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ADS-B Data Monitoring

*ADS-B NAS Wide Acquisition - Industry Day
June 19, 2006*

*Some observations from nearly two years of ADS-B data
collection and analysis*

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Background

- FAA needed insight into 1090 MHz ADS-B equipage
 - How many aircraft are emitting ADS-B messages?
 - What types of aircraft are they?
 - Who are the owners/operators of those aircraft?
 - What does the data look like (how much, if any, is useful)?
- DI had the capabilities to collect and analyze 1090 MHz data
 - DI Secondary Surveillance Radar Receiver (DISSRR)
 - Mode-S/ADS-B message processing
 - Internet based data distribution
 - Database for data collection and analysis
 - Web based reporting



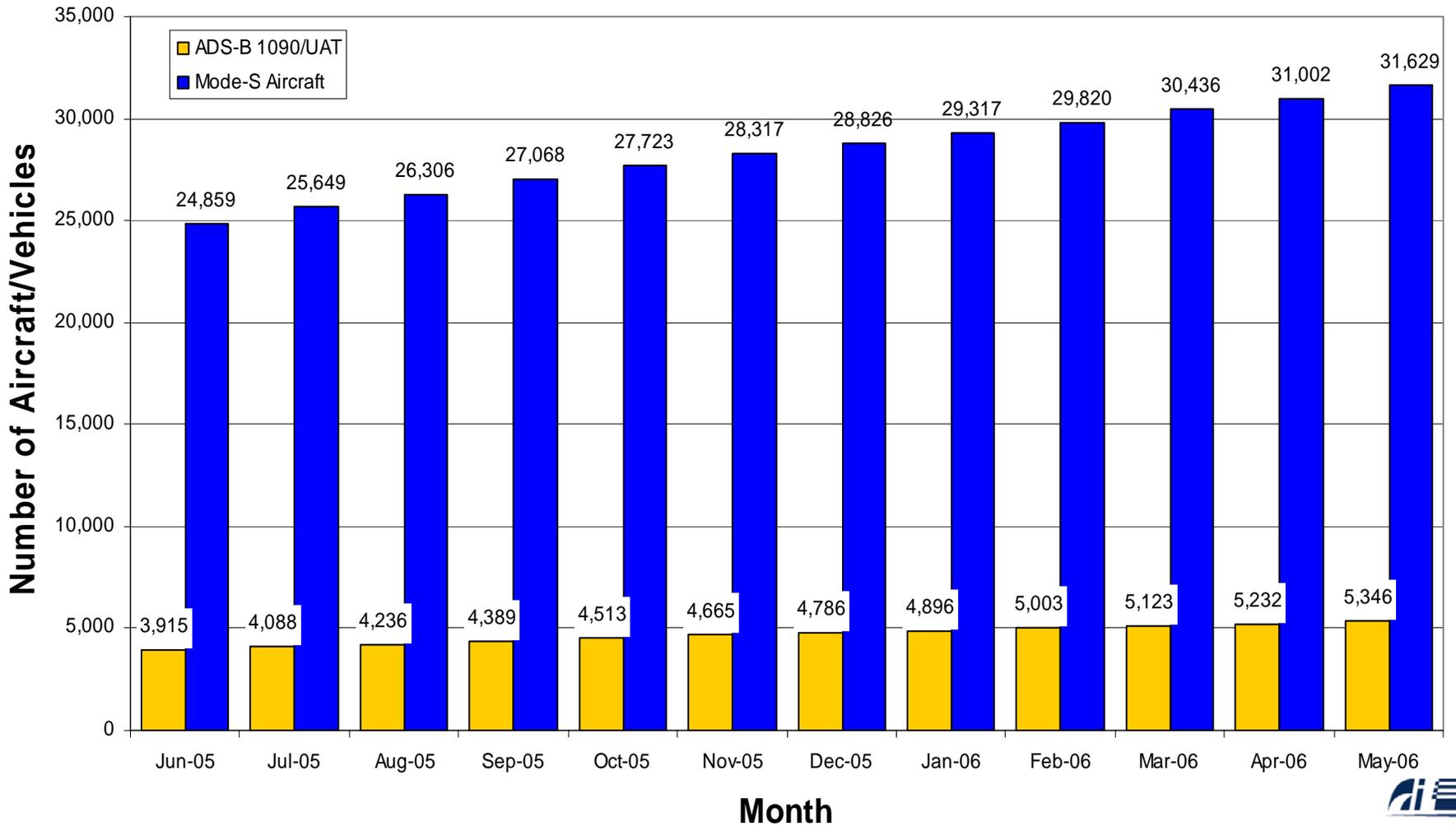
