



# **Sensor Panel - Introduction**

**Fred Newman, Chair**

**Joe Collins - NRL/DC**

**Erik Hougland - NAVAIR/Orlando**

**Gerry Konstanzer - JHU/APL**

**Marty Leonardo - Metron, Inc.**

**Russ Moulton - JRM, Inc.**

**SEDRIS Technology Conference**

**January 6-9, 2004**



# Agenda

- **4:00 Introduction – Chair**
- **4:10 Panelist presentations**
- **5:15 Discussion – all present**
- **5:55 Wrap up (?) – Chair**



# Panel Objectives

- **Present a variety of perspectives ranging from model development to overall project team**
- **Discuss development of requirements for sensor models**
- **Describe state of the art for modeling selected sensor systems (radar, EO/IR, underwater acoustics)**
- **Identify important capabilities that remain to be developed**
- **If appropriate, identify potential SEDRIS role**
- **Open discussion of issues from all attendees**



# How to Define “Sensor”?

- **Modeling of sensor system performance includes:**
  - Modeling the actual sensor system (receiver, signal processor, display, etc.)
  - Modeling the signal and noise as affected/effected by the natural environment
- **Panel focuses on role of the natural environment**
  - Effect on energy that is emitted/scattered/reflected from something
    - Signal energy from a source of interest
    - Noise, clutter, reverberation, etc.
- **(???) Other “things” that are affected by the environment**



# The Challenge

- **Development of computer-efficient and network-efficient "techniques" (models, approximations, etc.)**
  - **To account for and to model processes causing both signal and “noise” energy to propagate along paths ultimately leading to the sensor**
  - **To model effects (attenuation, dispersion, etc.) of the physical environment on signal and noise energy as it propagates to the sensor**



