BirdRad:

A Mobile Avian Radar For Near-Range Sampling Of Bird Populations

24 August 2004 Savannah, GA

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Overview

- Background to BirdRad Project
- Status of BirdRad Avian Radar
- Planned Enhancements
  - Current
  - Future

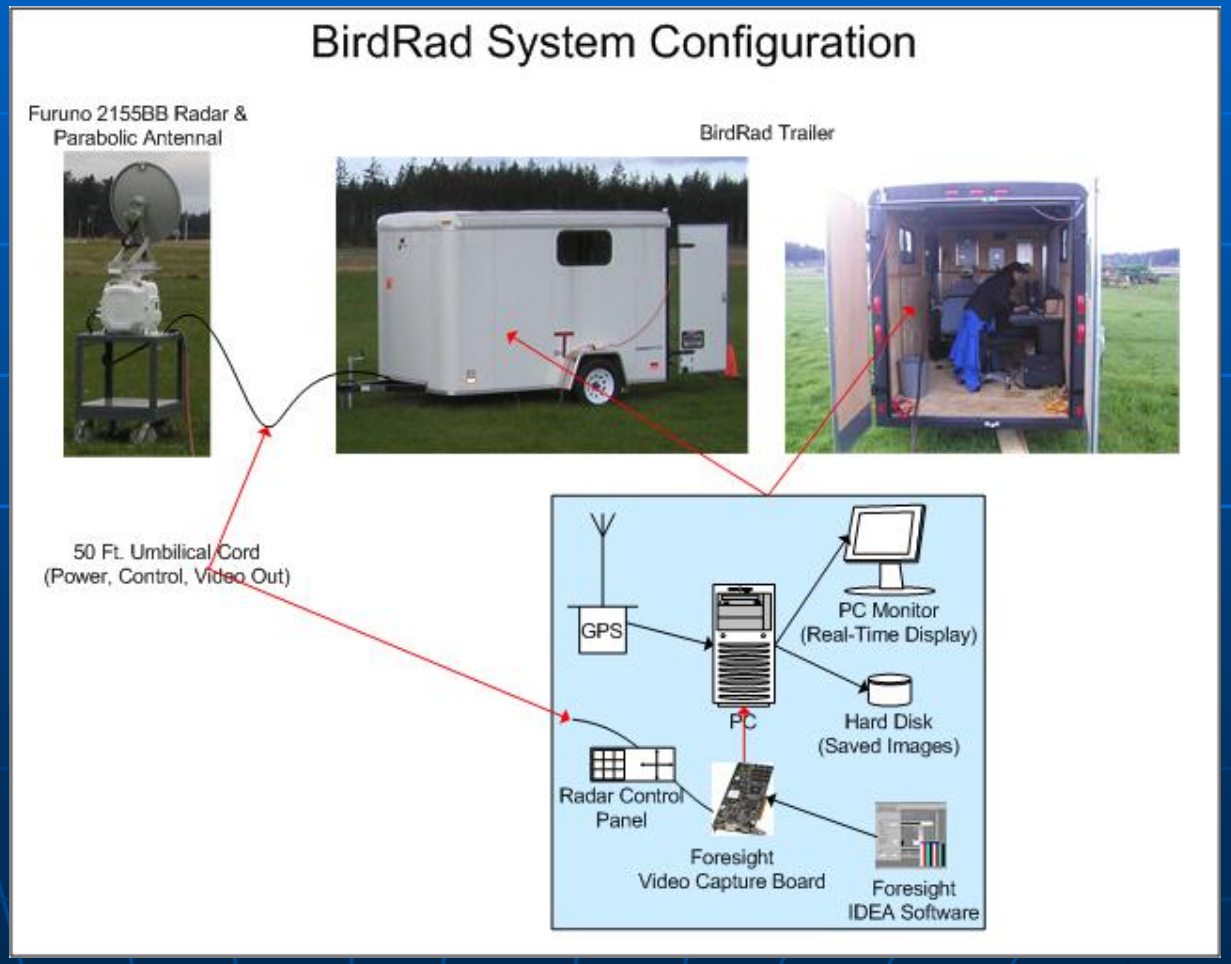
Background

- History
  - Weather Radars (WRS-88 or NEXRAD) Used to Study Migratory Birds
    - Coverage Gaps
  - 1999: DOD Legacy Contract To Sid Gauthreaux at Clemson University
- Design Requirements
  - Primary User Community: Natural Resources Managers
    - Application to BASH Came Later
  - Portability - Within & Between Sites
  - 360° Azimuth
  - Range 0-6 NMi
  - Measure Horizontal & Vertical(!) Location of Birds
  - Affordable

