

A decorative graphic on the left side of the slide consists of a blue and yellow triangle at the bottom, a white grid pattern representing a globe, and a white airplane flying across the sky with a white contrail.

Beyond OPSNET: NAS Performance Metrics for the 21st Century

Ken Lamon
February 4, 2004

Two Useful, Complementary Systems for Tracking Delays: ASPM and OPSNET

ASPM

- Delay measured relative to schedule
- Delays can be broken out by time of day
- Automated

OPSNET

- Delay due to aircraft being held in some way
- Delays cannot be broken out by time of day
- Not automated



OPSNET would be Greatly Improved if Automated

- **OPSNET's Shortcomings:**
 - **Reporting methods are subjective and vary by facility**
 - **Delays cannot be broken down by time of day**
 - **Delays are reported as aggregate counts that can't be traced back to individual flights**
 - **Counts can be inaccurate due to human error**
 - **Delays due to snow removal and deicing are excluded**
- **In addition to giving us better data, automation would also reduce the workload those in the FAA now tasked with manually reporting delays**

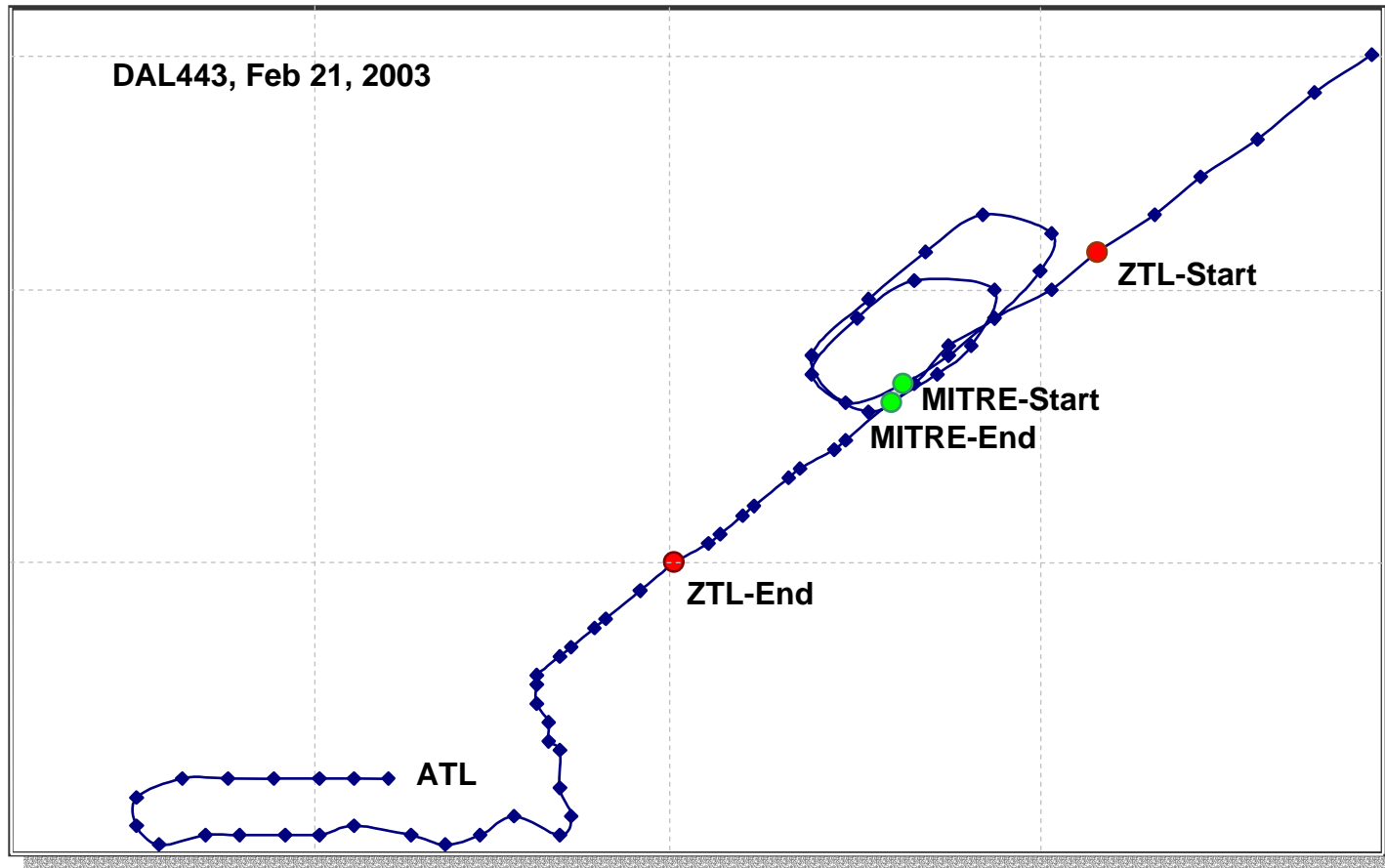


What OPSNET Gives You

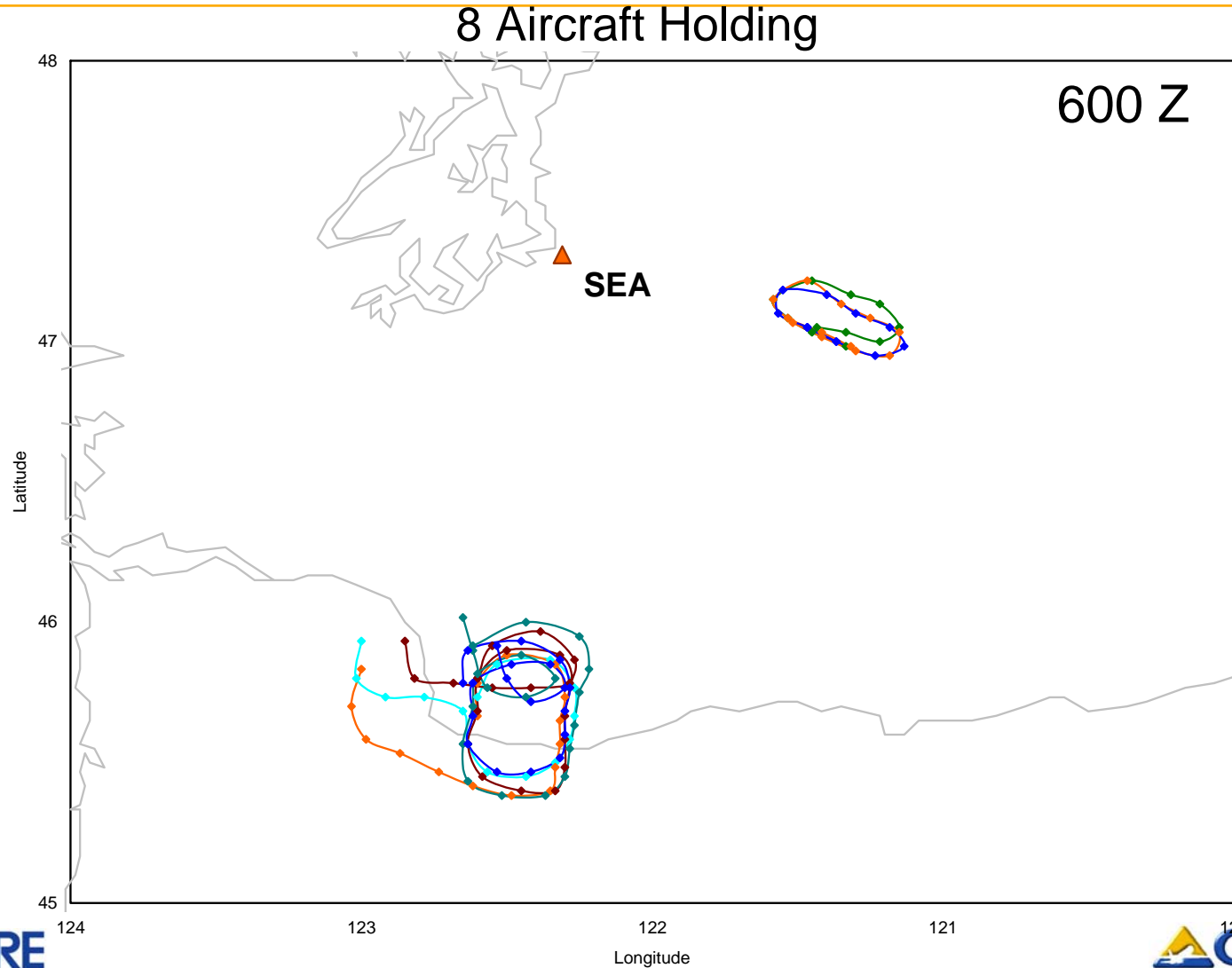
- **Delays by Category**
 - **Arrival and Enroute**
 - **Departure**
 - **TMS (Traffic Management System)**
- **Delays by Class**
 - **Air Carrier**
 - **Air Taxi**
 - **General Aviation**
 - **Military**
- **Delays by Cause**
 - **Weather**
 - **Terminal Volume**
 - **Center Volume**
 - **Equipment**
 - **Runway**
 - **Other**



Reporting of OPSNET Delays Varies by Facility



On this day SEA reported no Airborne Holding Delays



Metrics Wish-List

- **Daily counts of airborne holds, taxi-out delay, delays due to ground stops, and ground delay programs**
 - Broken out by duration: 15-30 min, 30-60 min, > 60 min
- **Snapshot every 15-minutes of number of aircraft in holding patterns, number of aircraft holding on runway, and number of aircraft waiting in ground stop or ground delay programs**
- **Diversions**
- **Start and stop times for ground stops and GDPs, and reasons**
- **No ‘delays by cause’ or ‘delays by class’**



