE Count, Today’s ≥ 245’ ASE Count

Watch List Case: A321



Watch List:
An observed trend towards -300 ft. then improved before an ASE-R was issued.

ASE-Report

Report provides:

- Operator name
- Brief background
- Important aircraft info
- ASE performance chart

Performance Assurance Team: NAARMO and FAA Flight Standards

FAA Flight Standards: Issues through Local Authority (FSDO)

- Responsible Inspector contacts operator

Altimetry System Error Report (ASE-R)

Date: April 3, 2025
Control Number: ASE-R 301

To: Operator Name

Prepared by: North American Approvals Registry and Monitoring Organization
Federal Aviation Administration
Atlantic City International Airport
Atlantic City, NJ 08405

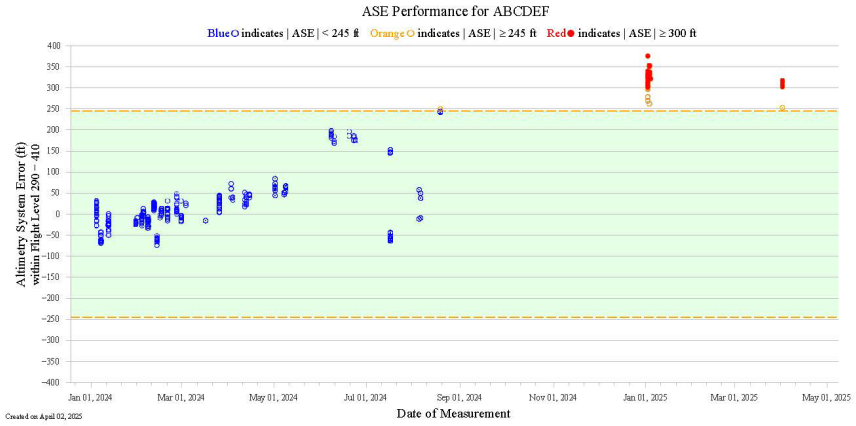
Subject: Aircraft Registration: N12345

The subject aircraft has been monitored by the FAA and was found to have deviated from established RVSM standards. The William J. Hughes FAA Technical Center Quality Control Team in conjunction with the North American Approvals Registry and Monitoring Organization (NAARMO), tasked to provide Reduced Vertical Separation Minimum (RVSM) monitoring services to other Regional Monitoring Agencies (RMA) and State Authorities, cite ASE data collected in Figure 1 as reason for safety concern.

Table 1. Aircraft Profile

Registration Number/Mode S Address:	N12345 / ABCDEF
Aircraft Type/Series/Serial Number:	Manufacturer / Details / 123

