Naval Oceanography Update

Briefing for
National Defense Industrial Association

RDML Fred Byus, USN

08 May 2007

4D Cube

- the ultimate objective for precise Navigation and Timing

- Today there are nautical charts, topographic charts and aero charts
- Tomorrow there will be an integrated 4D cube of digital data.

OPNAV Realignment

- Significant realignment at OPNAV over past 4 years

- N096 - N61/Forcenet – N6/7C – N84

Where We Are

Capability → Specificity → Stability → Affordability

Where We Stand

- N84 supports OPNAV N6 WRT FORCENet Compliance
- Integration with larger NCW efforts
  - Networks/Communications Strategy: Service Oriented Architecture, Net-Centric Enterprise Services, Robust C2 Applications
- OPNAV N6 (Dep DON CIO) requiring universal data standards/formats (e.g., metadata tagging/XML language, etc): promotes interoperability, reachback
- N84 / N2 partner as Navy's GEOINT Functional Manager
  - N84 = GI&S
- Digital Nautical Chart (DNC) completed in 2005 - provides seamless worldwide maritime digital "map" for Naval forces

Joint Maritime Battlespace
SEAPOWER From Knowledge

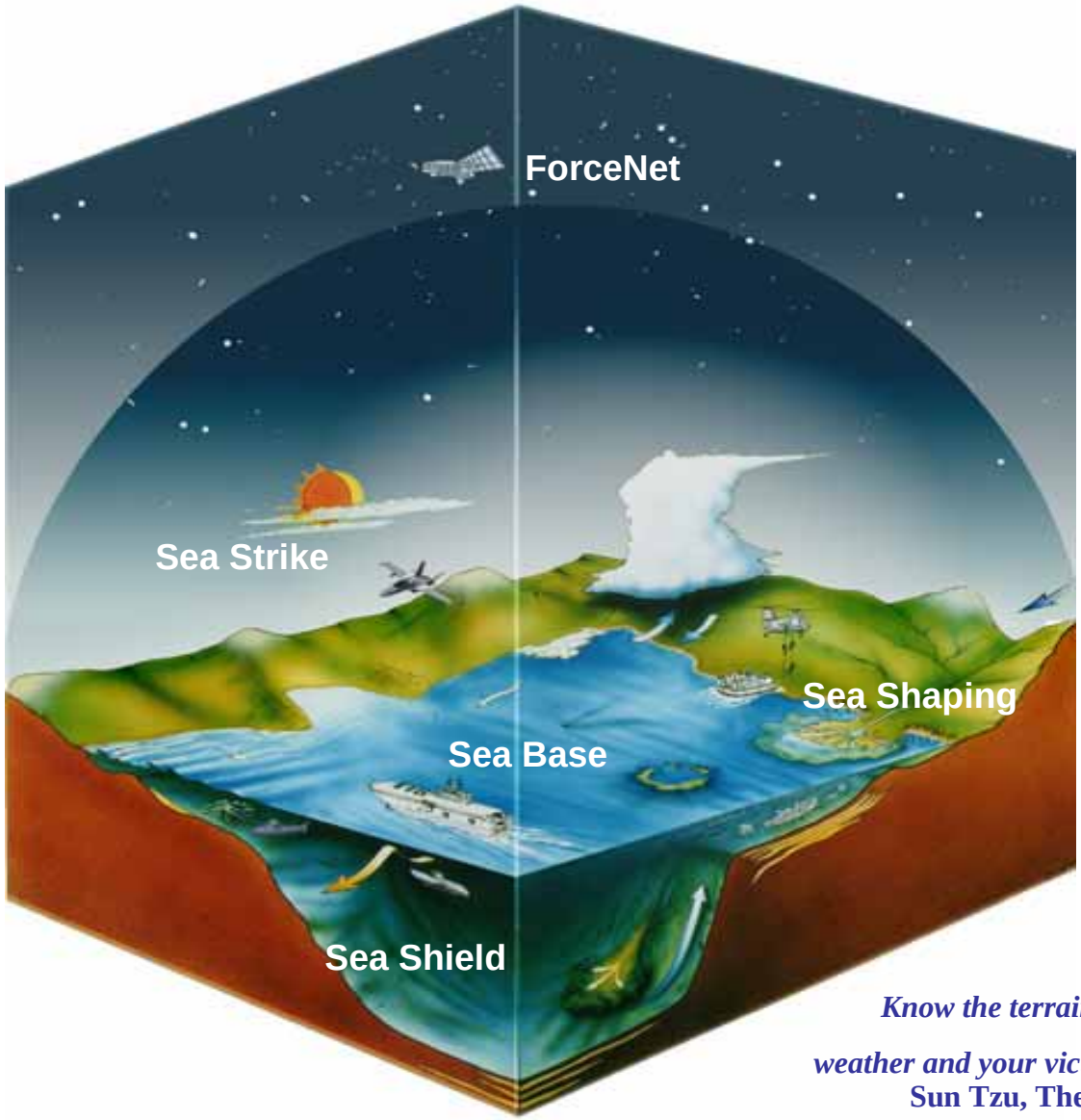
Provides

Environmental

Understanding

Assures

Safety &
Readiness



Ensures

Educated

Decision-Making

Enables

Dominant

Sea Power

Know the terrain and know the

weather and your victory will be complete
Sun Tzu, The Art of War

Navigation

Cost effective and efficient

Precise in Time and Position

All speeds

Air, surface, subsurface, and ashore

Minimally manned

Navigation Vision:
Safety of Naval Force ships, aircraft and personnel is assured throughout the Maritime Domain now and in the future

ECDIS-N Implementation

Resources

N85

N86

N87

N88

Acquisition

PEO SHIPS

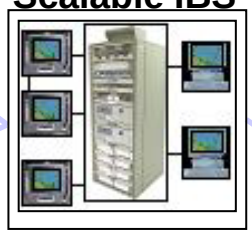
PEO IWS

PEO LMW

Hardware

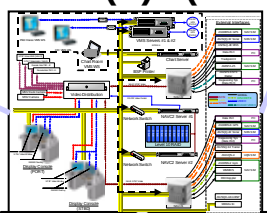
Integrated Bridge System (IBS)

Scalable IBS



AN/BPS-15&16

AN/SSN-2(V)5 (NAVC2)