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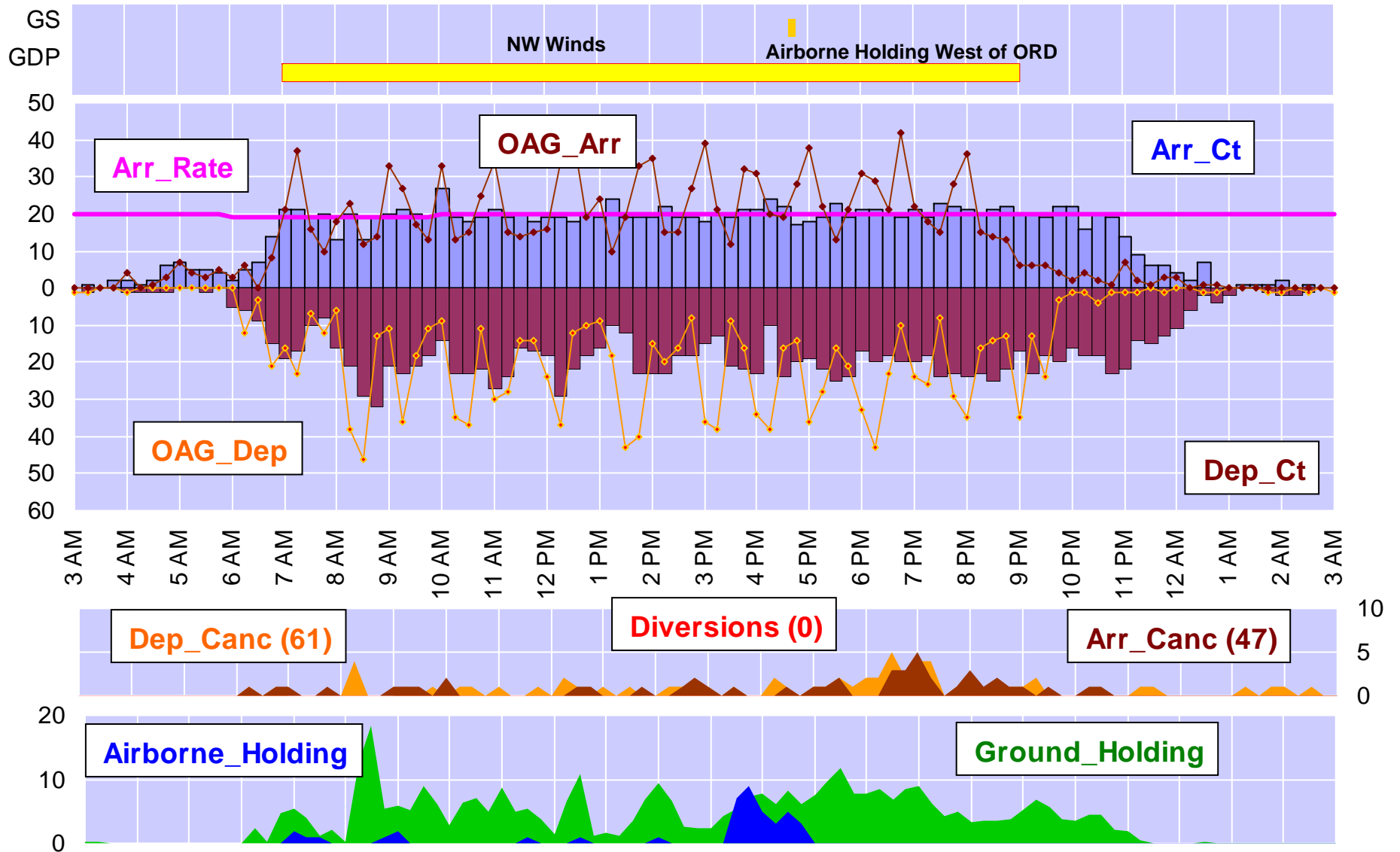
Presenting a Story: The Airport Specific Analysis Page