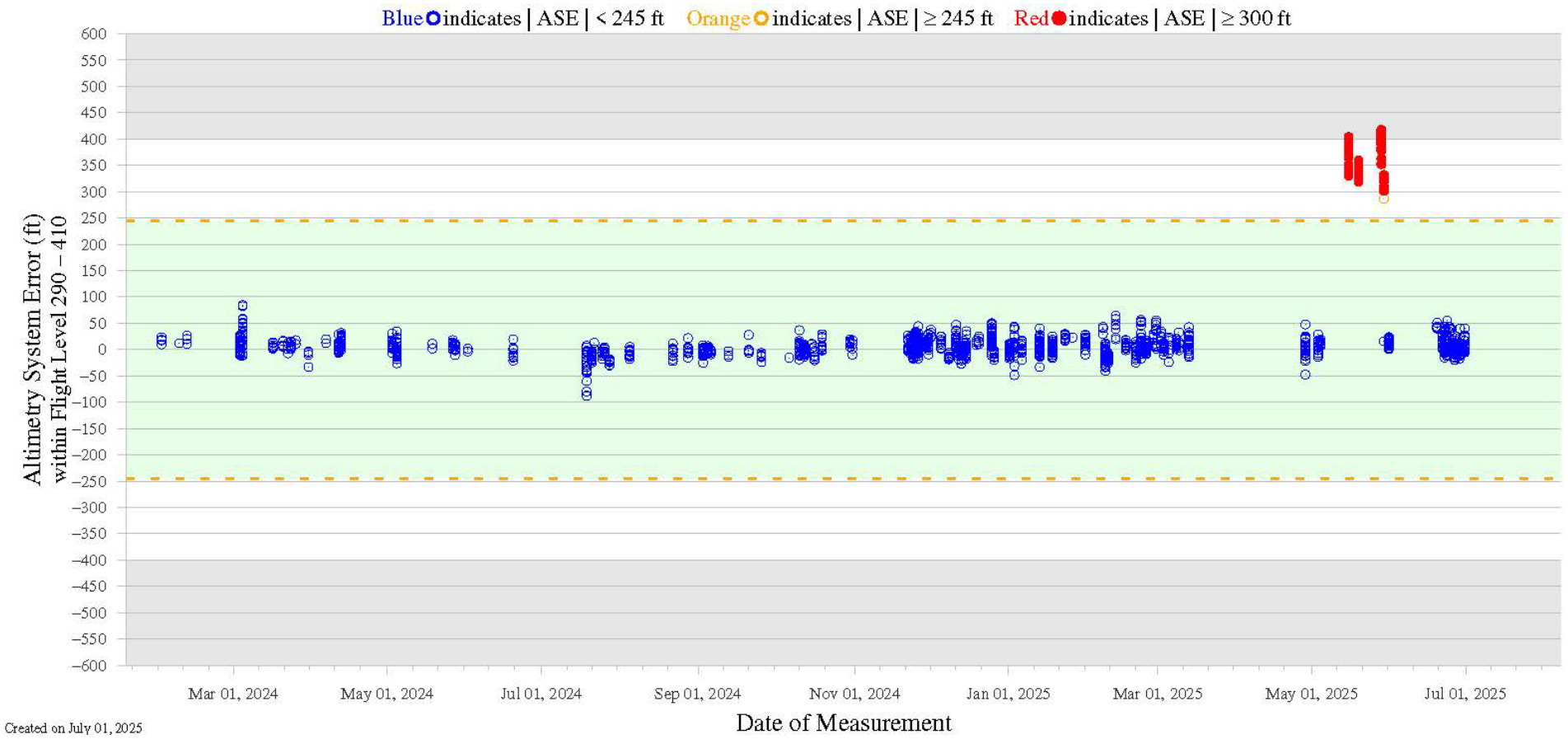
Figure 1. Overview of ASE Performance



A-1
ASE-R 301

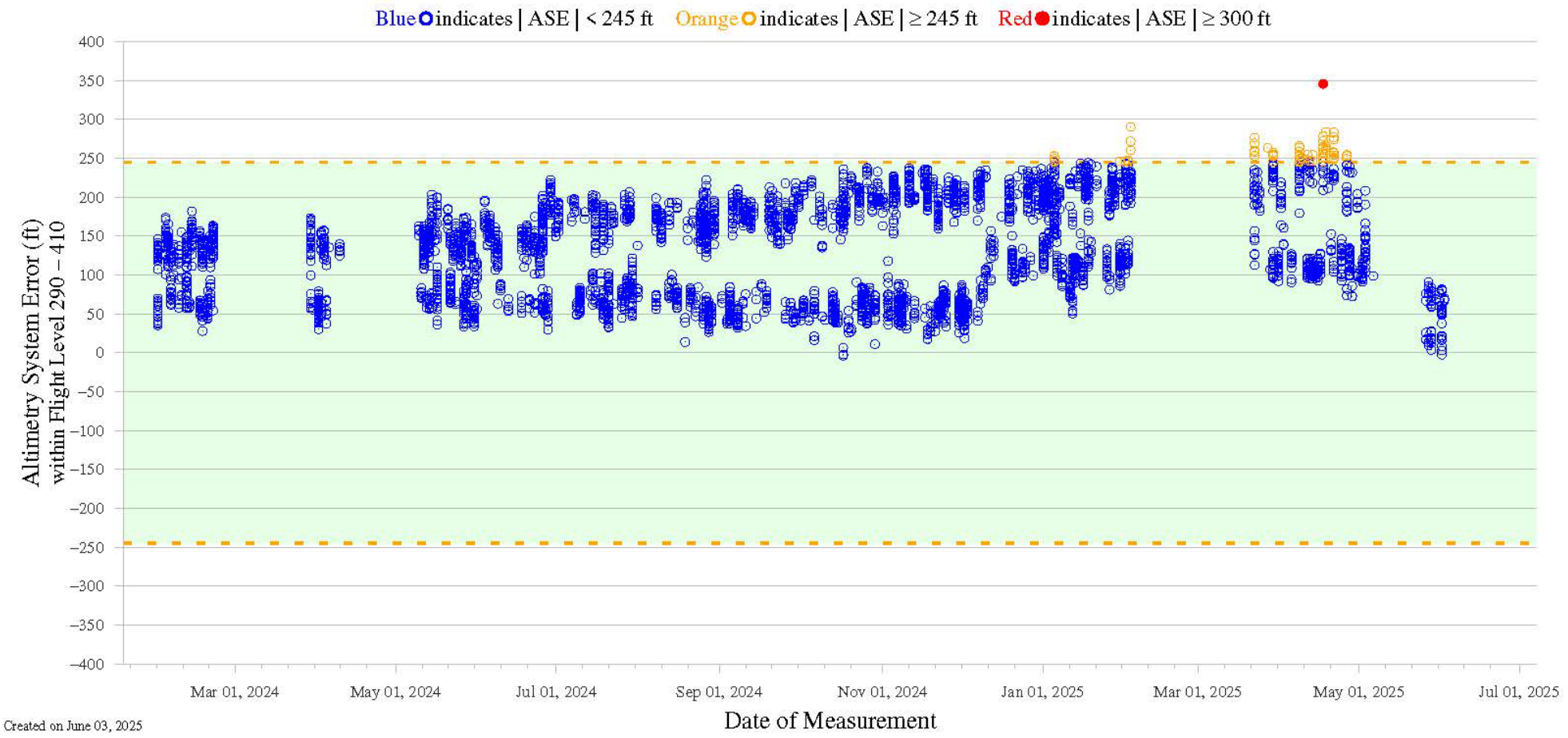
Federal Aviation Administration

ASE-R Case 1: CL60



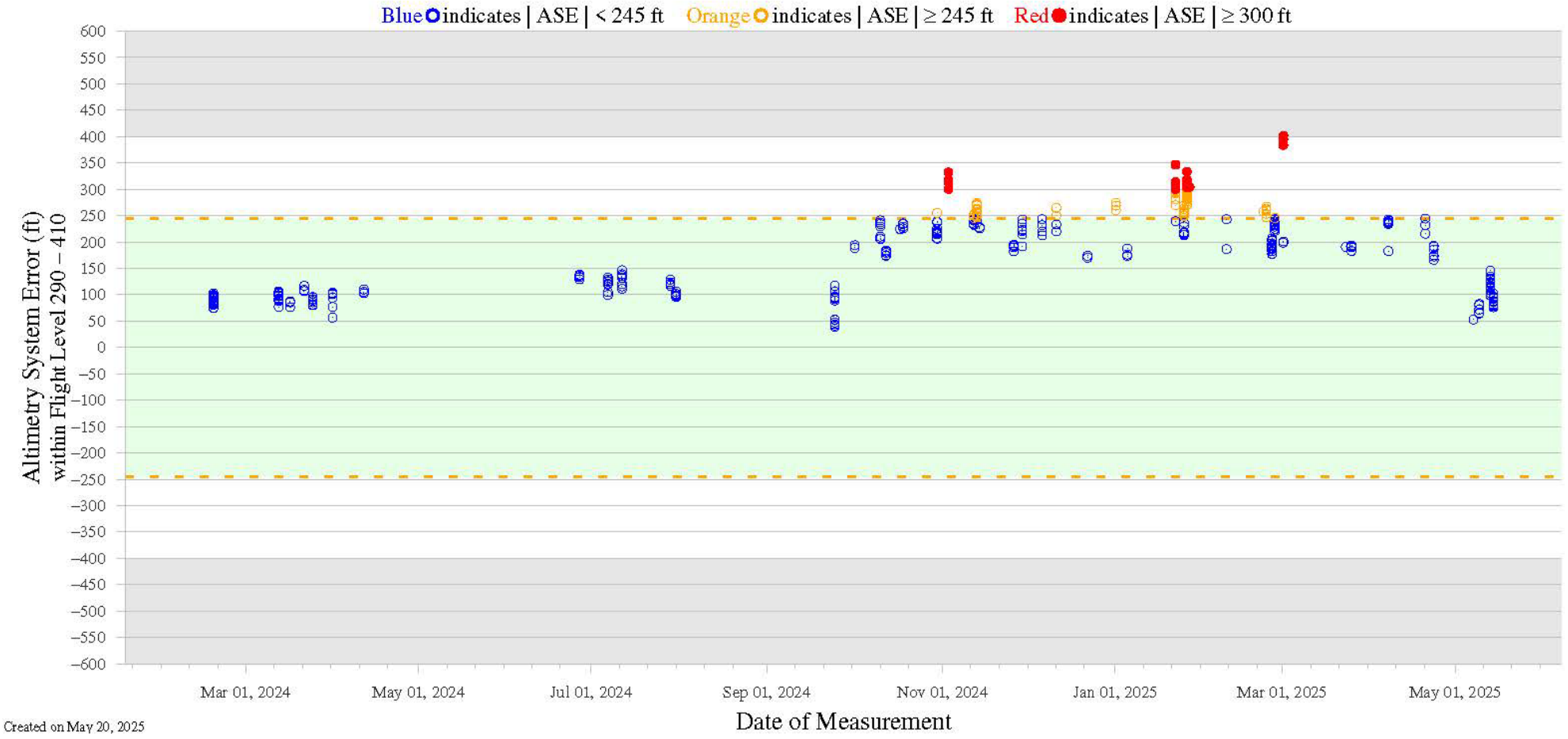
Multiple large ASE measurements.
Investigation revealed Pitot-static repairs were needed.
ASE returned to normal after repairs.

ASE-R Case 2: CL30



Large ASE split performance, worsening over time.
Maintenance: Replaced both pitot tubes which failed contour requirements.

