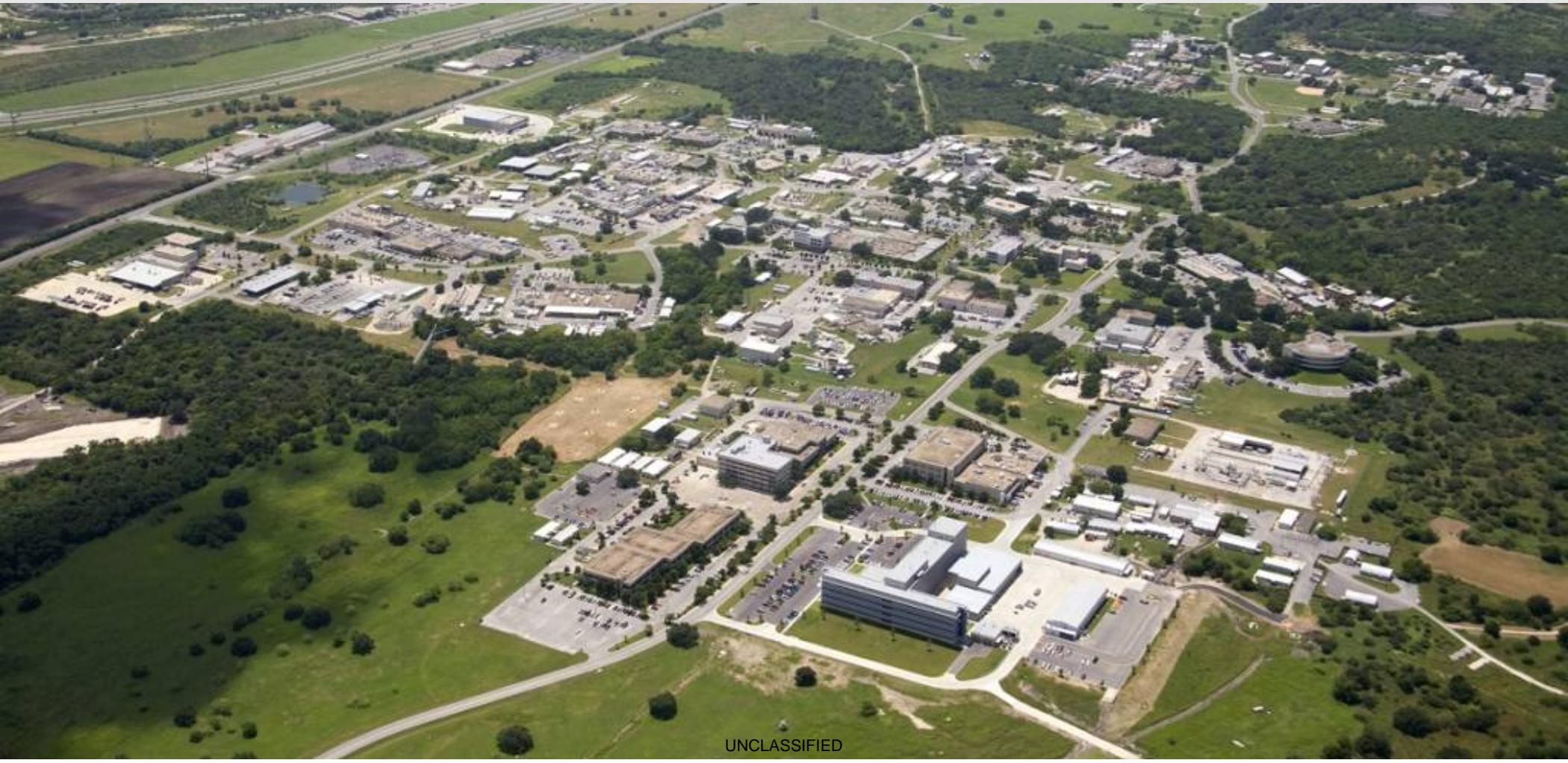


# SOUTHWEST RESEARCH INSTITUTE®

## San Antonio, Texas

# Signal Exploitation & Geolocation Division

## HF Capabilities Overview





# Southwest Research Institute Today

*Mission Statement: "Benefiting government, industry and the public through innovative science and technology"*

- **Independent Not-for-profit Organization**
- **Applied Research, Development & Testing**
- **FY 2012 Total Revenue - \$584 Million**
- **1200 acre Campus, over 160 Buildings**
- **Over 2,000,000 sq. ft. of**
- **Laboratory and**  
**Office Space**
- **3100 Staff,**  
**>50% degreed**
- **30 R&D 100 Awards**