ADS-B Monitoring Task Overview

- FAA tasked DI to provide data on ADS-B activity
- DI collects data from 4 DI ADS-B receiver sites and 2 FAA GBTs
- DI provides a monthly report to FAA
 - Comprehensive monthly and cumulative statistics
 - Summary of Mode-S and ADS-B airframes observed
 - Breakdown of airframes by registrant
 - Breakdown of airframes by operator
 - Breakdown of airframes by FAA aircraft type
- DI makes monthly and real time data available to the FAA via the Web
 - Integrated correlation to Civil Aviation Registry
 - Extensive drill down capabilities
 - Detailed breakdown of types of ADS-B data provided by each airframe observed
 - Real time display of ADS-B aircraft via Google Earth



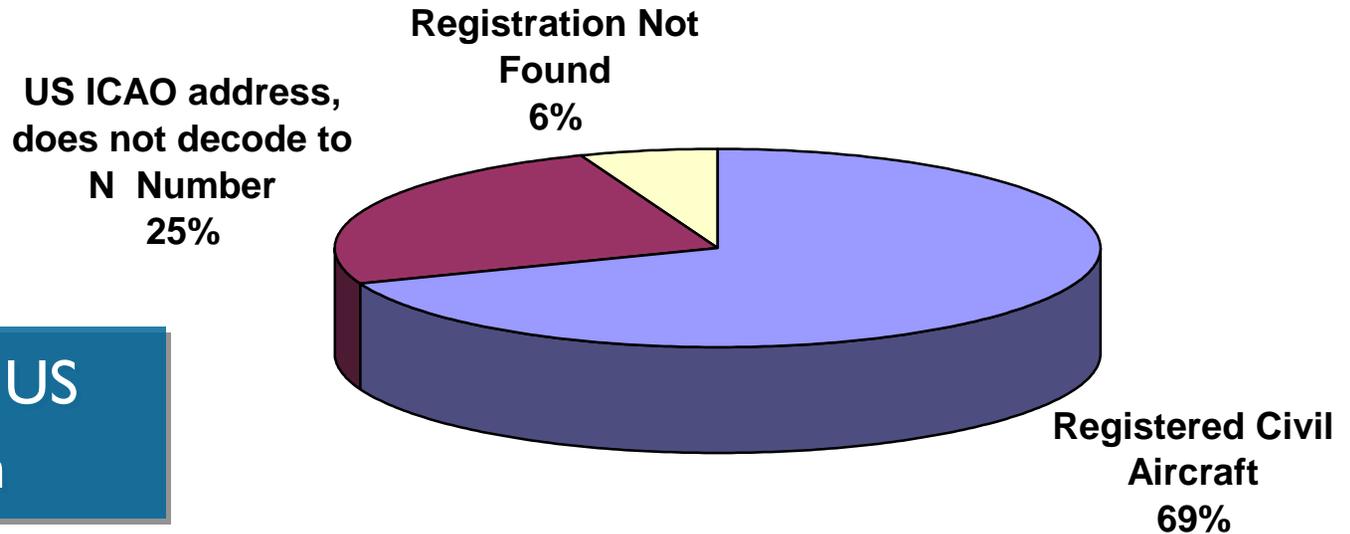
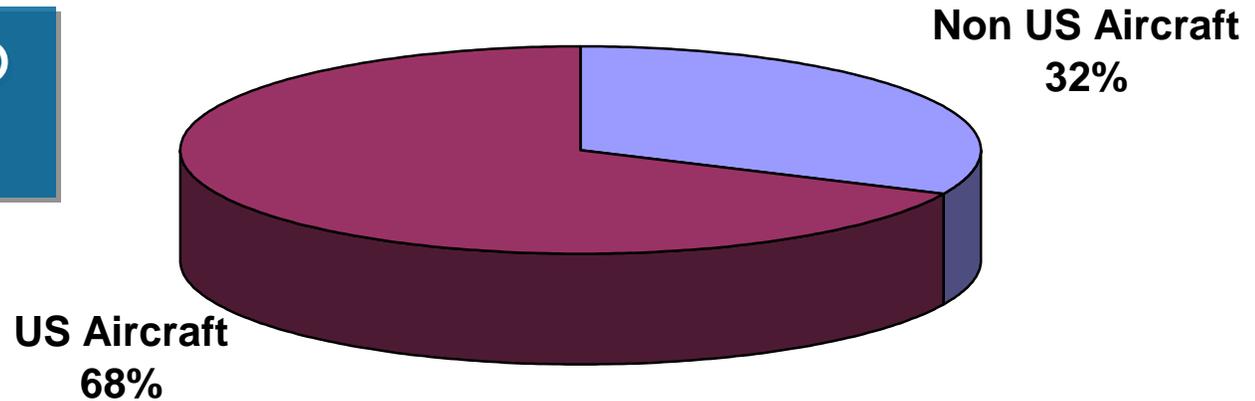
Mode S and ADS-B Activity