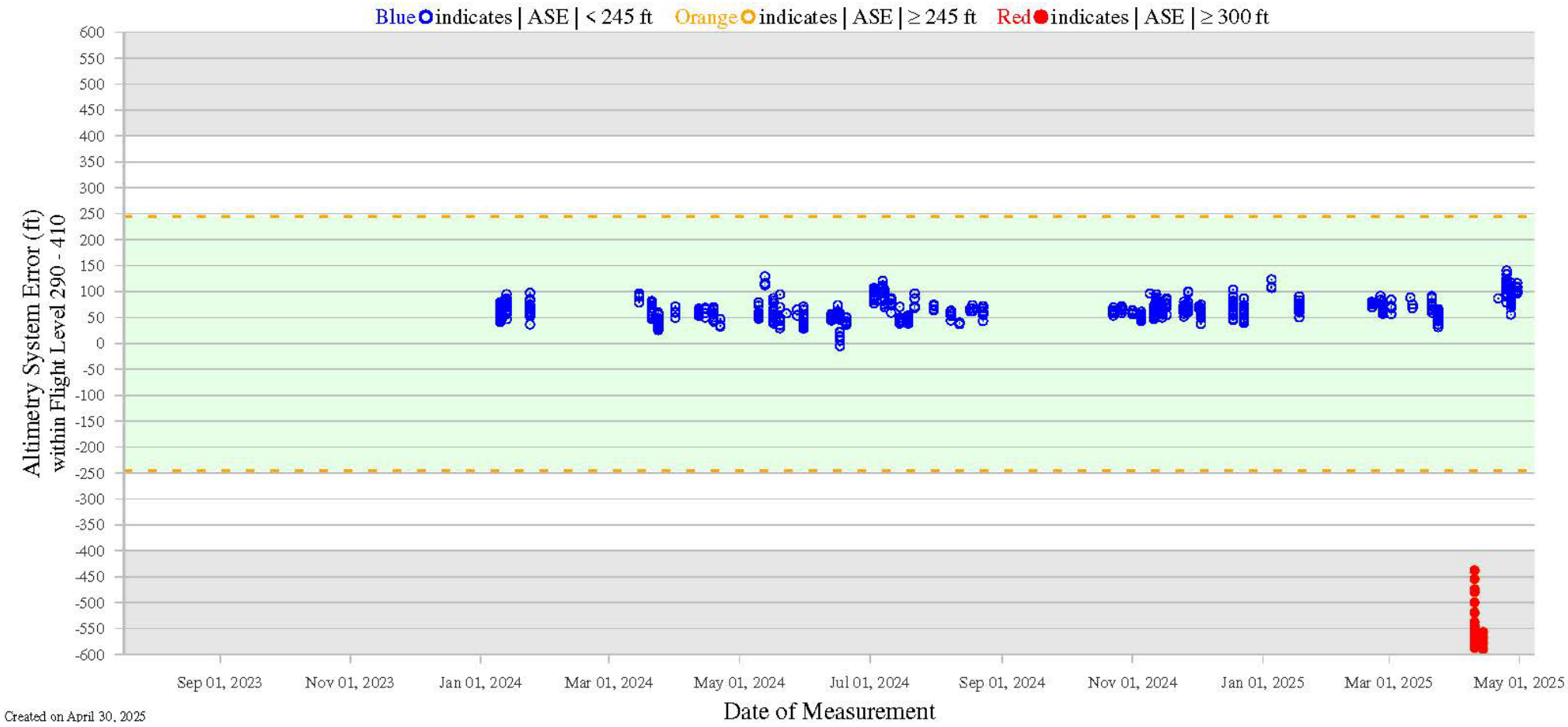
ASE-R Case 3: GV-SP



Maintenance Actions:

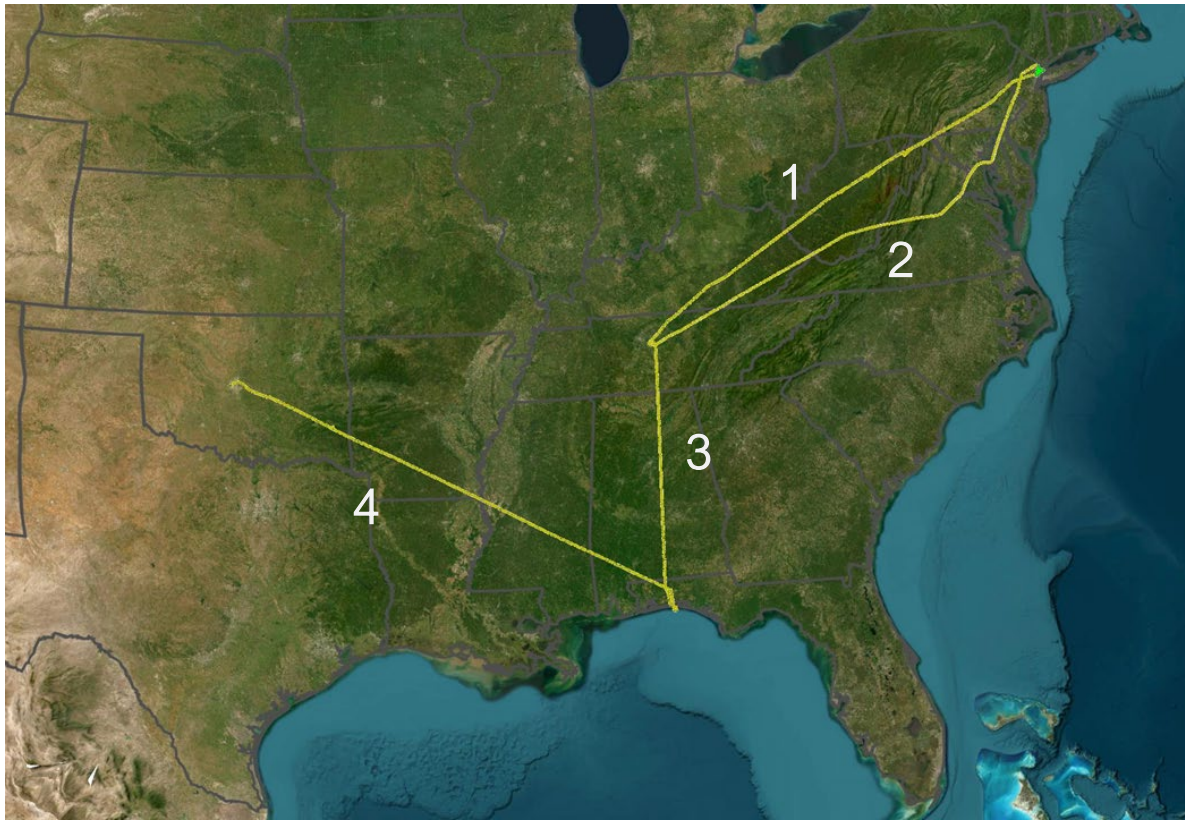
1. Pitot static system - draining/purging
2. Removal/installation of all four pitot static probes.
3. Developed a custom Aircraft Condition Monitoring Function (ACMF) application to be loaded prior to flight. Triggered upon event record selection by the flight crew to record all relevant air data parameters. Loaded ACMF file to aircraft.