ORD: Friday, Dec 19, 2003

Delays	Departure	Arrival	TMS
649	0	22	627

% Ops delayed = 23%

Average delay = 84 minutes

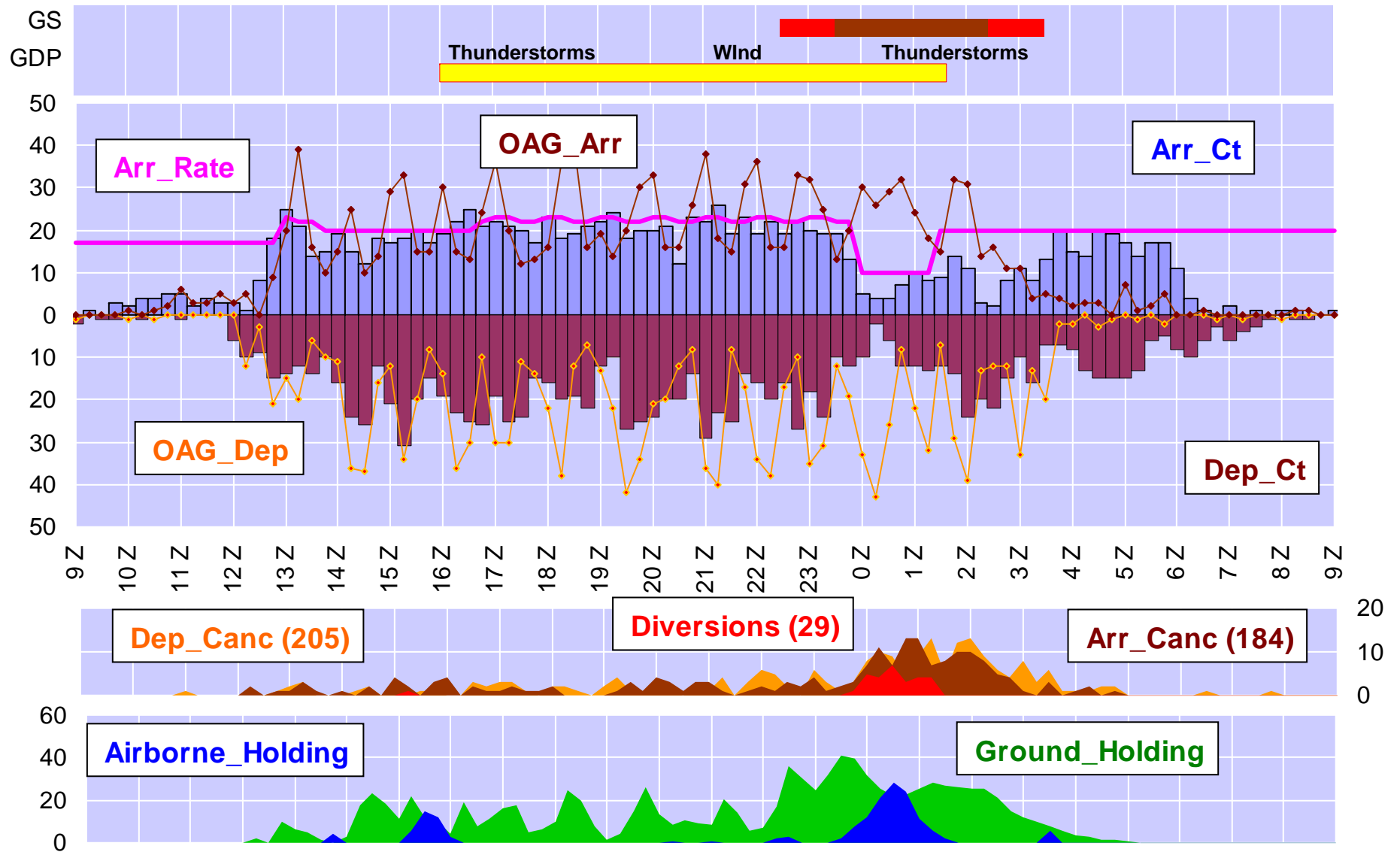


ORD: Tuesday, Nov 04, 2003

<u>Delays</u>	<u>Departure</u>	<u>Arrival</u>	<u>TMS</u>