Graphic of active Mode S and ADS-B Aircraft/Vehicles - All Sites



Breakdown of Registration of ADS-B Aircraft

US vs. Foreign ICAO Addresses



Breakdown of US Registration



Top 10 Registrants – ADS-B Aircraft

#	FAA Registrant	Aircraft
1		2672
2	<u>UNITED PARCEL SERVICE CO</u>	223
3	<u>WELLS FARGO BANK NORTHWEST NA TRUSTEE</u>	188
4	<u>AMERICAN AIRLINES INC</u>	117
5	<u>UNITED AIR LINES INC</u>	64
6	<u>FEDERAL EXPRESS CORP</u>	35
7	<u>NORTHWEST AIRLINES INC</u>	29
8	<u>INTERNATIONAL LEASE FINANCE CORP</u>	29
9	<u>CONTINENTAL AIRLINES INC</u>	29
10	<u>BANK OF AMERICA NA</u>	27



Top 10 Operators – ADS-B Aircraft

#	TriGraph	Operator	Aircraft
1	-	-	2716
2	UPS	United Parcel Service Company	219
3	RCH	Air Mobility Command	162
4	AAL	American Airlines	126
5	BAW	British Airways	110
6	AFR	Air France	104
7	UAL	United Air Lines Inc.	88
8	DLH	Deutsche Lufthansa, A.G.	79
9	COA	Continental Airlines	65
10	FLT	Flightline	54