***Signal Exploitation & Geolocation Division***



# Signal Exploitation and Geolocation Division

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- **Over 60 years in Antennas/RF/COMINT**
- **200-Acre Antenna Test Range**
- **Material Control/Inventory Control**
- **Secure USG Network Connectivity**
- **Fully cleared management, engineering and technical staff**
- **Government Furnished Property Procedures**
- **Production Capability (ISO-9001 Certified)**
- **CMMI Level 3 Certified**
- **Support to Programs on Six Continents**
- **Life Cycle Support**



*Signal Exploitation & Geolocation Division*



# SwRI Radiolocation Testing Range

- 200-acre testing range
- Twin 70-foot non-conducting towers
- 4000-square-foot field laboratory
- Ground Level rotator
  - Antennas
  - Vehicles
  - Aircraft
- Automated/remote-control capability



*Signal Exploitation & Geolocation Division*



# HF Research & Development Field Laboratory



**Narrowband N-channel  
Testbed**



**Vertical Incidence  
Ionospheric Sounder**

- **4000 sq. ft. Laboratory**
- **DF arrays remoted via Fiber Optic link to main laboratory spaces**
- **75 Meter Reference Interferometer Array**
- **Reconfigurable HF Antenna Range**
- **Wideband sequenced and N-channel HF Acquisition and DF Test Bed**
- **Narrowband N-channel DF and SSL Test Beds**

***Signal Exploitation & Geolocation Division***

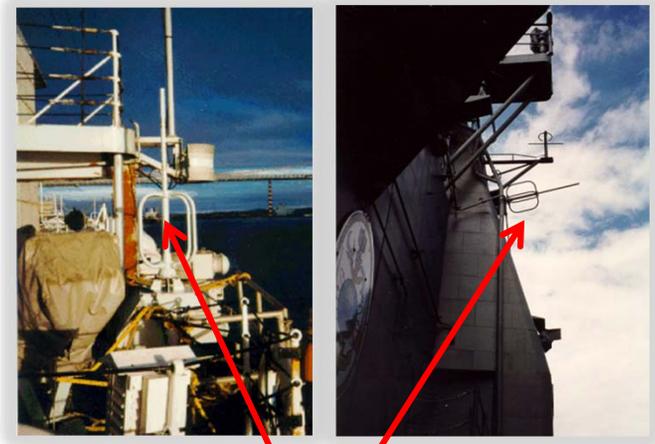
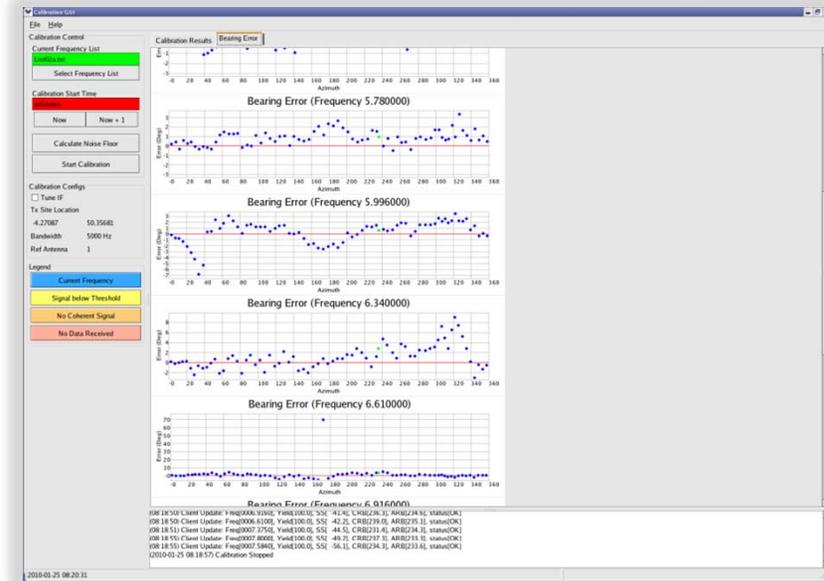


**Wideband  
Test Bed**



# DF Technology and DF Calibration

- **BSVM – correlative DF algorithm**
  - World class, field proven, high performance
  - Allows flexibility in antenna installation locations
  - Requires one-time, post installation platform DF calibration
  - 2° installed DF accuracy
- Characterizes the complex interaction between the ship's many electromagnetically conductive structures and the shipboard DF antennas
- Calibration collection performed over frequency and azimuth
- Built in calibration features on SwRI COMINT systems
- SwRI has been performing DF calibrations for nearly 60 years, including the development of Speedy/GPS calibration techniques