721	195	58	468

% Ops delayed = 31%

Average delay = 72 minutes

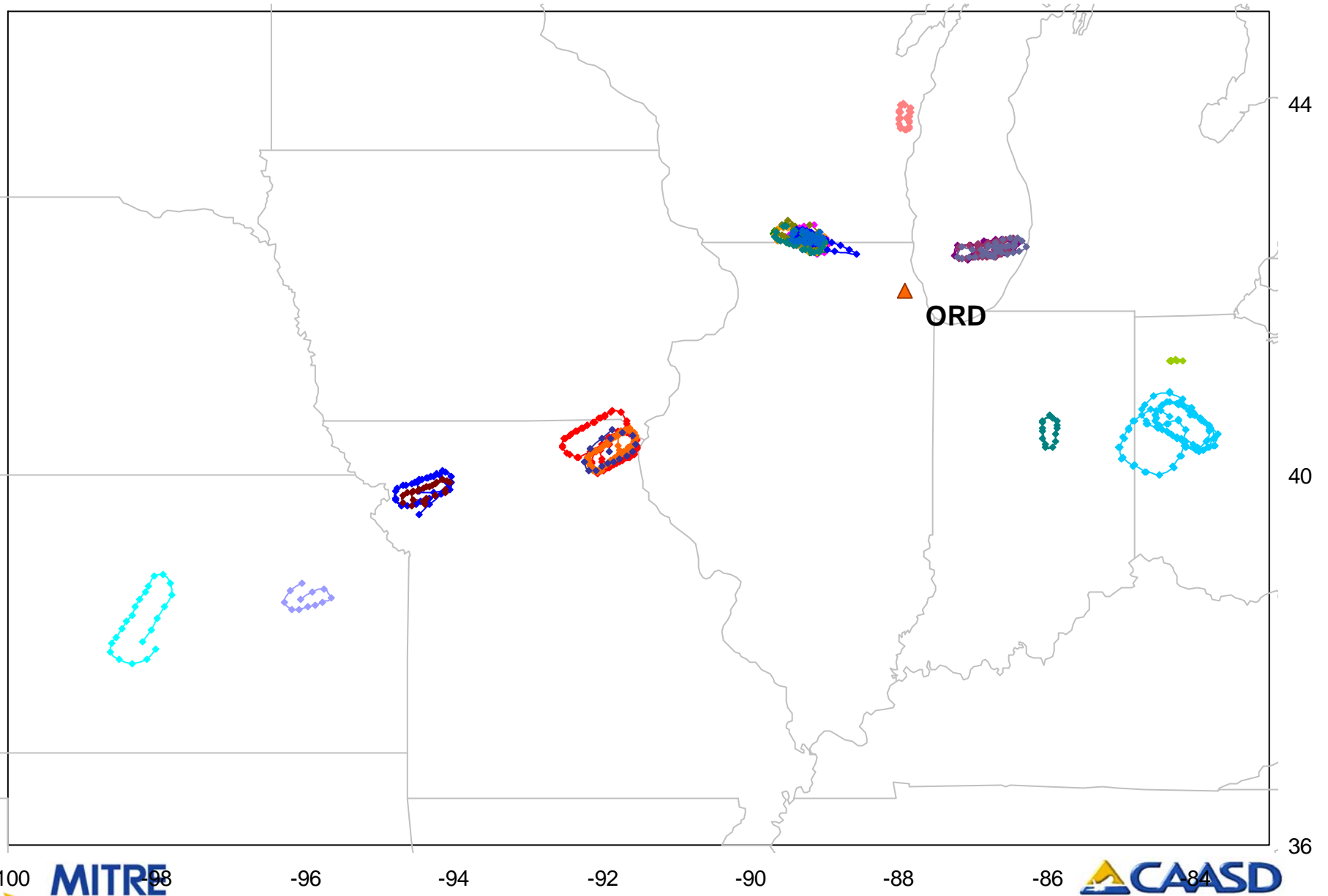


DateHere

5-Nov-2003

21 Aircraft

015 Z

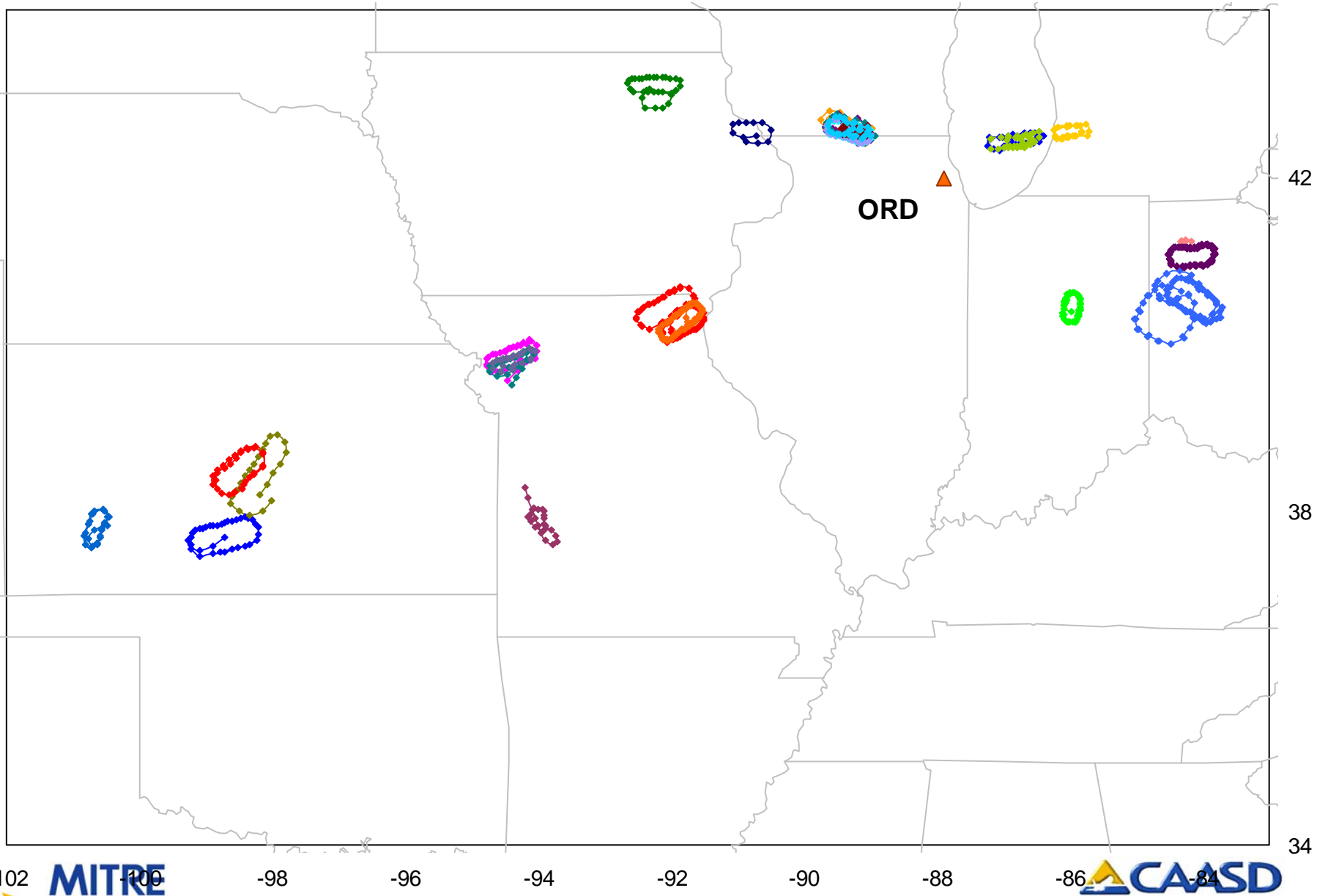