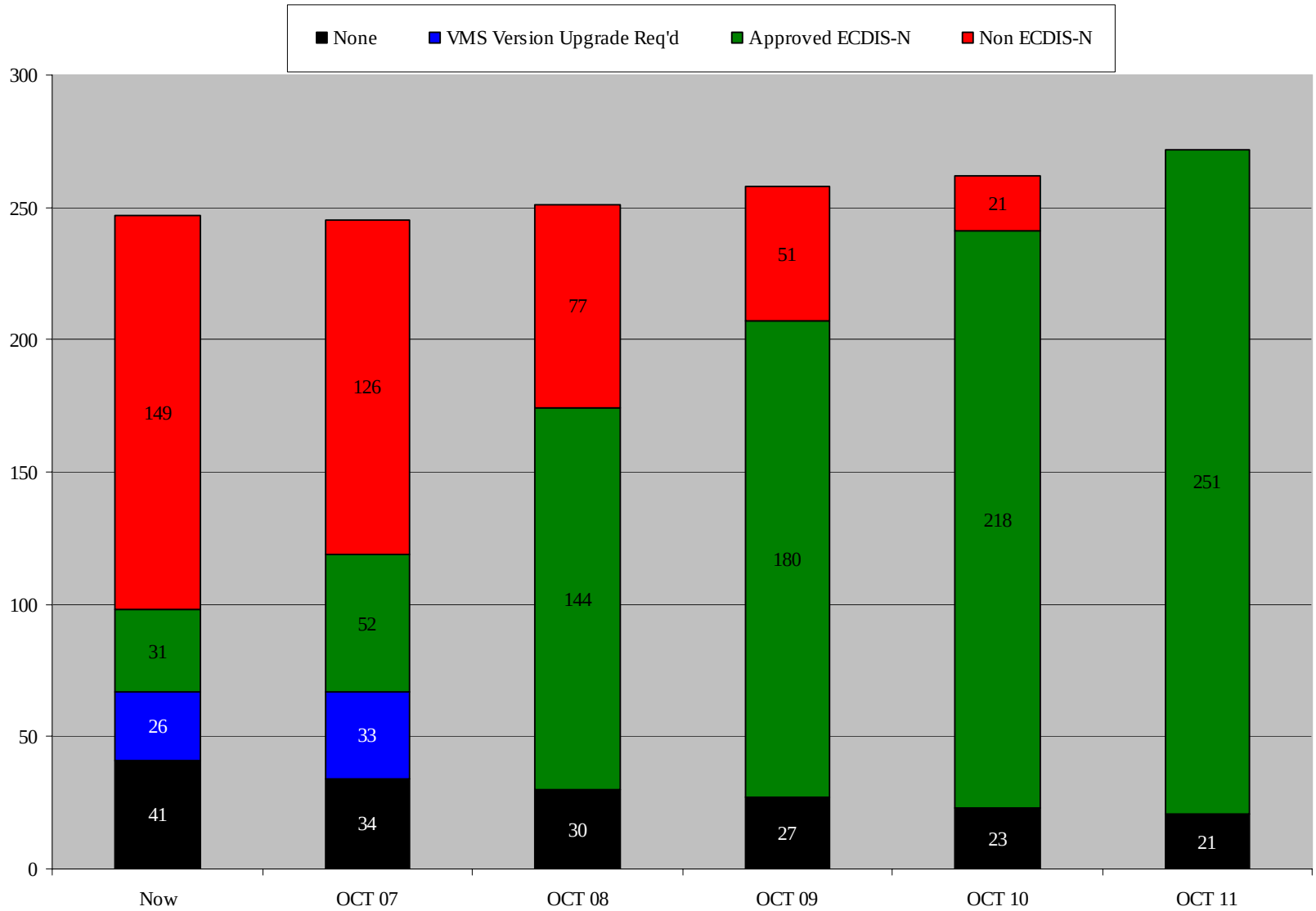
EC Software

Northrop Grumman Sperry Marine Voyage Management System (VMS)

Now

- Approved ECDIS-N
  - CGs with Integrated Ship Control (ISC)
  - CGs/DDGs with Scalable IBS
  - SSN 688 (non SWFTS)
- Near Term Operational Test
  - MCM Final Report May 07
  - SSN 688/21/SSGN (SWFTS) – 3Q FY07
  - DDG with ISC – 1Q FY08

ECDIS-N by FY

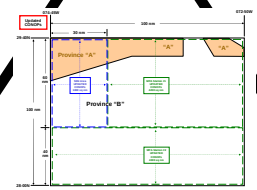

None
VMS Version Upgrade Req'd
Approved ECDIS-N
Non ECDIS-N
300
250
200
150
100
50
0
149
31
26
41
126
52
33
34
77
144
30
51
180
27
21
218
23
251
21
Now
OCT 07
OCT 08
OCT 09
OCT 10
OCT 11

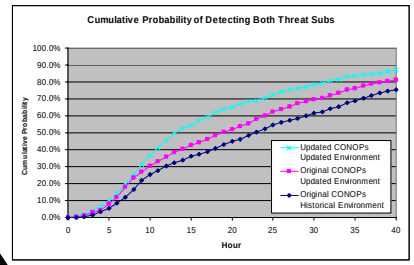
Navy Navigation Vision 2030

- **N84 Proposal**: Cross Functional Team (CFT) to produce a Navigation vision for 2030 and supporting investment strategy
- **Today**: Navigation and Piloting; safely getting from Point "A" to Point "B"
  - Disaggregated PNT user equipment/systems
    - Piecemeal display, data distribution, sensors
  - Separate DOTML-PF approach
  - e-Nav and Combat Systems separate
  - GPS central
- **2030**: Continuous Command and Control (C2) of Geospatial Position and Orientation
  - Applicable to Platform, Weapon and Sensor - Manned and Unmanned / Any Domain
  - Environmentally Informed / Spatially Aware <red, white, blue & grey>
  - Enabled by Uncertainty Models / Autonomous Tools
  - Transportable – Tactical to Operational to Strategic