ASE-R Case 4: C650

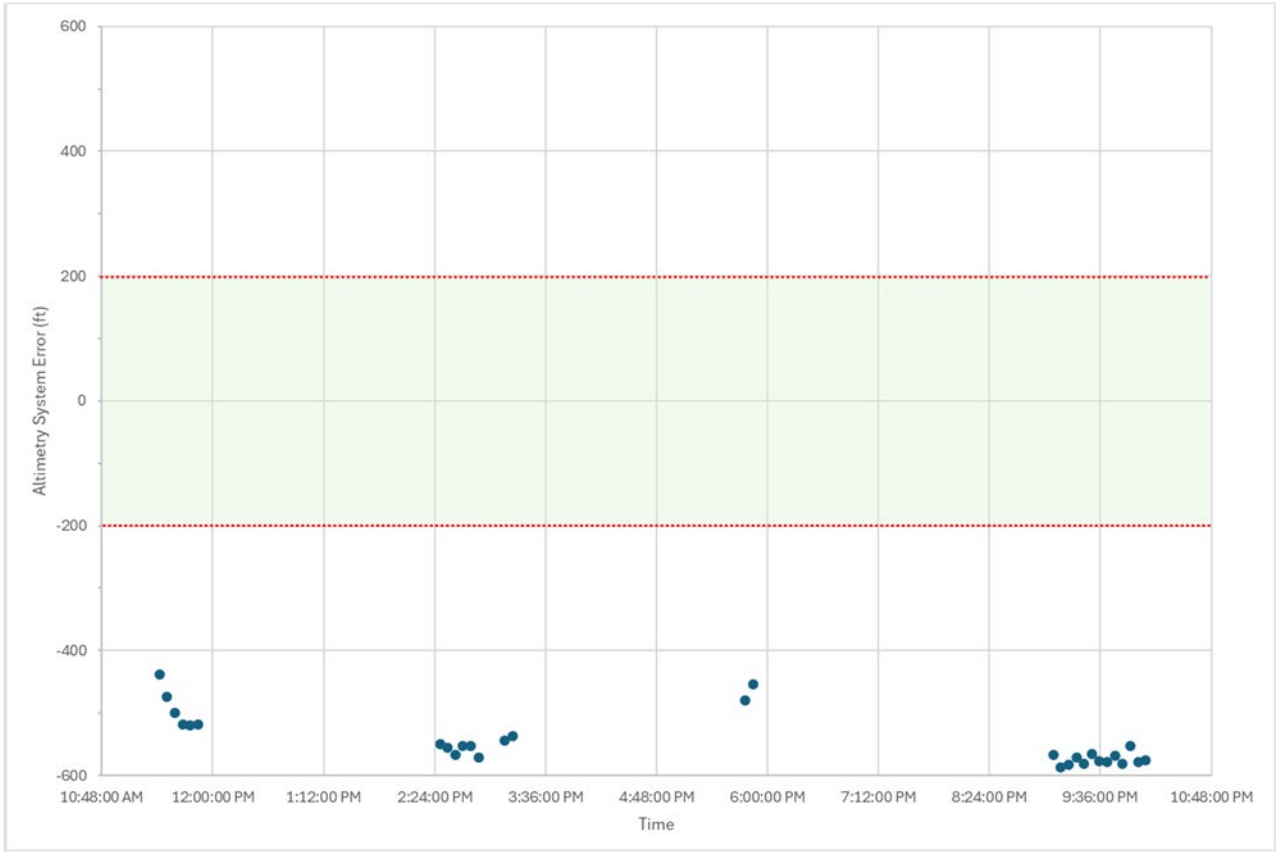


Very large repeated ASE measurements: Pitot quick connect hose became disconnected from ADC2. After replacement, ASE returned to normal.