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5-Nov-2003

27 Aircraft

030 Z

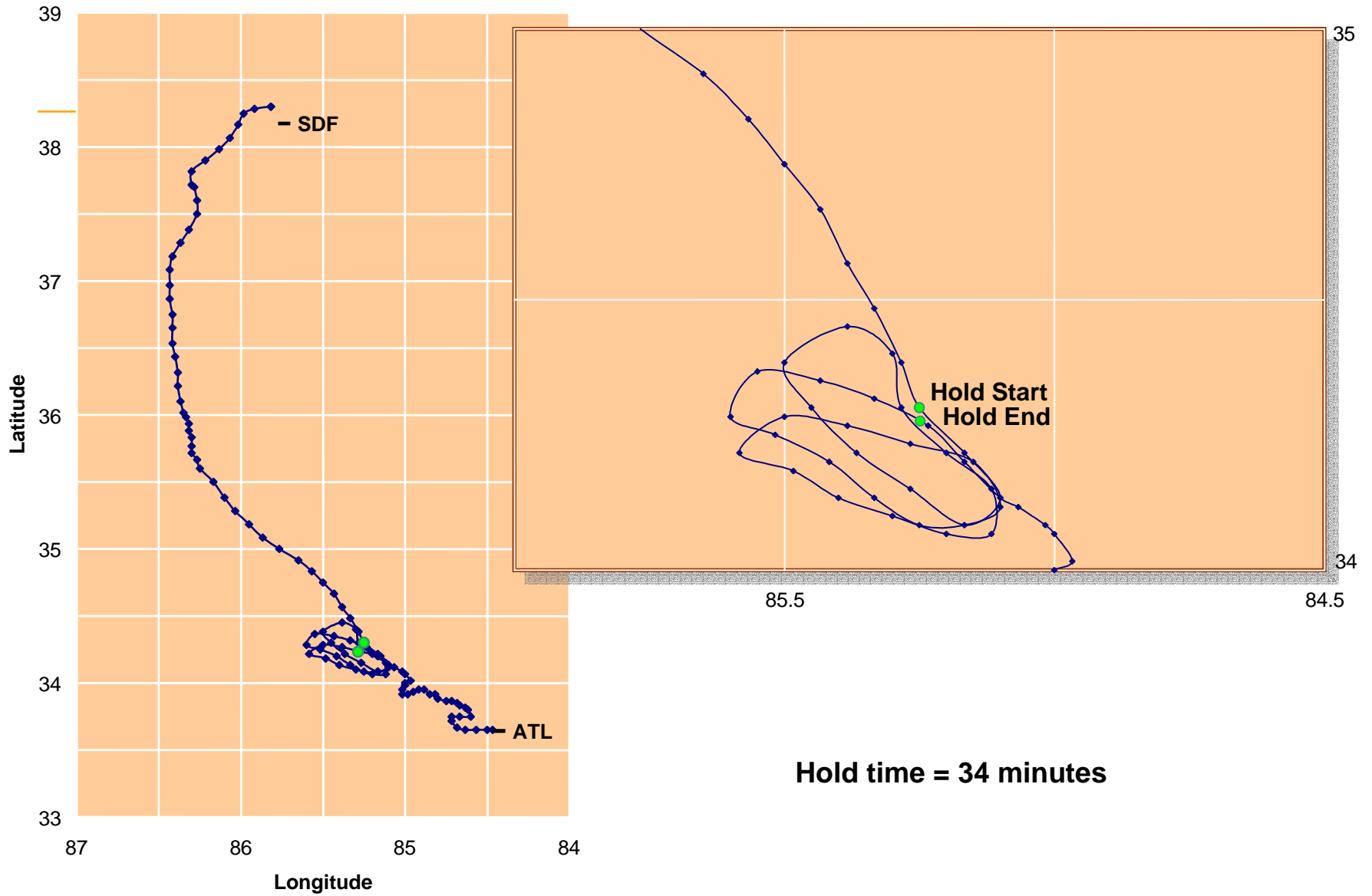


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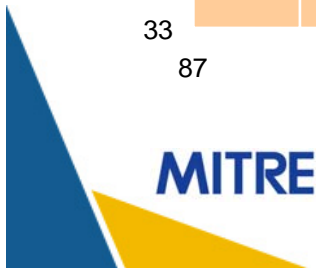
MITRE's Automated Holding Algorithm