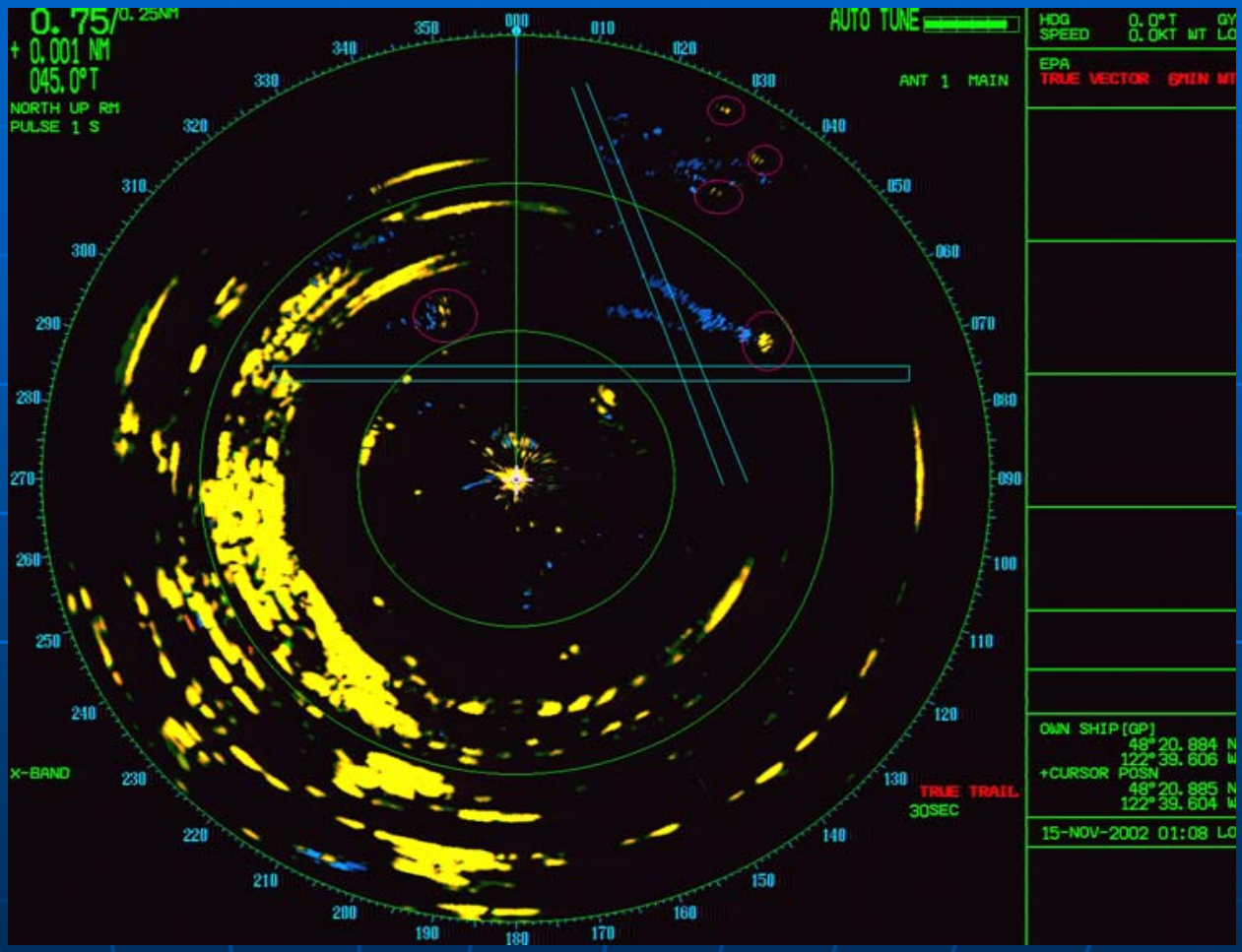
Status

- First BirdRad Unit Delivered in 2001
- Units Currently Operational At:
  - MCAS Cherry Point
  - NAS Patuxent River
  - NAS Point Mugu
  - NAS Whidbey Island
  - USAFB Elmendorf
  - SSC San Diego (R&D)