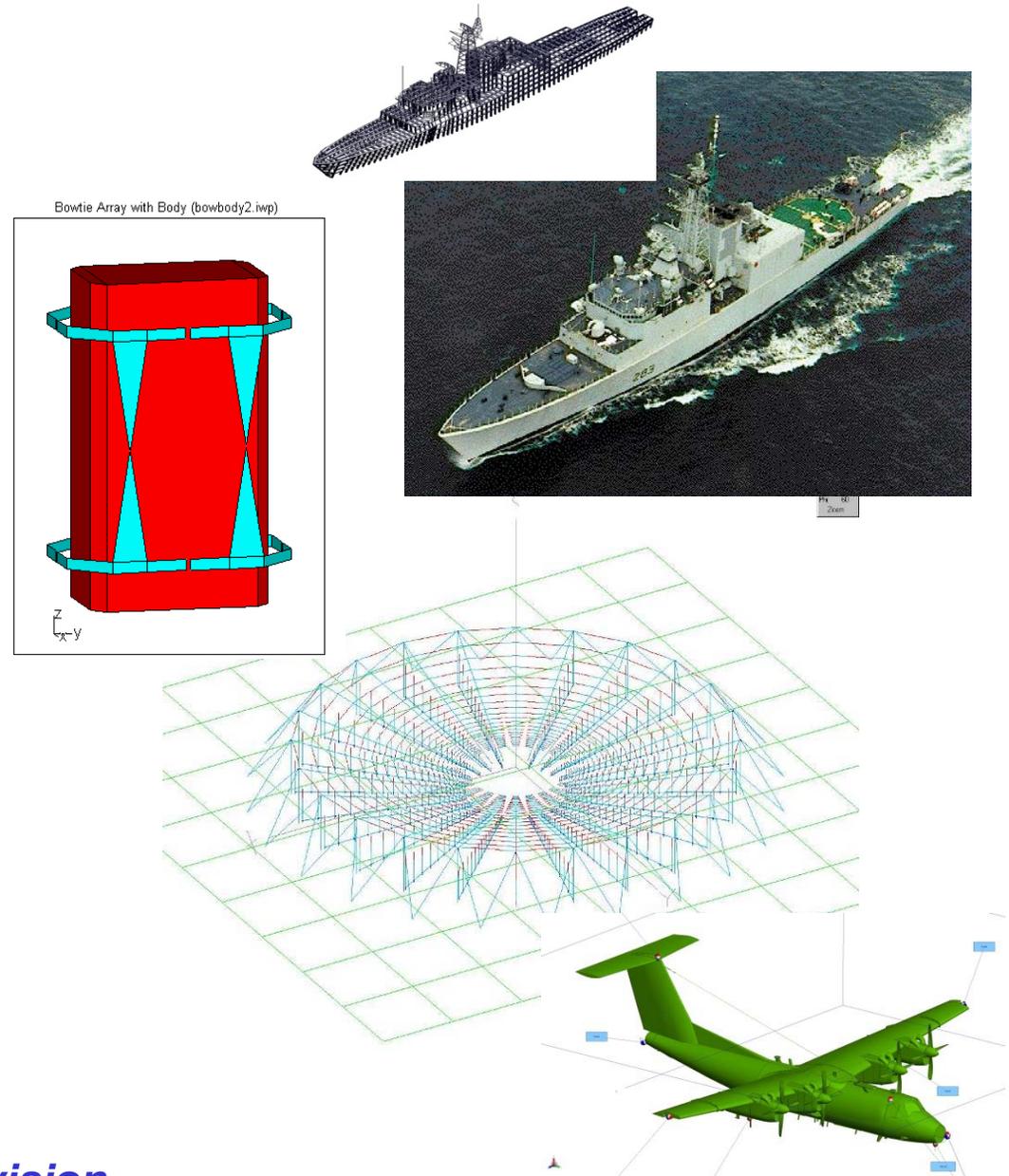


Typical Cluttered Site HF DF Antenna Installations



# Antenna and Site Modeling Capability

- All Aspects Of Numerical Modeling Research Are Employed
- Primary Focus on Direction Finding (DF) Arrays
  - DF Antenna Design
  - DF Array Design, Installed
  - Detailed Analysis Of Installed Characteristics
  - Installed DF Antenna System Performance Predictions
  - Consideration of multi-polarization responses
  - Algorithm Development
  - Calibration Of Installed Systems
  - Real World Applications And Installations
- Vessels, Land-based Fixed, Land Mobile, Aircraft, Body Worn