**MIV: A Methodology for  
Modeling Detailed and Realistic  
Environmental Effects:  
An Example From JWARS**

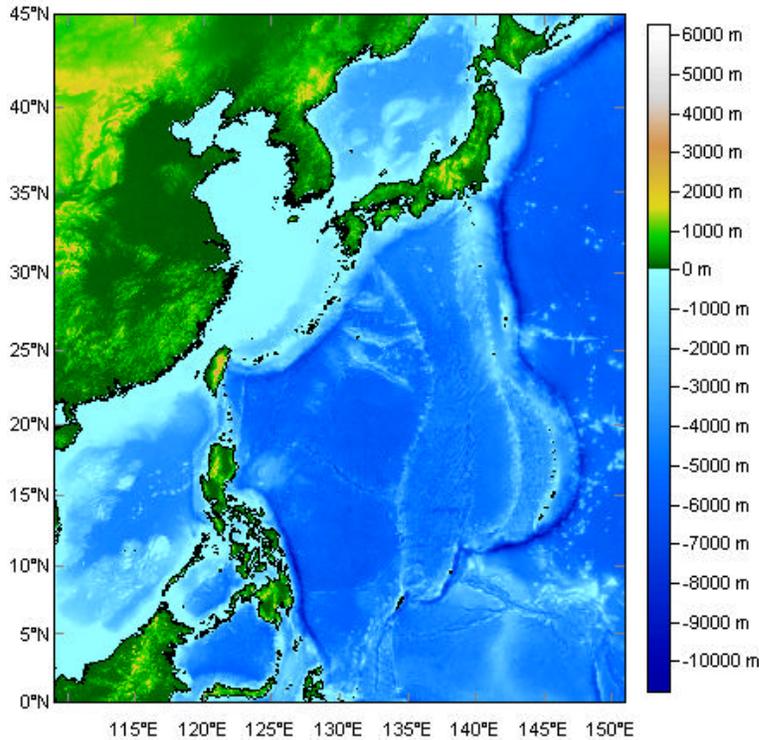


# JWARS Ocean Acoustic Environment

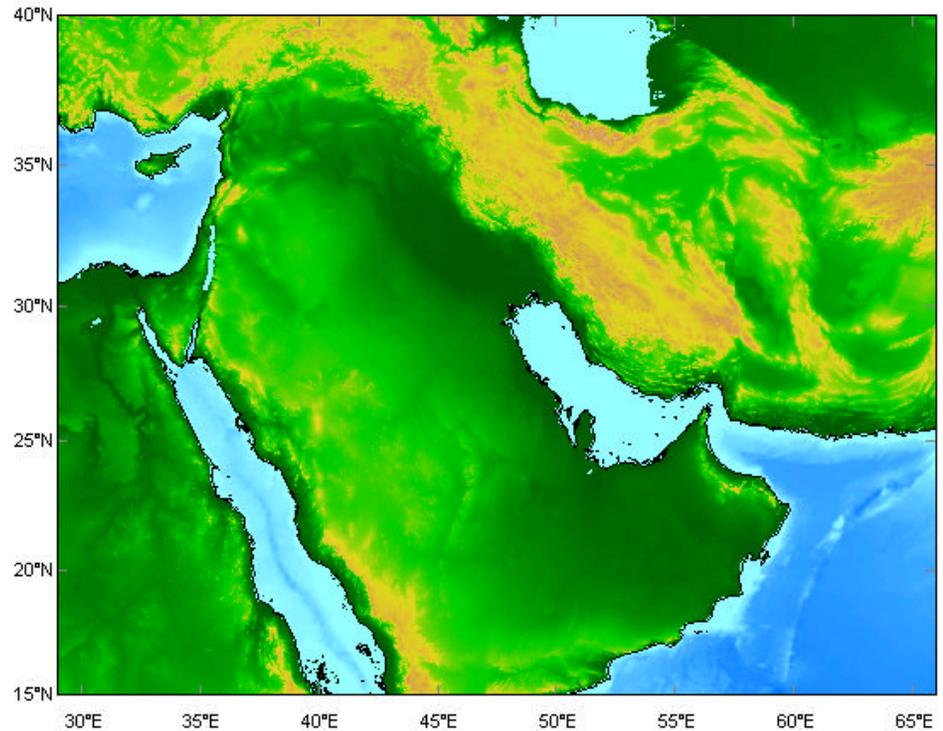
- **Realistic simulation of environmental effects on anti-submarine warfare sensors is required**
- **Geographic and time varying response to the environment for January 1997 through June 1998**
- **Model-Response Investigation and Visualization (MIV) provides:**
  - Complete but compact data base of acoustic transmission loss curves
  - Full range of acoustic propagation behavior
  - Littoral and deep ocean environments
- **MIV process:**
  - Automated and objective geographic area provincing
  - Comprehensive physics-based model calculations
  - Cluster analysis of model calculations to develop complete but compact data base



# JWARS Geographic Areas of Interest



East Asia



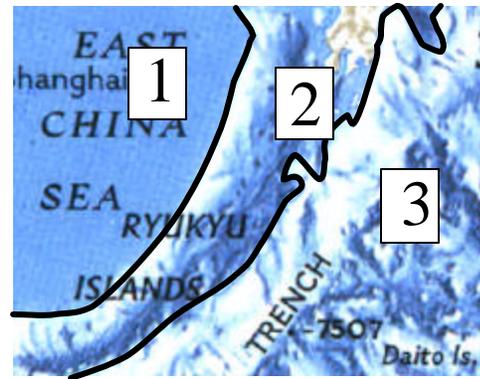
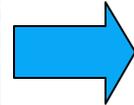
Southwest Asia



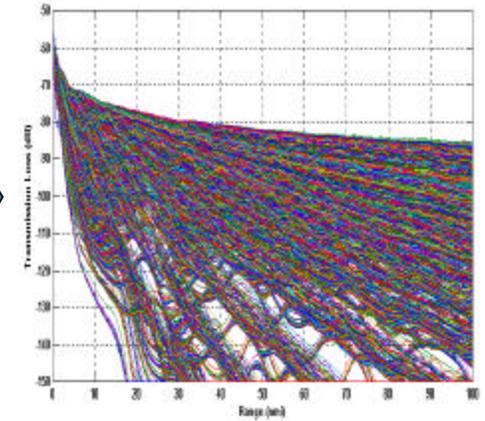
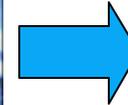
# MIV Process



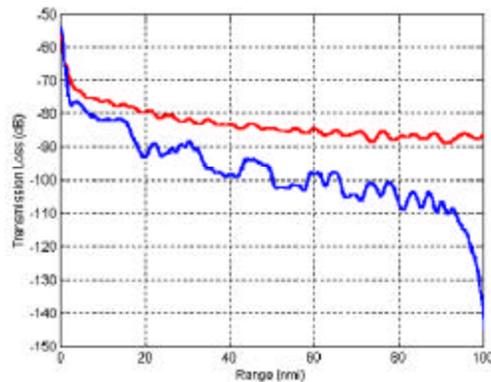
Environmental Analysis



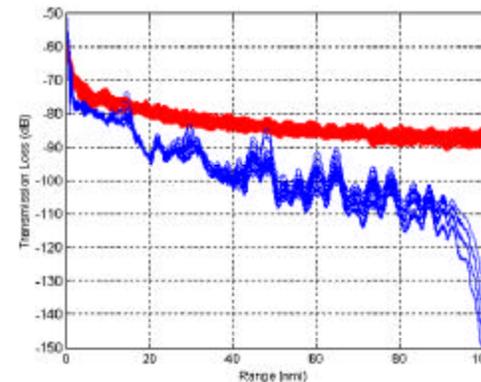
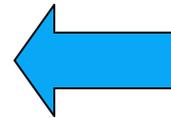
Feature Area Development



Propagation Model



“Representative Model” Results  
Provided to the Simulation



Cluster Analysis of  
Propagation Model Results