DateHere

A Typical Hold: Flight DAL547, February 21, 2003



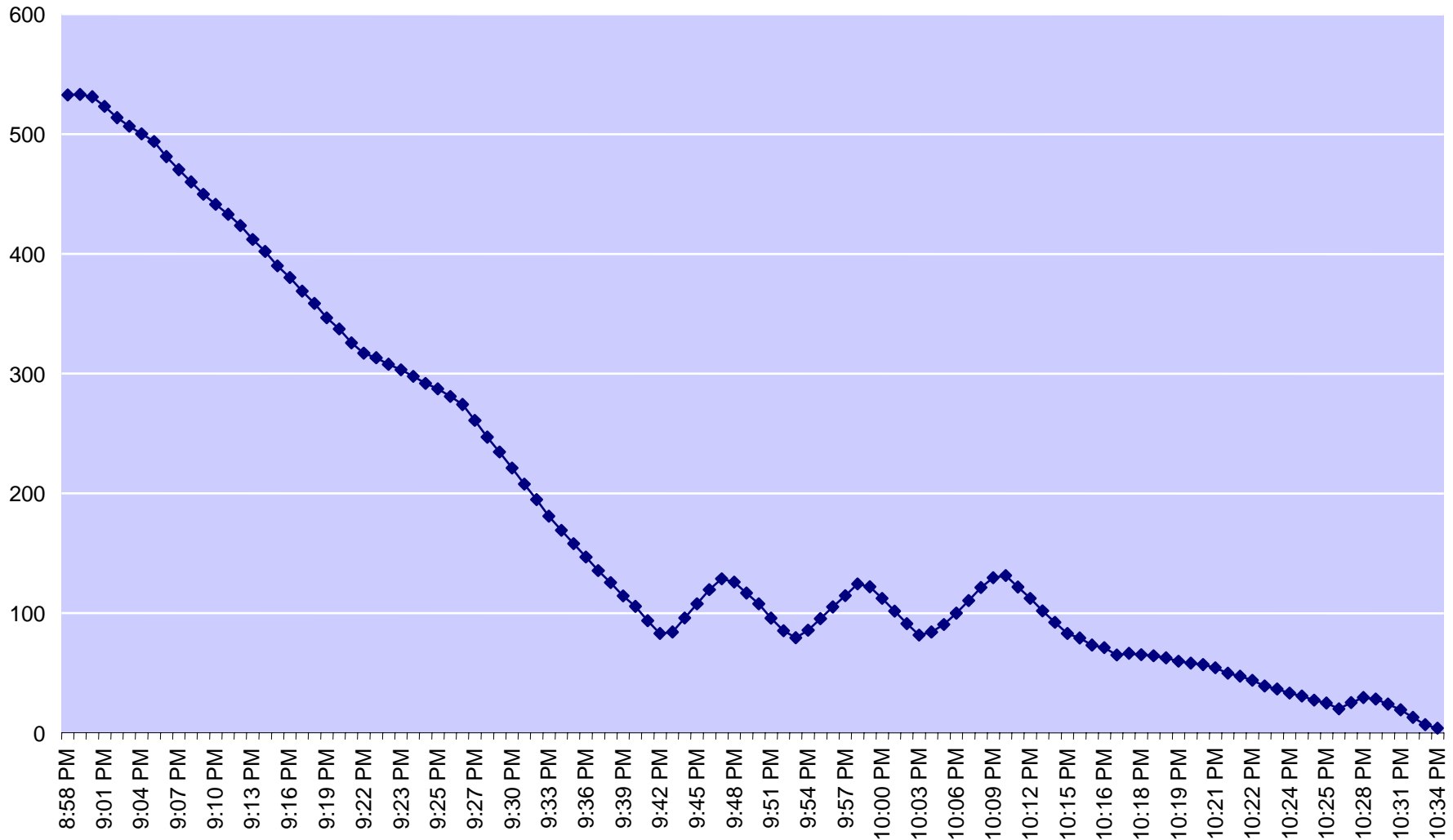
Hold time = 34 minutes



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A Typical Hold: Flight DAL547, February 21, 2003

Distance from ATL (nm)