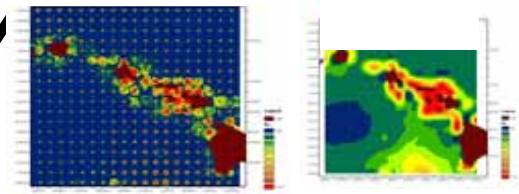
Battlespace on Demand
The Three Tiers

Tier 3 – the Decision Layer
- ***Options / Courses of Action***
- ***Search Patterns***
- ***Asset Allocation / Timing***
- ***Quantify Risk***

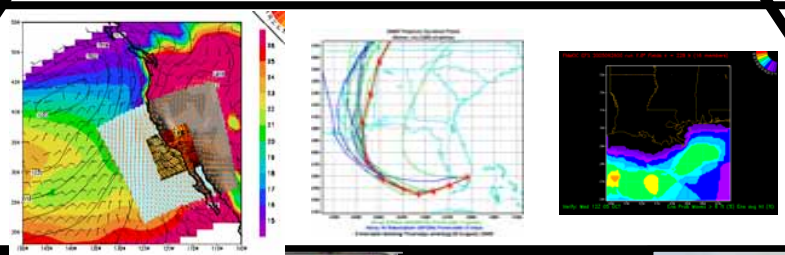


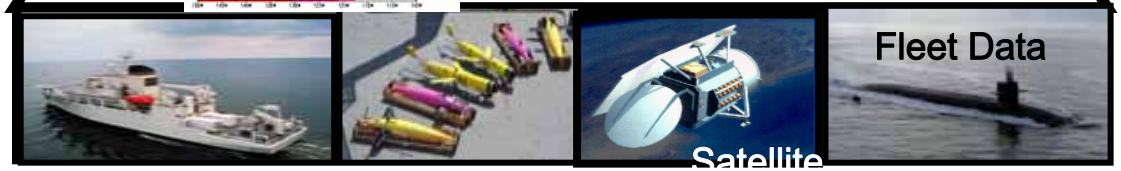


Tier 2 – the Performance Layer



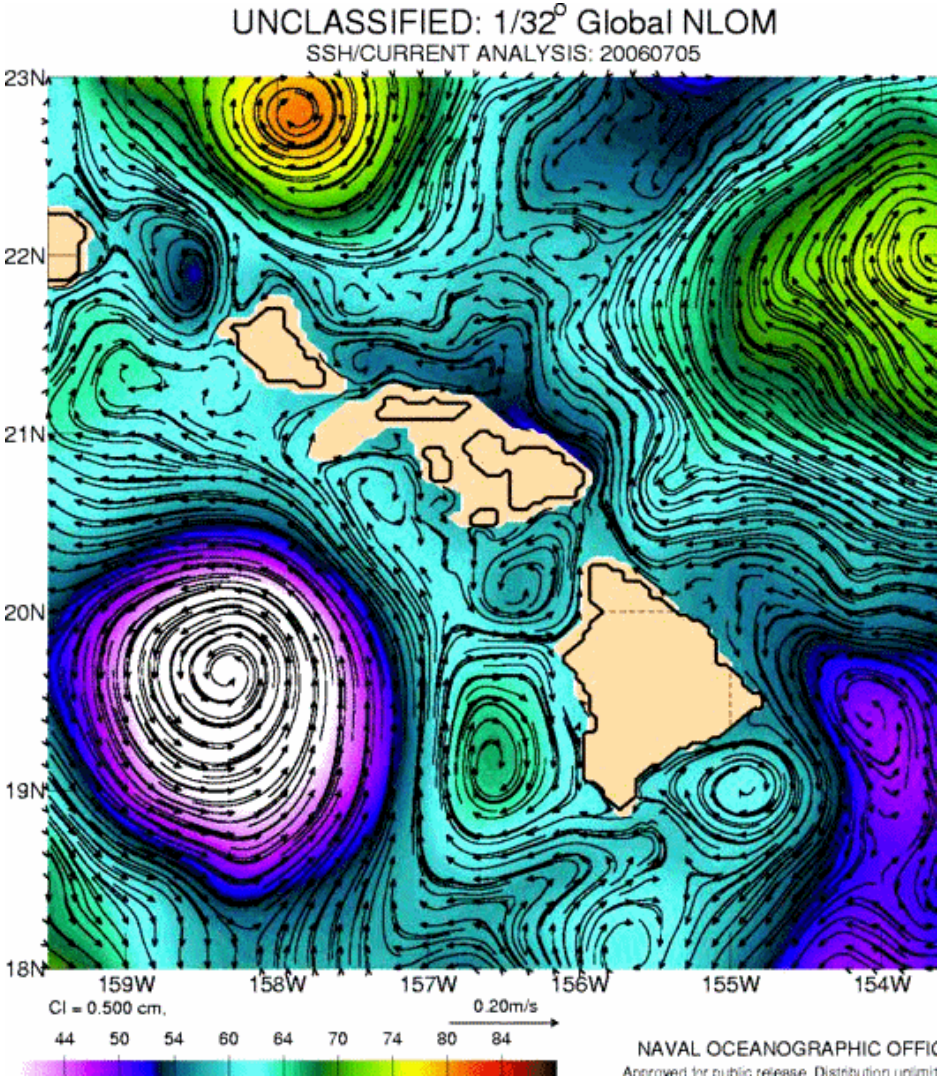
Tier 1 – the (forecast) Environment Layer