Current Configuration

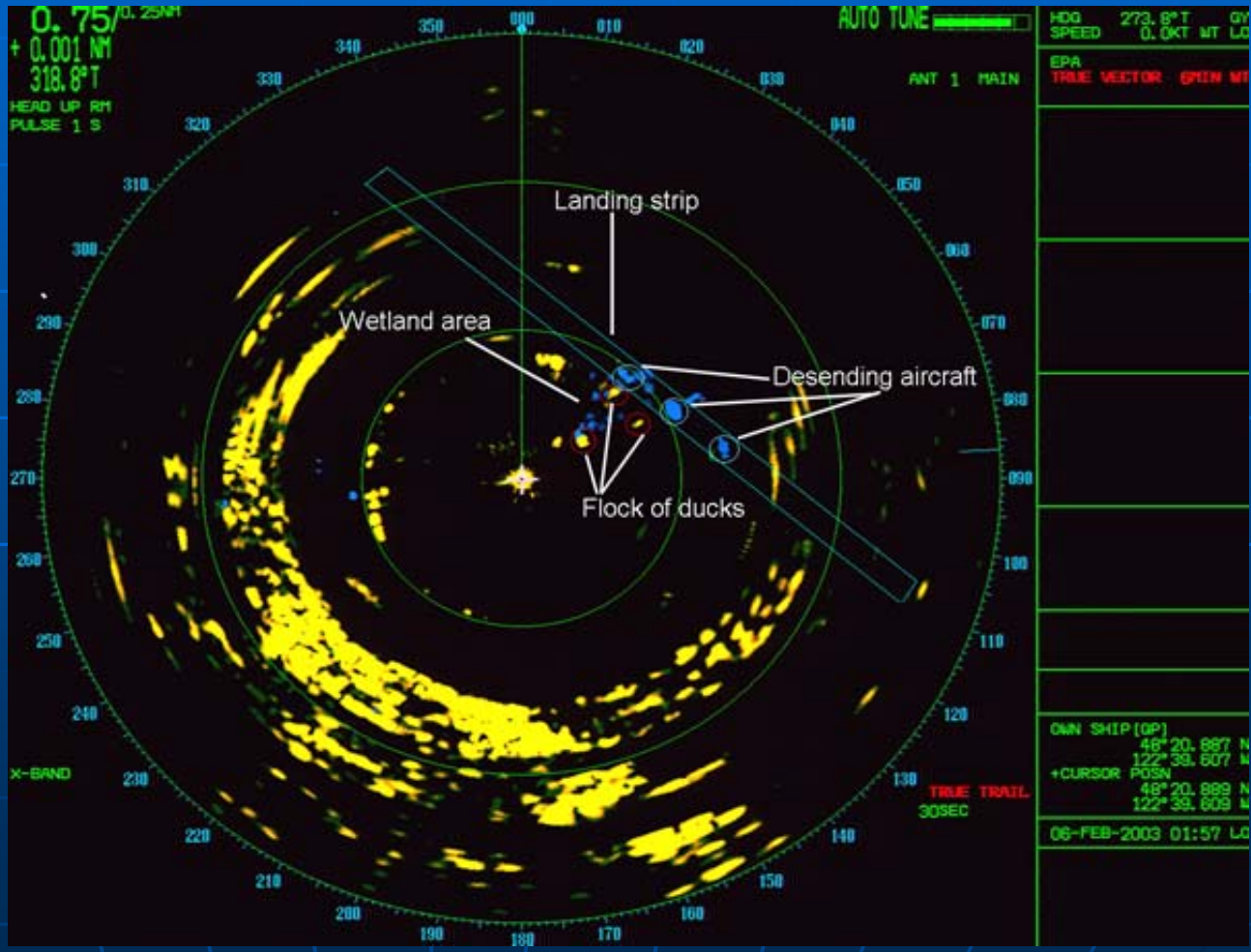


Visual Display

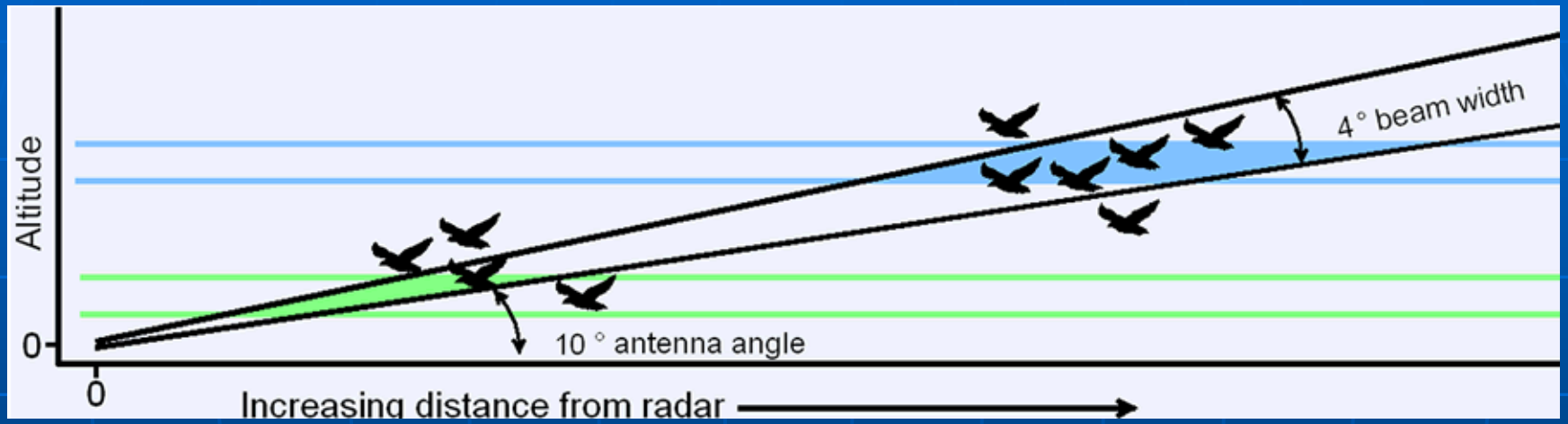


Sample BirdRad Display
NAS Whidbey Island 12 Nov 2002 17:09 PST

Capturing A Near-Miss



Narrow Radar Beam



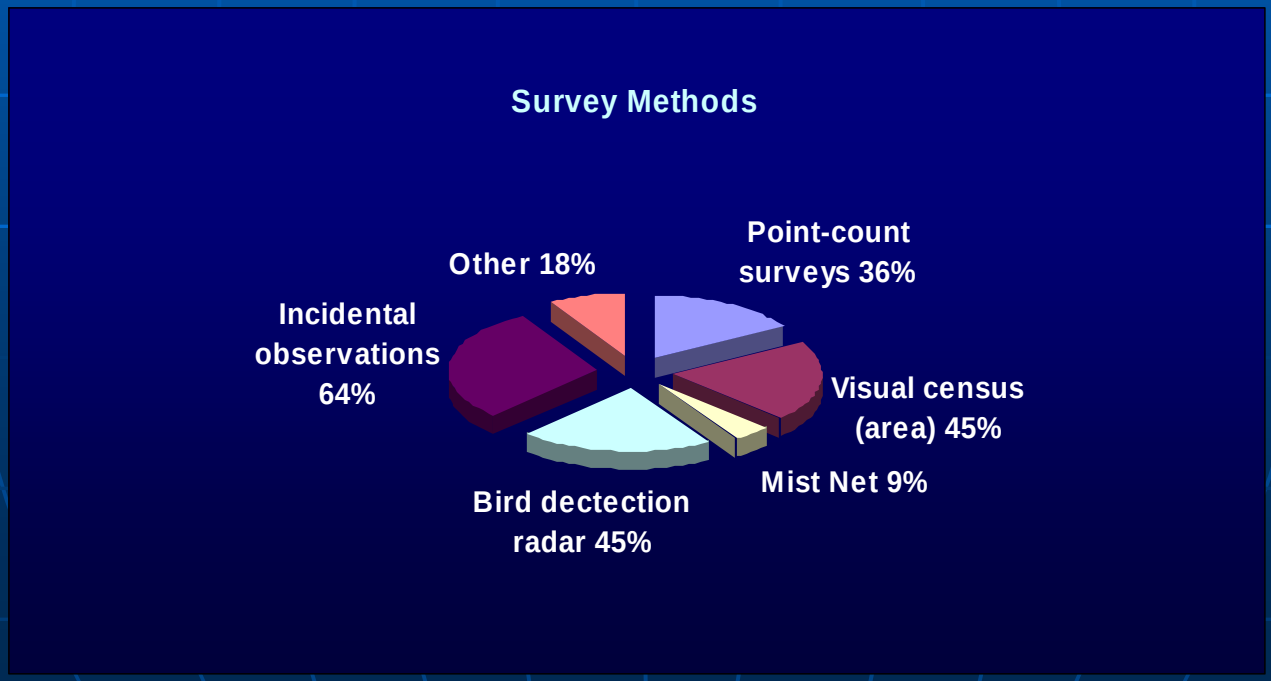
- Radar Beam Width: 4°
  - More Accurate Target Altitude
  - Larger “Cone of Silence” - Unsampled Volume Above & Below Beam
- Antenna Angle: 5-10°

Enhancements

- BirdRad System Met Design Goals
  - Highlighted Additional Requirements
- 2002: NAVFAC Tasks SSC San Diego to Research Additional Requirements of BirdRad Users
- SSC Extends Analysis of Requirements

