



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**

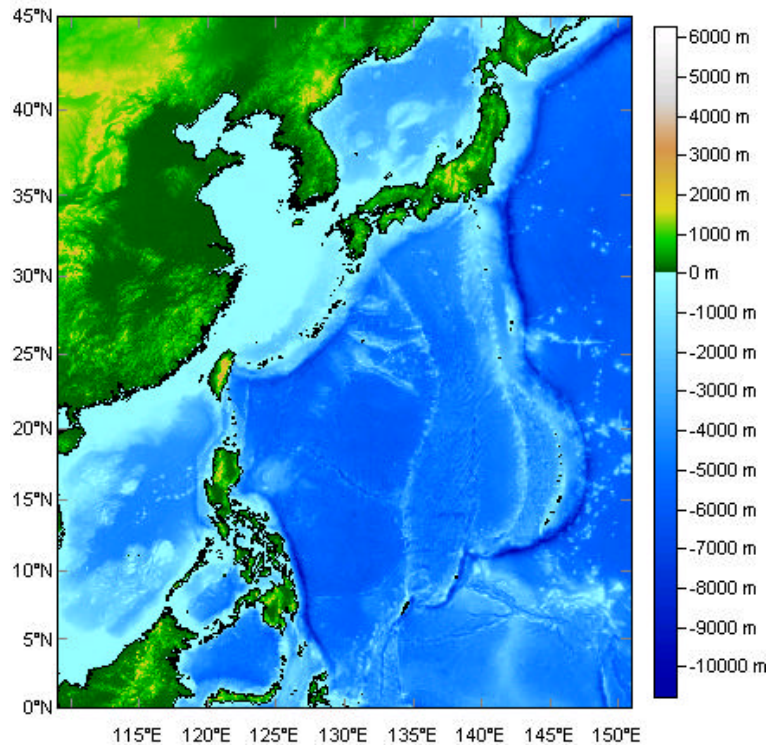


JWARS Ocean Acoustic Environment

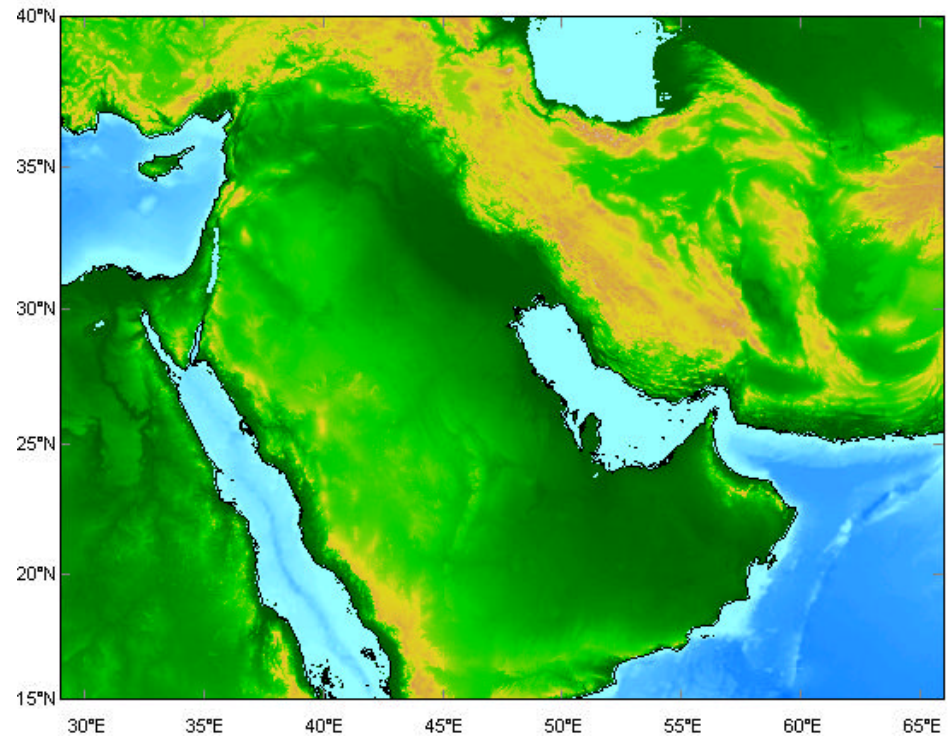
- Realistic simulation of environmental effects on anti-submarine warfare sensors is required
- Geographic and time varying response to the environment for January 1997 through June 1998
- **Model-Response Investigation and Visualization (MIV)** provides:
 - Complete but compact data base of acoustic 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



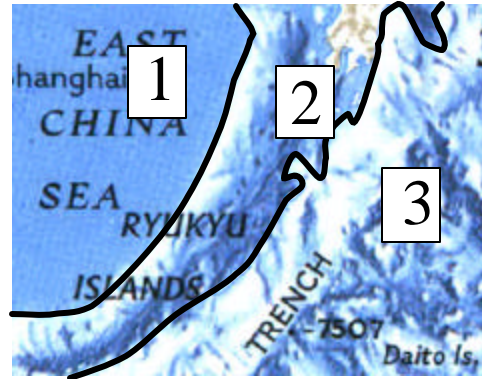
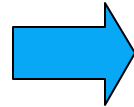
Southwest Asia



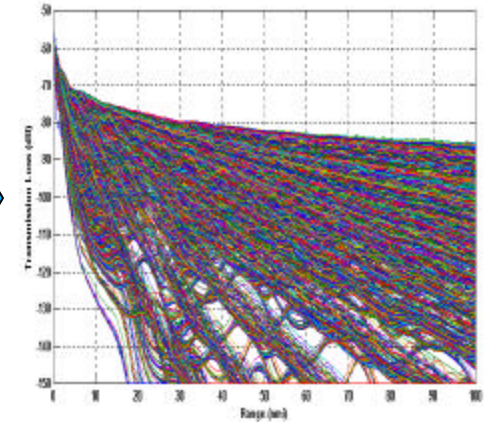
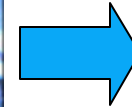
MIV Process



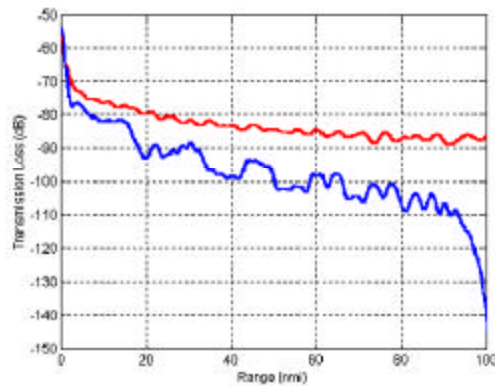
Environmental Analysis



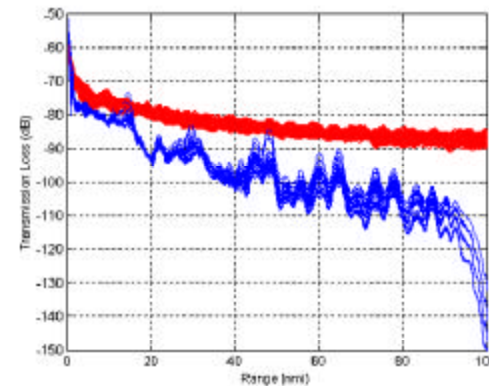
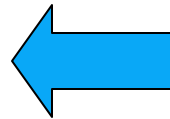
Feature Area Development



Propagation Model



**“Representative Model” Results
Provided to the Simulation**



**Cluster Analysis of
Propagation Model Results**