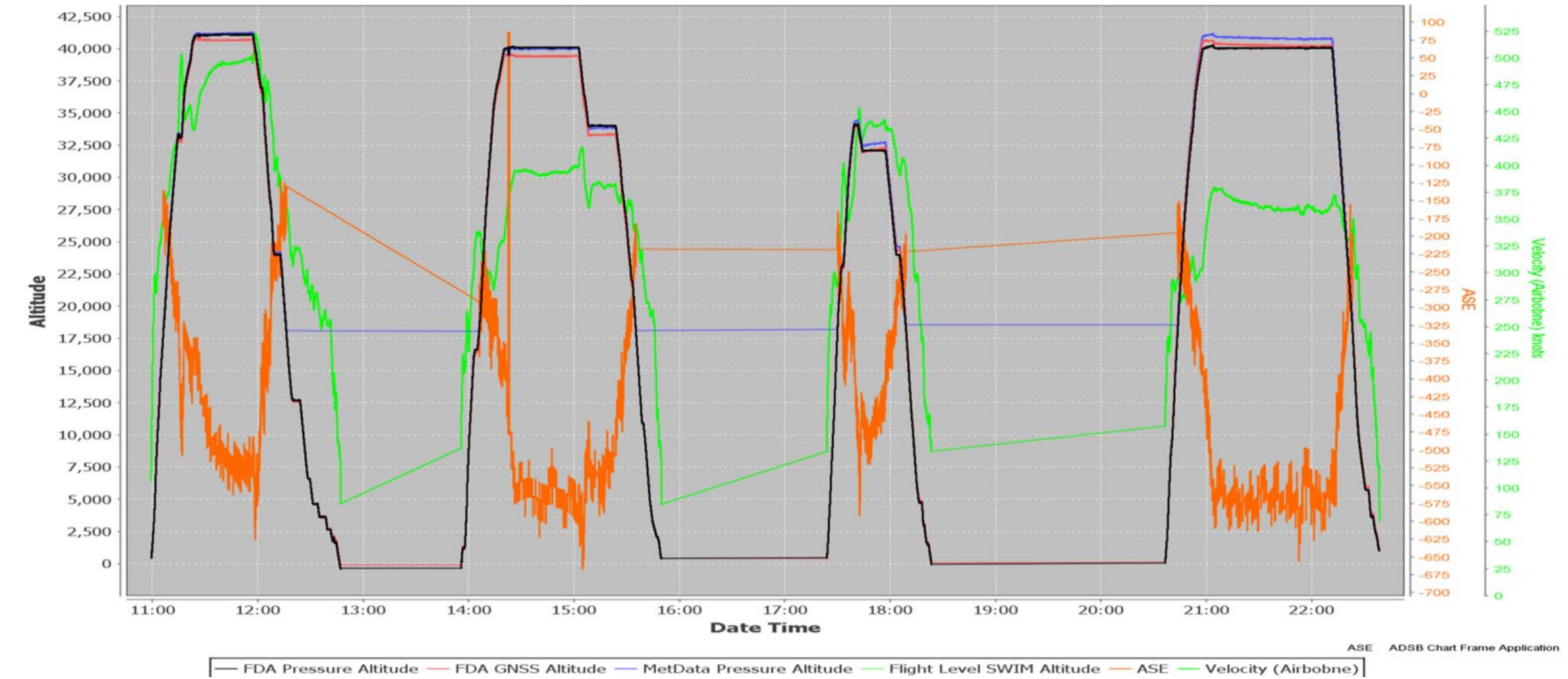
ASE-R Case 4: Flight Path



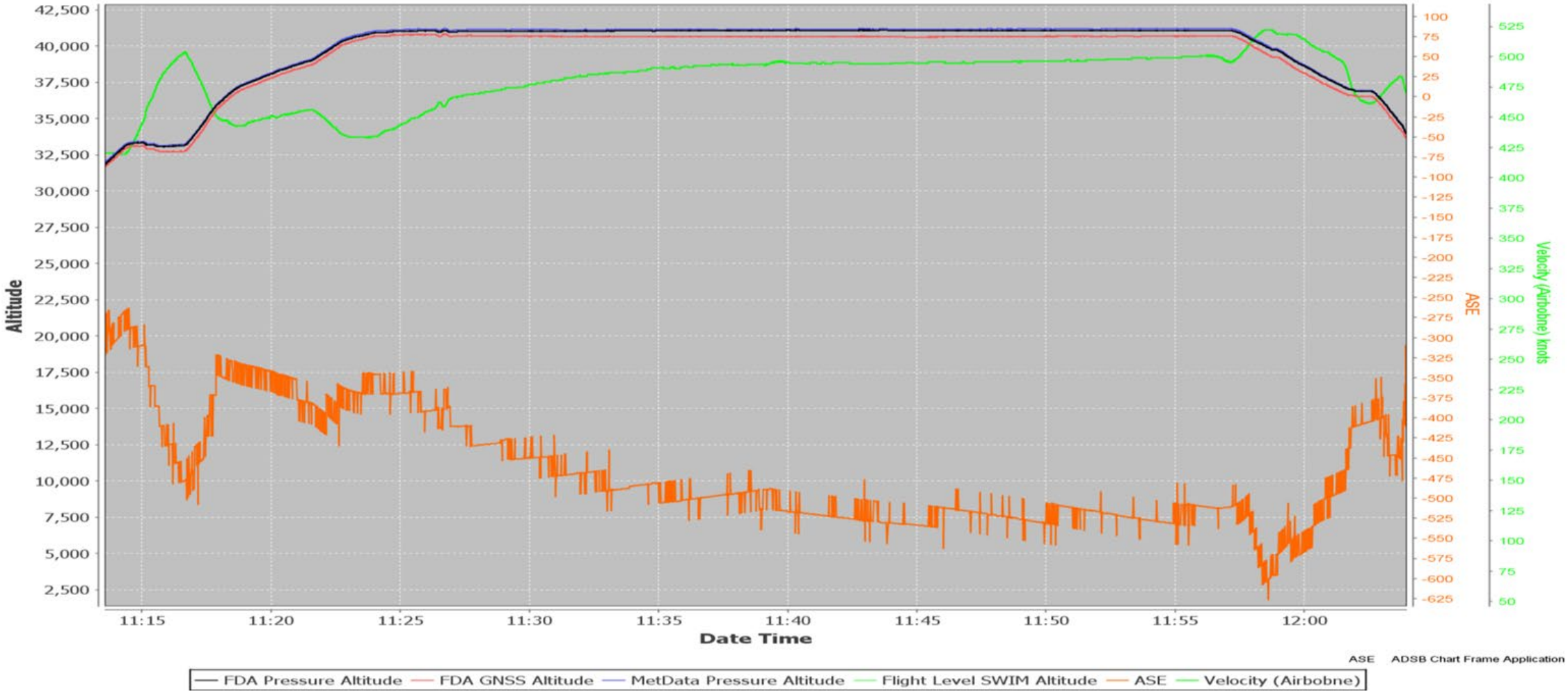
Hourly ASE Performance on the day with large ASE