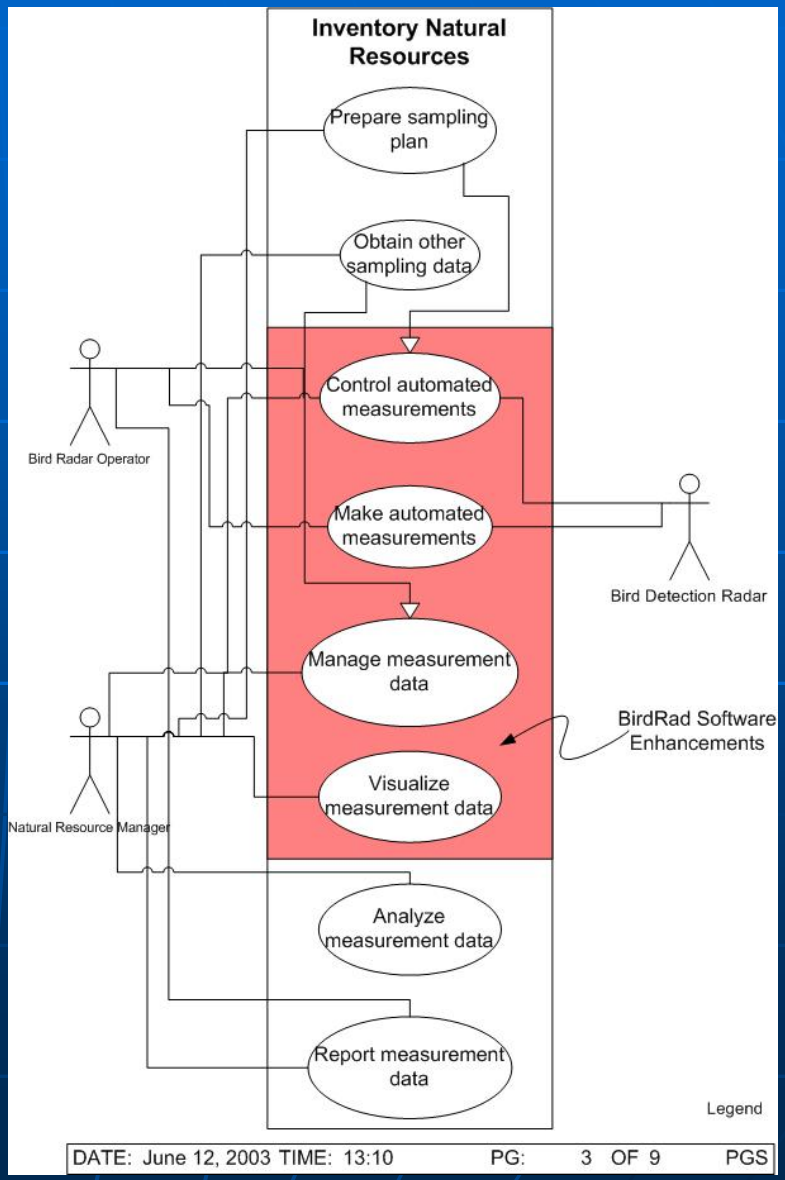
General Requirements

- Analyzed Resource Managers' Requirements for Bird Activity Data in General



Use Case Analysis

- Uniform Modeling Language (UML)
- Aid Both Programmers & End-Users to Understand System Capabilities
  - “What’s In, What’s Out”



Proposed Enhancements

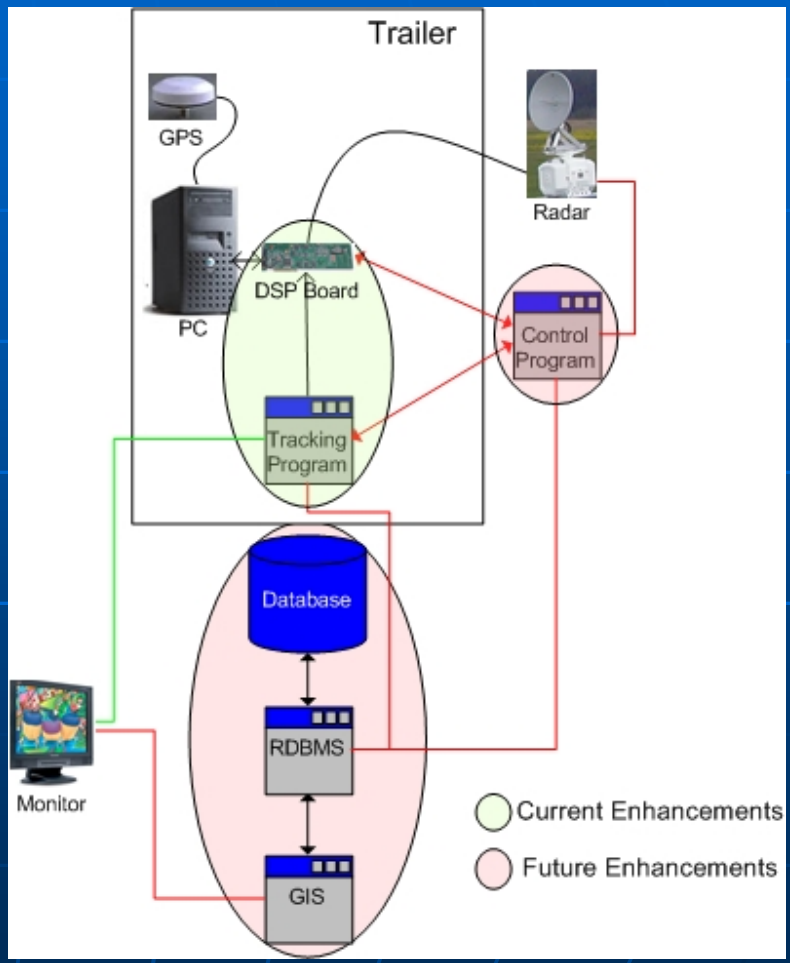
Constraint	Enhancements
Digital Signal Processing	▪ Clutter Removal ▪ Data Acquisition System ▪ Data Visualization
Furuno Controls	▪ Remote Operations
Operations, Not R&D	▪ Environmental Controls
Technical Feasibility & Cost	▪ Birds vs. Insects ▪ “Cone of Silence”