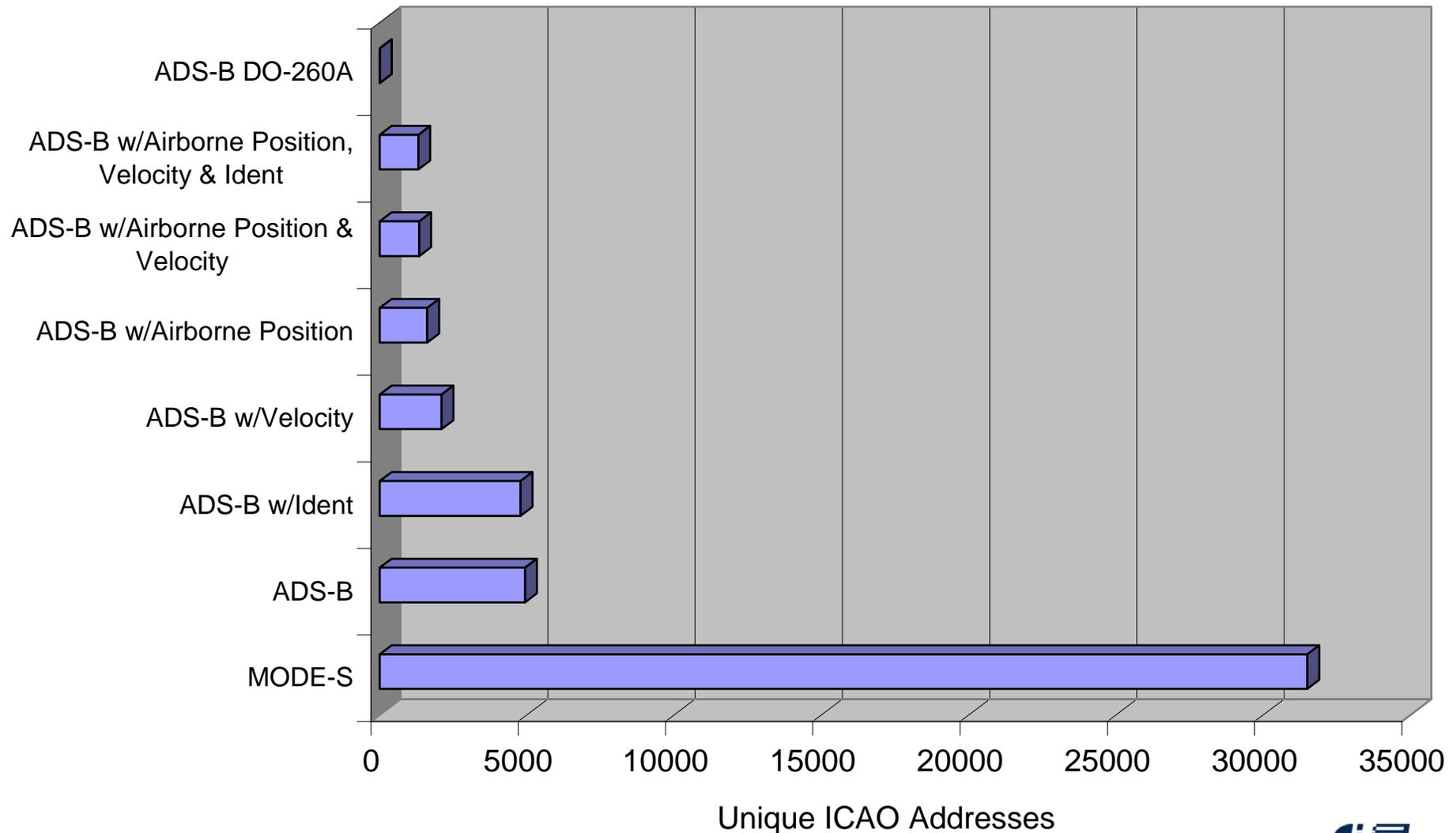


Top 10 Aircraft Types – ADS-B Aircraft

#	FAA Aircraft Type	Aircraft
1	-	2672
2	GLF4	330
3	CL60	219
4	B752	135
5	B772	121
6	GLF5	120
7	F900	98
8	B763	96
9	FA50	89
10	F2TH	87



Breakdown of Data by Capability



DI Capabilities at 1090MHz

- DISSRR - 1090 MHz Receiver
 - Mode-S and ADS-B Message Processing
 - Waveform display and capture for examining pulse characteristics
- Extensive database of ADS-B data
 - Every bit of every valid ADS-B message is being saved
 - Saving selected Mode-S messages as well
 - Over 9,000,000 operations (flights) recorded to date
- Web based access to both statistical and real time data
- DI Passive Radar System (DIPRS)



DI Receiver - Alexandria, VA



- Simple outdoor installation
- Sealed environmental enclosure
 - No heating or cooling requirements
- Ethernet Interface
- Power over Ethernet
 - No requirements for power source at receiver
- Small, lightweight
- Portable for testing or rapid deployment
- Remote monitoring and configuration capability
- ~20 years of operating hours with no failures