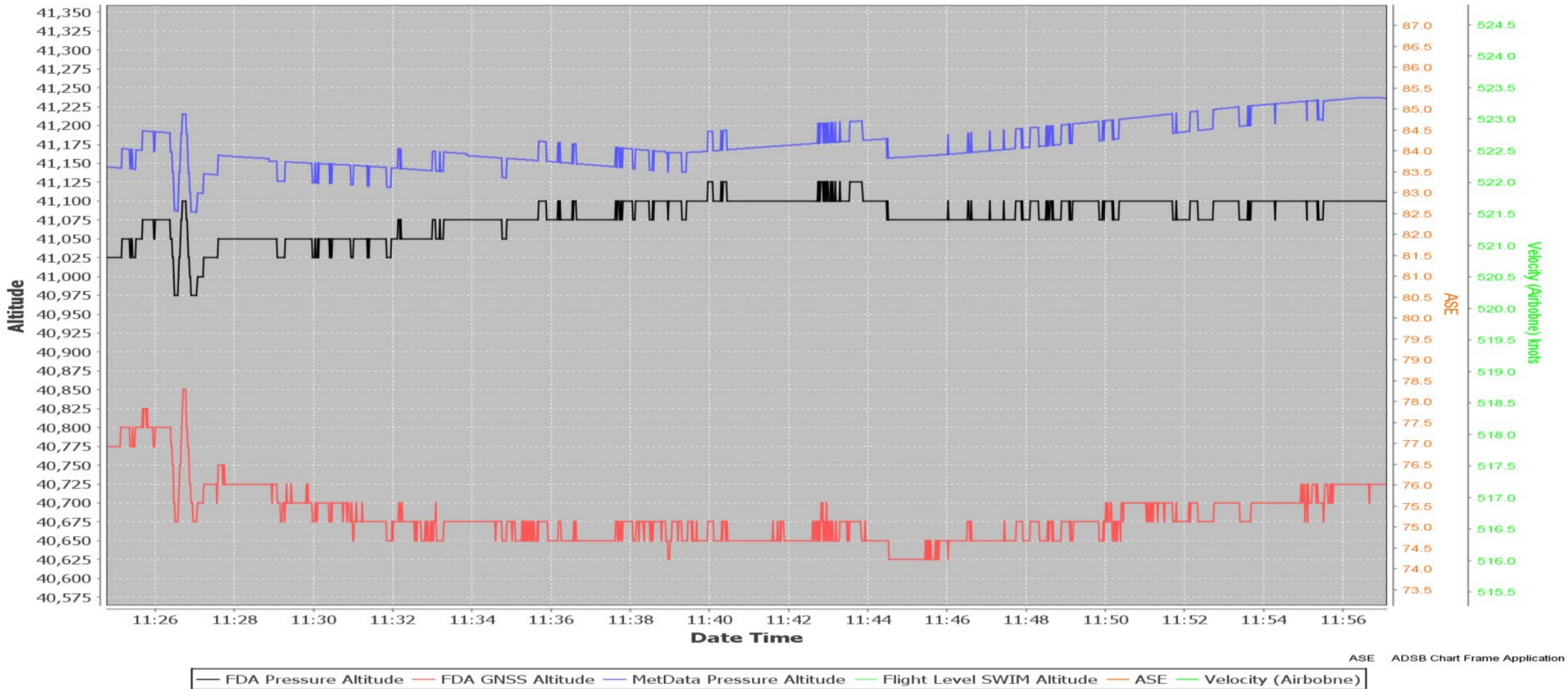
ASE-R Case 4: A Deeper Look



ASE-R Case 4: Flight 1



ASE-R Case 4: Flight 1 - MET



Possible Operator Actions

- Inspection of static ports;
- Skin waviness inspection;
- Check of the pitot static system drains;
- Test of the captain's and first officer's altimetry system on flight deck;
- High range pitot static leak check;
- Functional test of altimetry system accuracy.

Note: These tests are sometimes run under various simulated airspeeds.

Possible Operator Actions: ctd.

- Decals or logos affixed to aircraft skin in critical areas;
- Paint not to specification;
- Loose or damaged rivet heads;
- Incorrect pitot tube alignment;
- Damage in the sterile area of the static vents;
- Fuselage damage;
- Addition of external devices.

Additional Checks

Operators may need to change components of the Air Data System

A number of failures have been attributed to Air Data Modules

In some cases, it may be necessary to conduct an airworthiness evaluation of the aircraft

Attention to conformity to design and alterations or modifications, with discrepancies noted and repaired.

Common Contributing Factors

Corrosion or Erosion: Deterioration in pitot tubes and static vents.

Humidity and Leaks: Moisture or leaks in static lines affect accuracy.

Air Data Computers (ADCs) Drift: Variations due to changes in electrical components, such as transducers.

Altimeter Drift: Gradual deviation from tolerance levels over time.

Mechanical and Electrical Faults: Issues in components which contribute to the altimetry performance

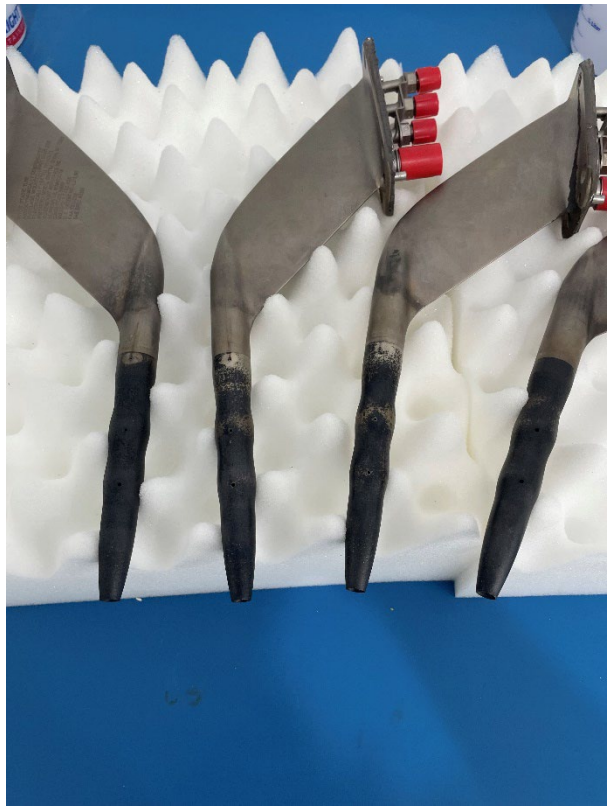
Contributing Factors: ctd.

Flying an aircraft outside of the speed limits defined for RVSM operations. Each RVSM MASPS solution has a defined performance envelope.