In Progress **Planned**

Parallel **On Hold**

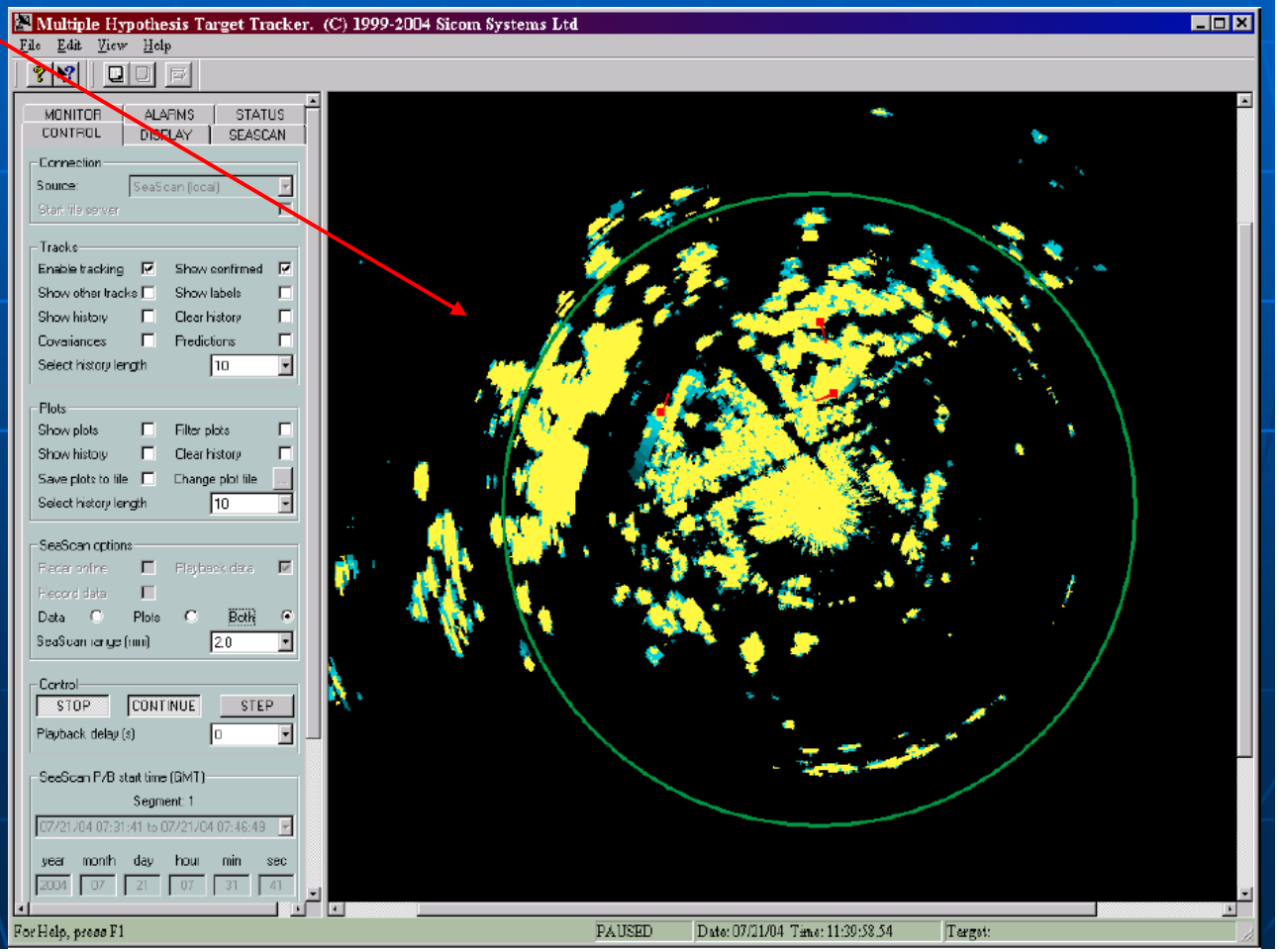
Proposed Enhancements

- Current Enhancements (Sicom Systems Ltd.)
  - Digital Signal Processing
    - Rutter Graphics Rsi4000RT
  - Target Tracking Program
    - MT-Tracker™
- Future Enhancements
  - Remote Scheduling and Control Program
  - Output to RDBMS With Feed to GIS



Current Enhancements

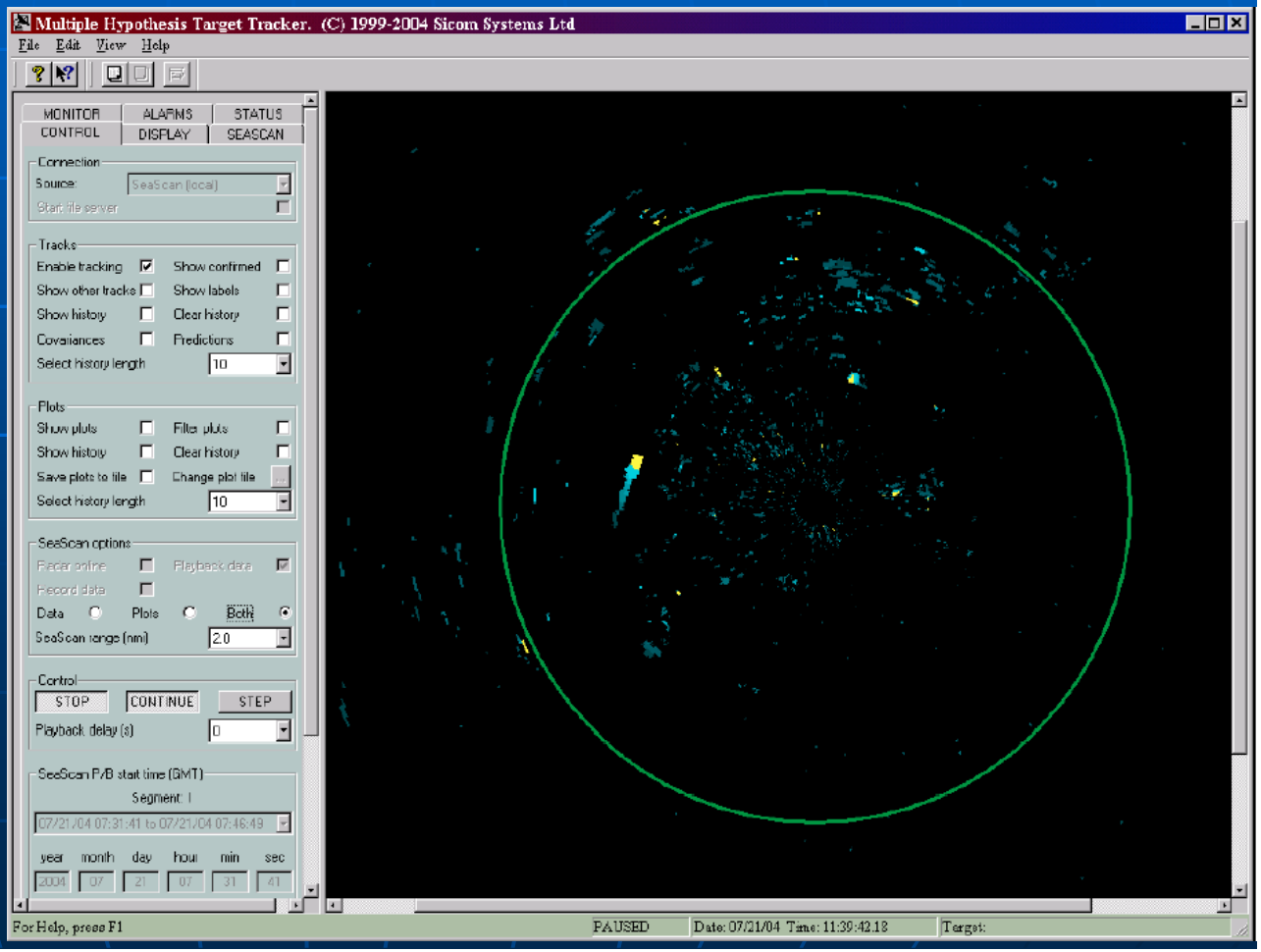
- Target Trails Display (Optional - Emulates Furuno 2155BB)
  - Yellow Heads & Blue Tails
- User Can Select The Background:
  - Target Trails (Standard)
  - Target Trails (Clutter Removed)
  - Map
  - Blank
- User Can Select The Overlay:
  - Targets
  - Tracks
  - Both
- Replay Video