# Scout - Portable Signal Survey System



## Applications

- Ideal for automatic collection of DF antenna array responses against known check targets

## Specifications

- 2 to 30 MHz
- 8 to 28.5 MHz IBW
- Automatic acquisition, classification, ID and demodulation / decoding
- Long-term storage
  - 25 hours with Prospector
- 100% compatible with USG SIFs
- >100 signals in signal library
- Results SQL database
- SwRI FRONTIER Architecture
- DF Capable

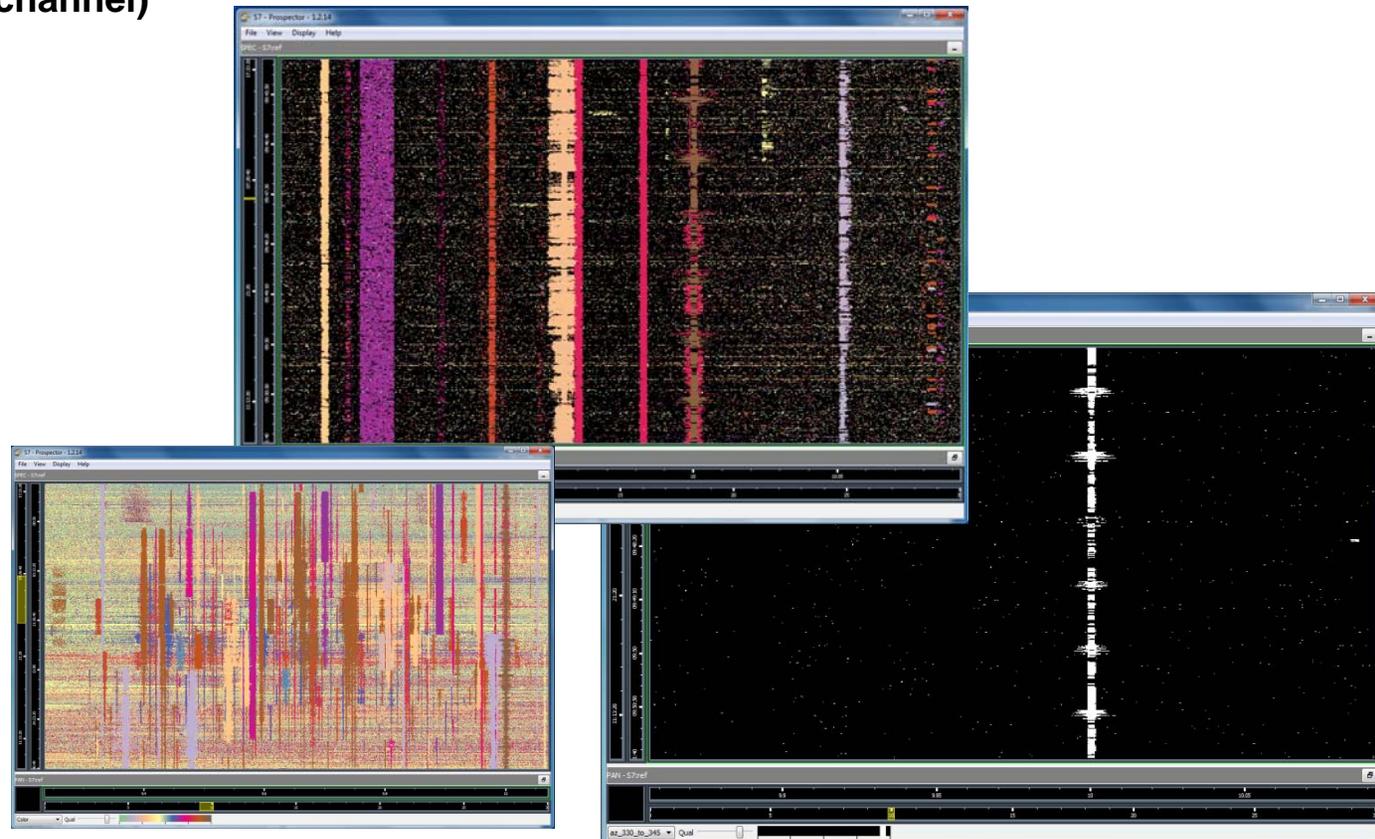


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# VistaView Wideband DF Processing

- Wideband 2-channel sequenced or N-Channel DF
- Wideband DF for Search
  - Azimuth, Elevation, Quality
  - 300 Hz resolution bw (N-channel)
  - 160 updates/sec
- Real-Time Processing



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