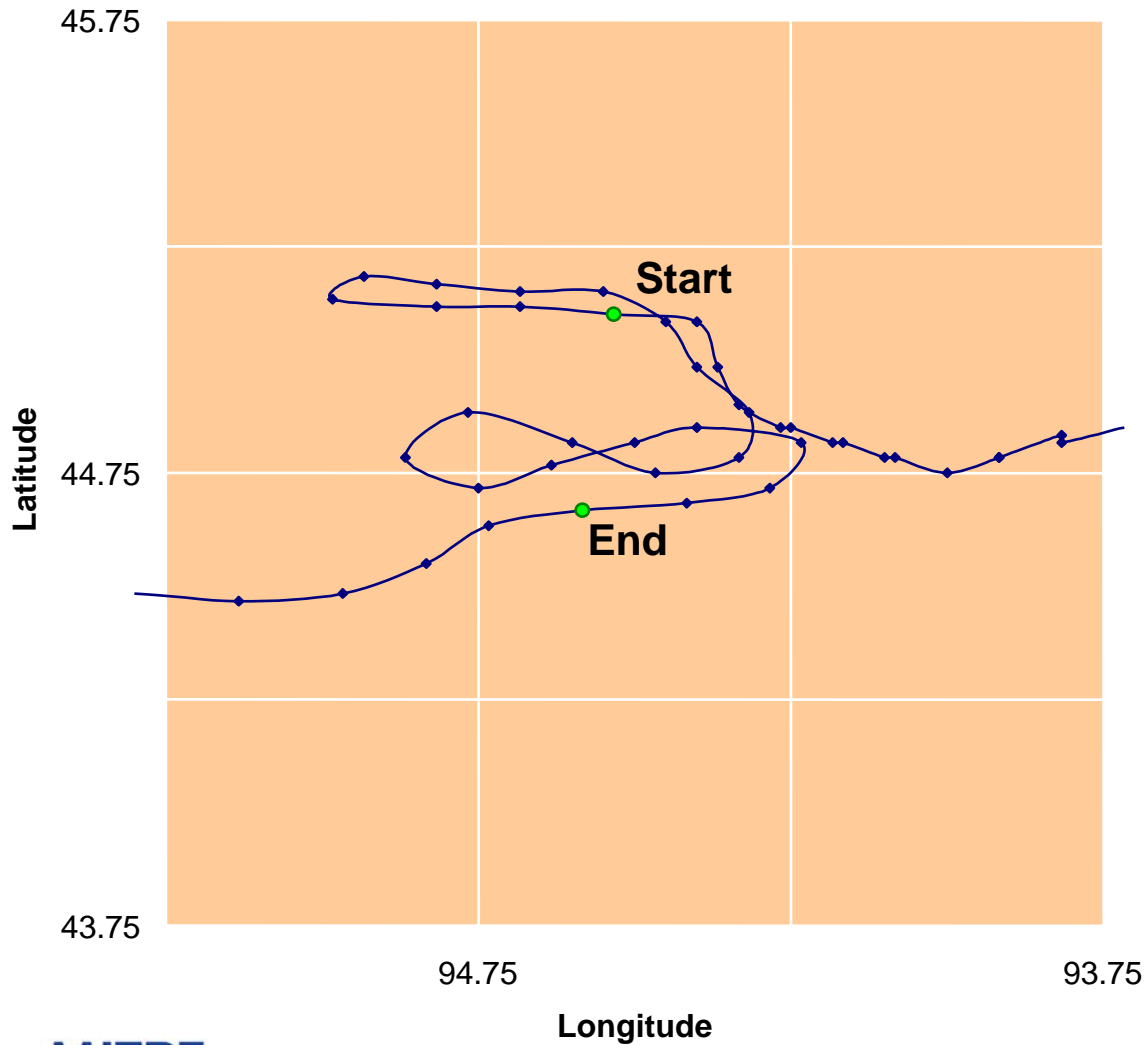


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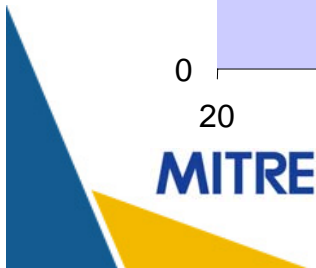
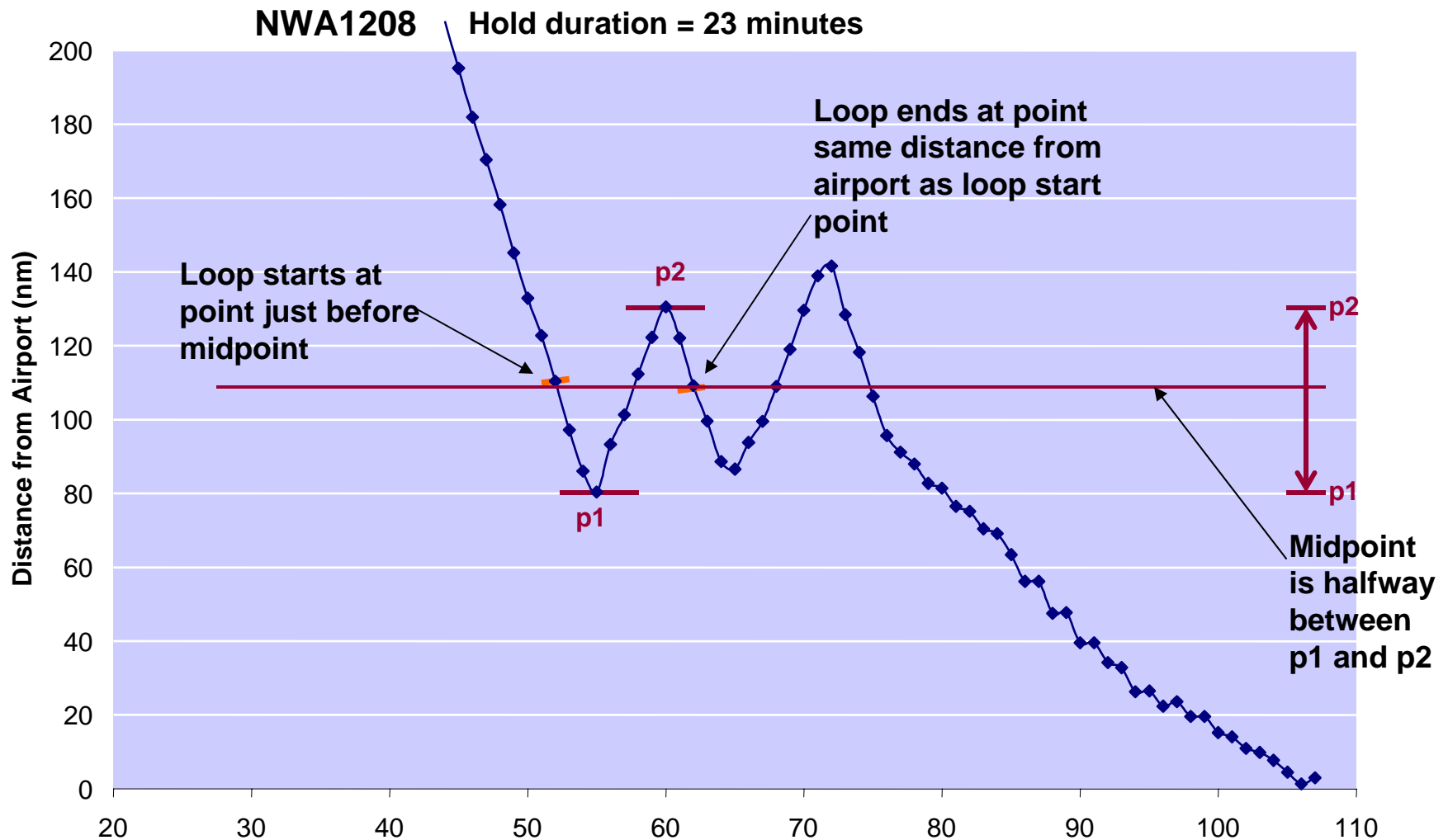
Holds Look Complicated in 2-D

NWA1208 Hold duration = 23 minutes



But even complicated holds look simple when converted to 1-dimension

Complicated holds look simple in 1-D



Non-Circular Holds are Filtered Out Based on “Pseudo-Speed”

- **Not all aircraft that move away from their destination are in holding patterns**
- **Non-circular holds are filtered out based on “pseudo-speed”**
- **To calculate p-speed divide the distance between the hold start and end points by the time taken to travel between the two points**
- **Aircraft in holding patterns have a very low p-speed**