Current Enhancements

- Apply Clutter Map
  - Residual Clutter
  - Heads & Tails

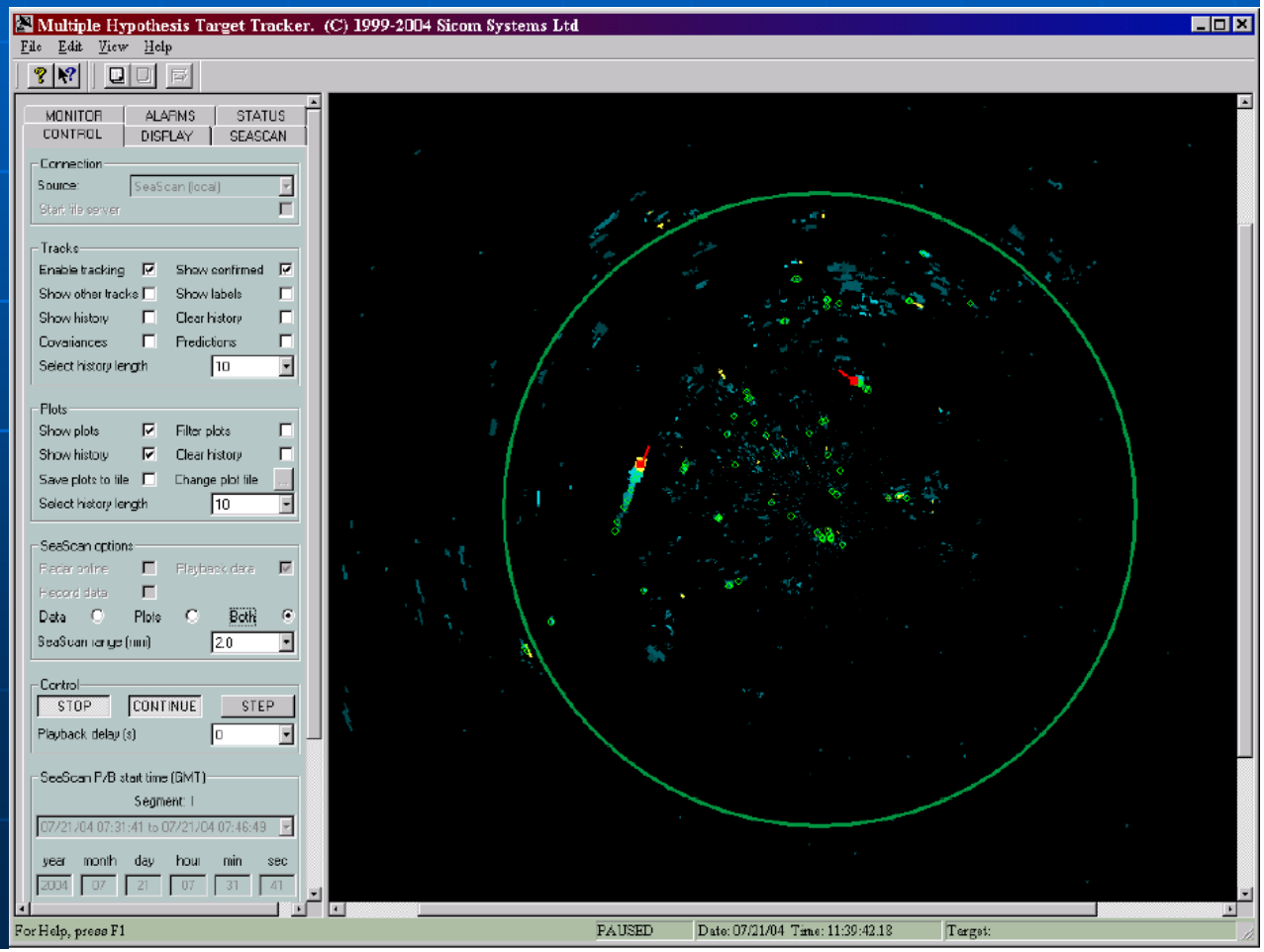
NAS Patuxent River: 21 Jul 2004 11:39 EDT



Current Enhancements

- Display Targets (Circles) & Tracks (Squares)