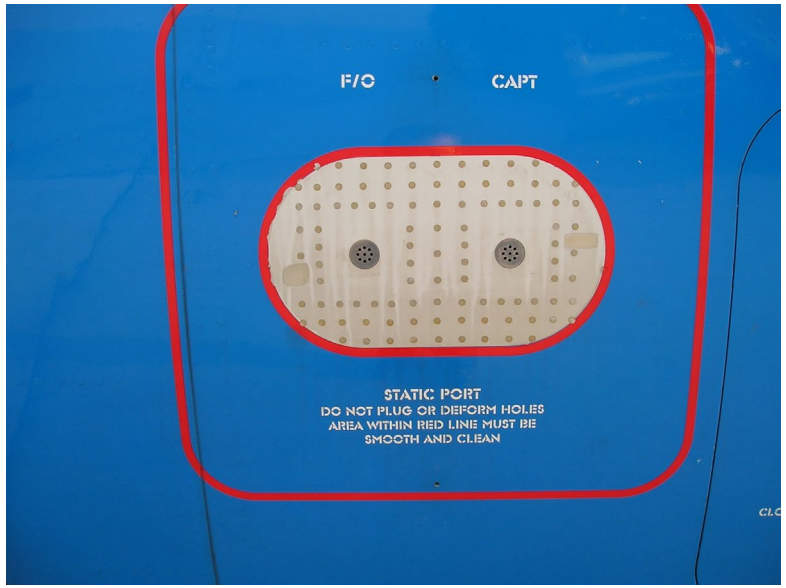
Basic RVSM Envelope: The range of Mach numbers and gross weights within the altitude ranges FL 290 to FL 410 (or maximum available altitude) where an aircraft is expected to operate most frequently.

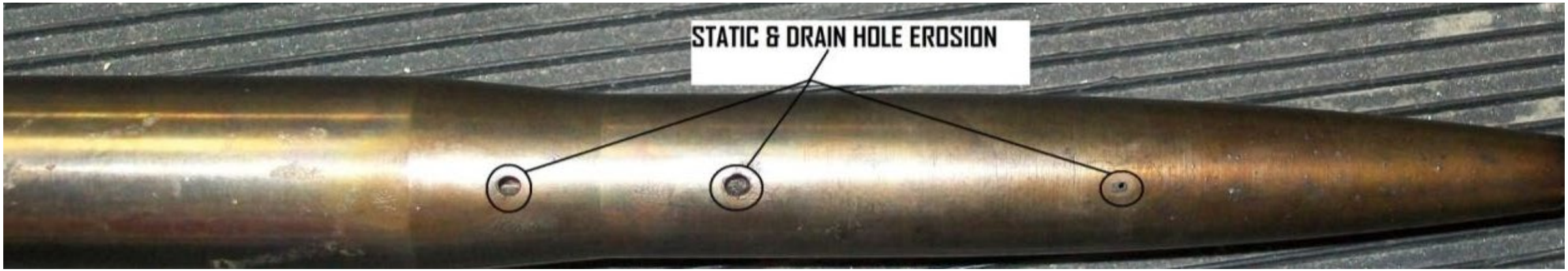
Full RVSM Envelope: The entire range of operational Mach numbers, W/δ, and altitude values over which the aircraft is operated within RVSM airspace.

Probe Corrosion

Examples of Reported Issues





Resolution Form

Always request maintenance action by operator for tracking purposes

- Typically, it is more effective to withhold the sufficient report until received.
- Tracking corrective actions can assist in developing a repository to assist operators in troubleshooting ASE issues.

Altimetry System Error (ASE) Report
Resolution Sufficient

Date: July 2, 2025
Control Number: ASE-R 305-S

To: Operator Name

Prepared By: North American Approvals Registry and Monitoring Organization
Federal Aviation Administration
Atlantic City International Airport
Atlantic City, NJ 08405

Subject Aircraft Registration: N12345

On May 21, 2025, the North American Approvals Registry and Monitoring Organization reported large Altimetry System Error for subject aircraft registration N12345 (report control number ASE-R 305). In the report data were presented demonstrating large ASE performance. A recommendation for maintenance review was advised to bring the ASE performance within RVSM compliant levels.

Upon further data inspection of the subject aircraft from recent ADS-B monitoring, the subject aircraft is now within RVSM compliant levels.

The following plot (Figure 1) indicates repeat ASE measurements before and after notification of large ASE performance.

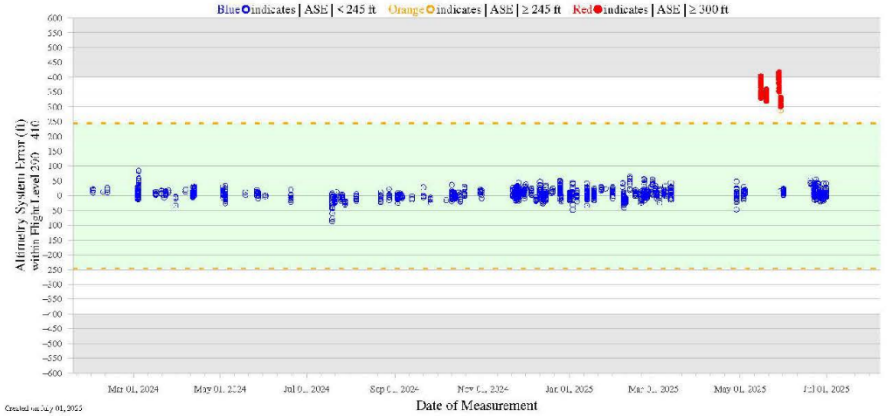


Figure 1

Questions

- Large ASE Watch List
- ASE-Rs
- Cases
- Resolutions