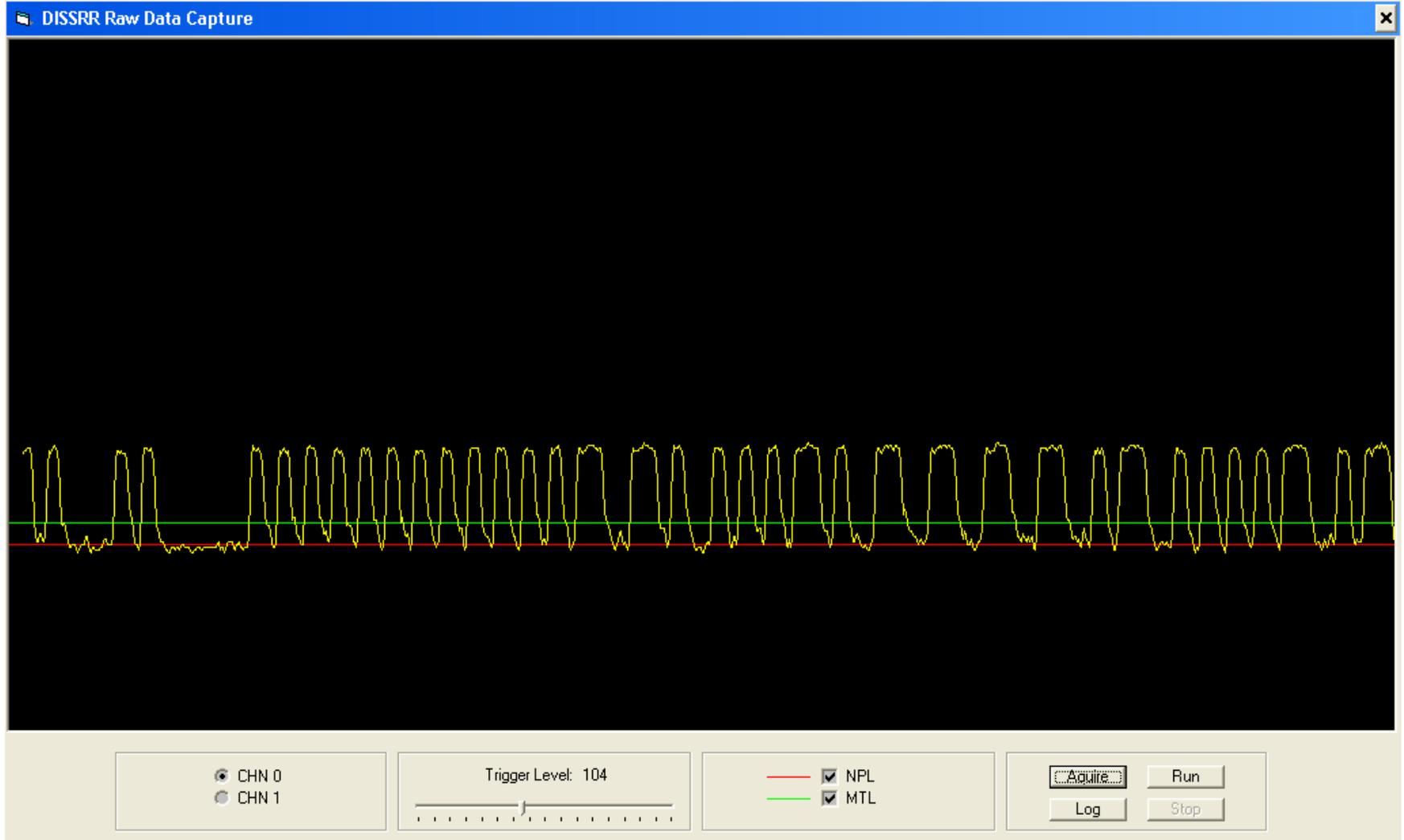
DISSRR Installations



Real Time Display - Google Earth



Waveform Capture



Wrap Up

- ADS-B messages seen from almost 5000 unique ICAO addresses
- Less than 1/3 of those are providing identification, position, and velocity
- The vast majority of aircraft are reporting DO-260 version
 - Only 7 aircraft seen to date that indicate DO-260A version