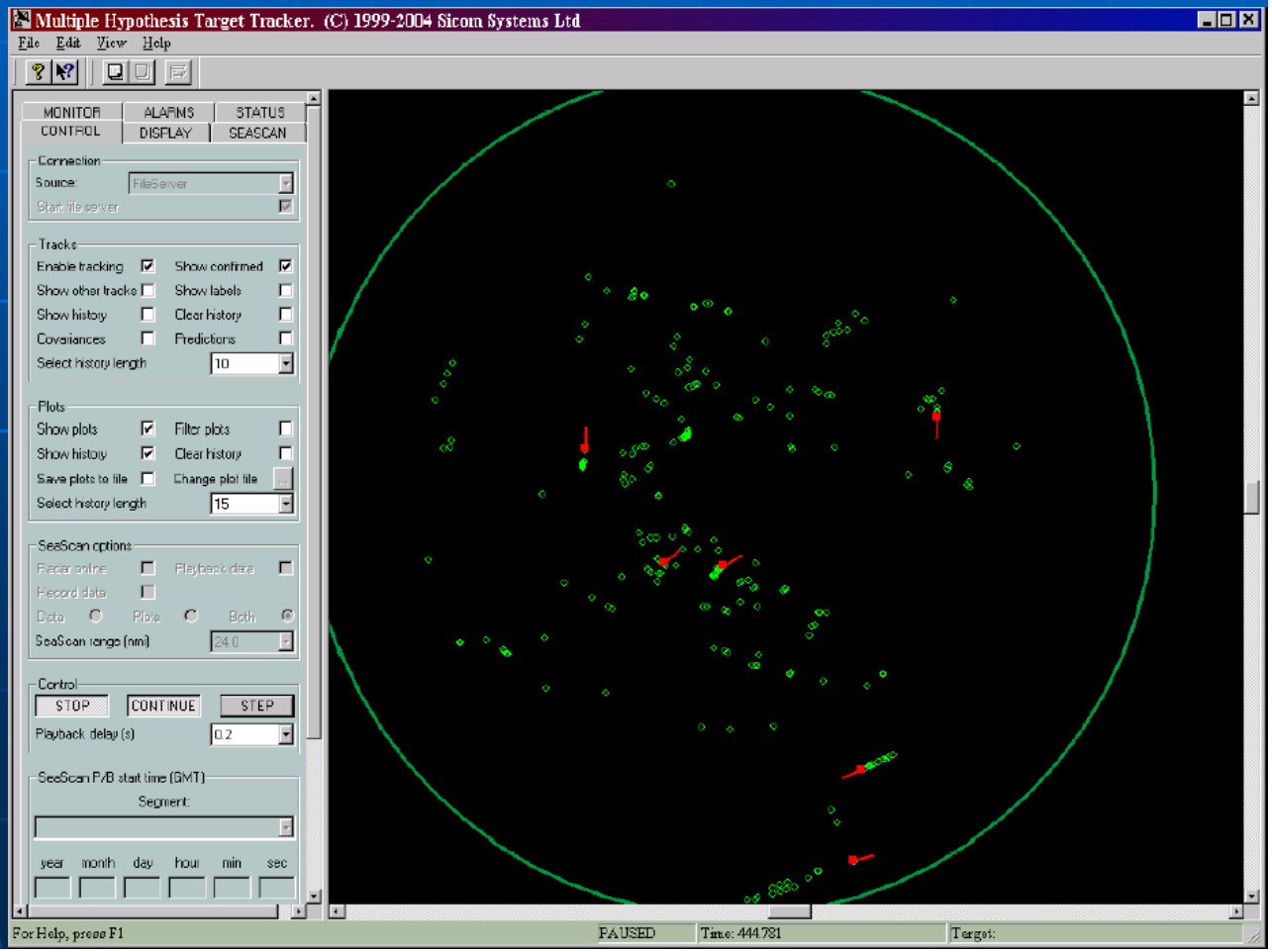
NAS Patuxent River: 21 Jul 2004 11:39 EDT



Current Enhancements

NAS Patuxent River: 21 Jul 2004

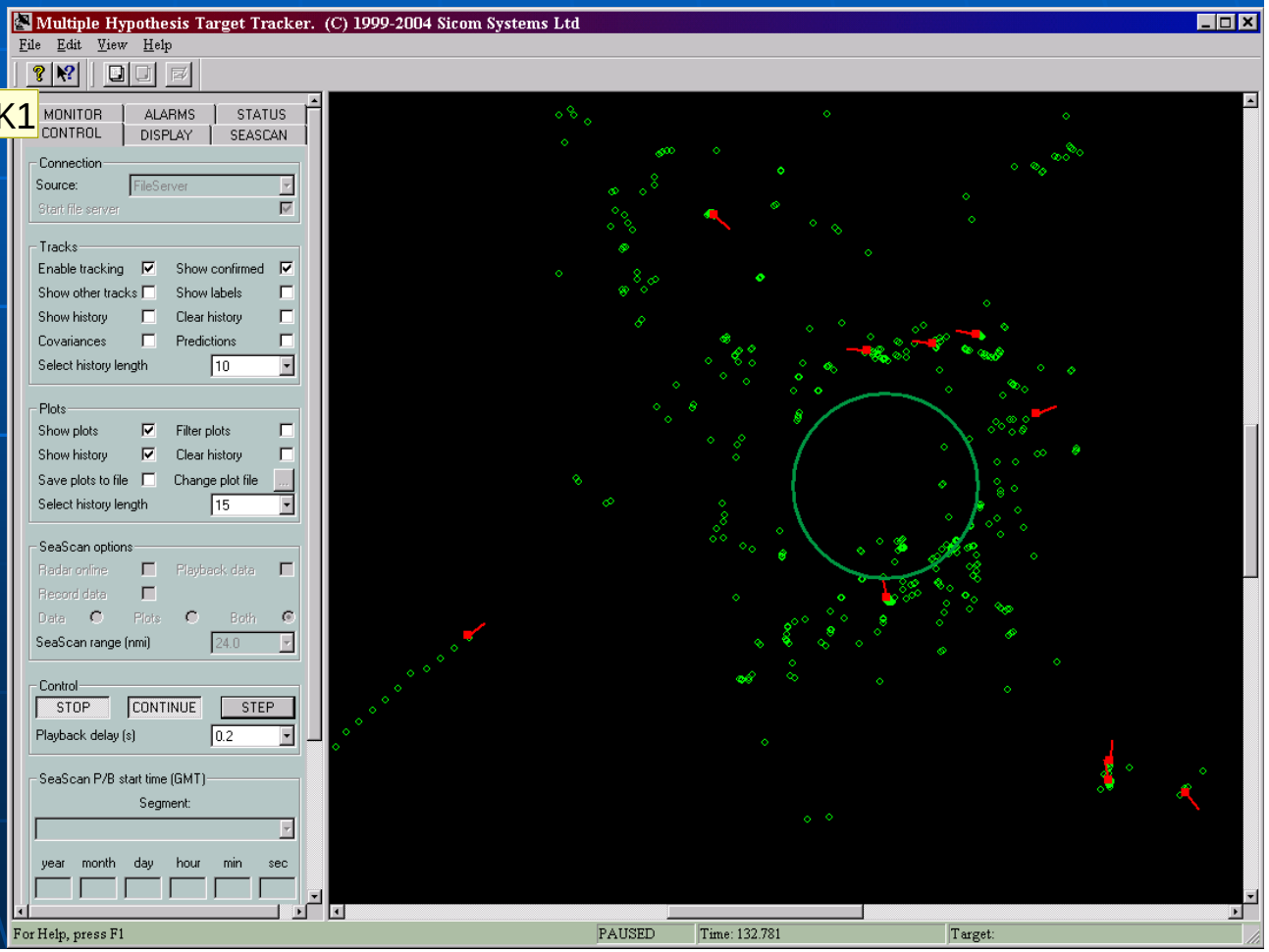
- Image Showing Targets & Tracks Only



Current Enhancements

- Example Of Longer Range
  - Note: Airplane at 8 o'clock, Ships at 5 o'clock

NAS Patuxent River: 21 Jul 2004



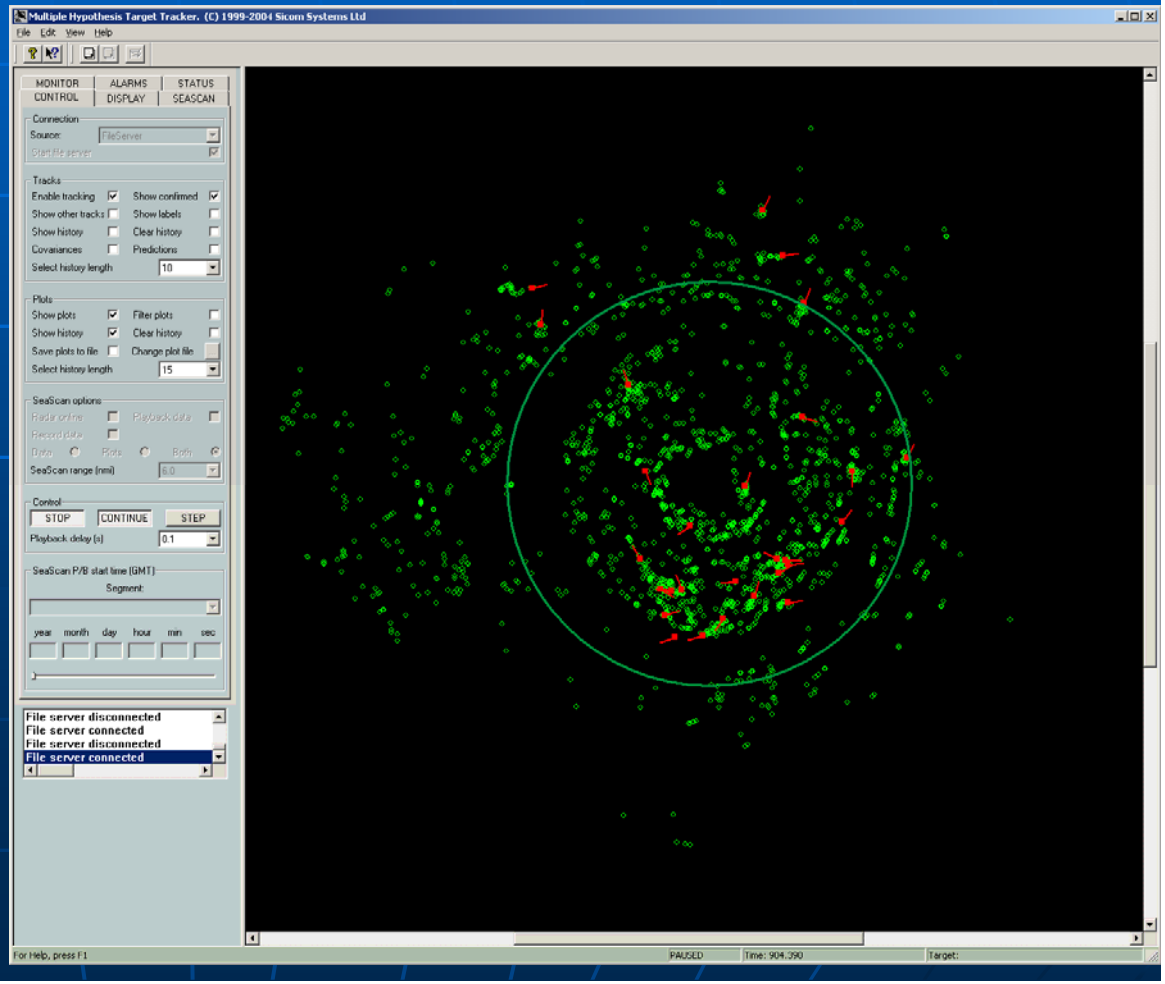
Slide 18

GSK1 Is this really 24 nmi?
Gerry Key, 8/17/2004

Current Enhancements

- Crank Up Sensitivity
  - More Targets
    - Close to Residual Clutter/Noise Level
  - More False Alarms
    - Increases Processing Load on the Target-Tracking Program
    - MT-Tracker™ Has Handled This Load

NAS Patuxent River: 21 Jul 2004



Trailer

- SSC Charleston → SSC San Diego
  - On Hold – Field Testing of HW/SW Enhancements

Future Enhancements (FY05)

- Remote Control
  - Control Radar On/Off/Standby
  - Preprogram Sampling Times & Configuration
  - Alarms & Notification
- GIS & Database
  - Export XML
    - SensorML
  - Load Into Relational Database
    - Generalized Data Model With Other Measurement Data
    - Configuration As Well As Measurement Data
  - Visualize Using Standalone and Web-Based GIS
- Comparison Study with MARS – October 2004

Future Plans

- Web Services
- Data Streaming
  - Digitized Raw Radar Data on the Net
  - Security Issues
- Other Sensors
  - Thermal Imaging (Insects)
  - Wind Speed Profilers (Insects)
- Taxonomic Identification
- Air Traffic Control? – No Plans

Questions?

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