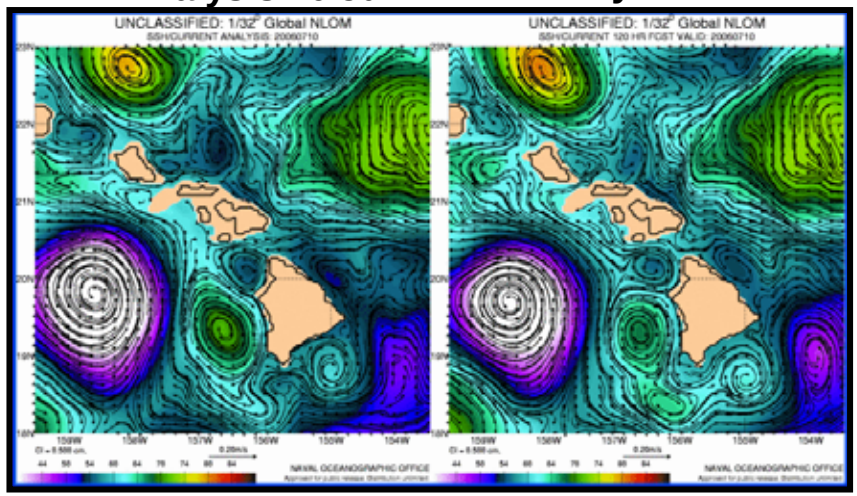


Initial and Boundary Conditions

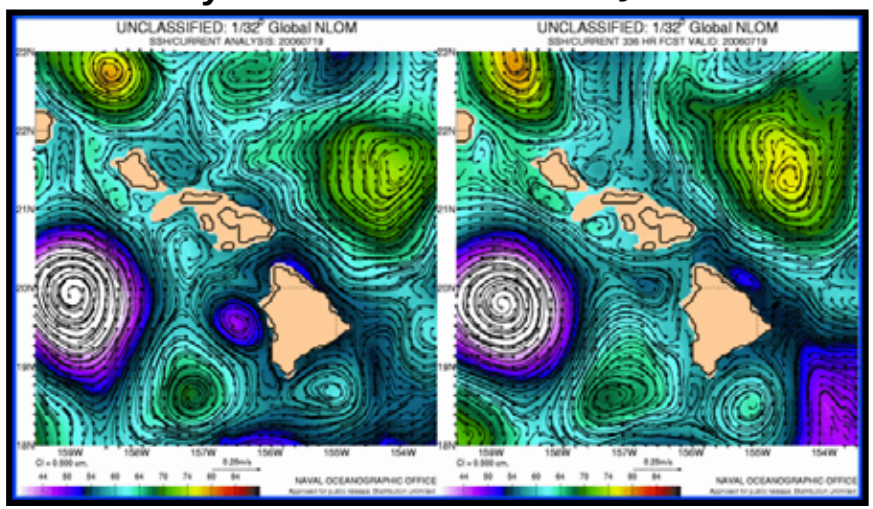
The Dynamic Ocean at Operational Scales
Thinking in "forecast space"



Analysis 10 Jul **5 Day Forecast**



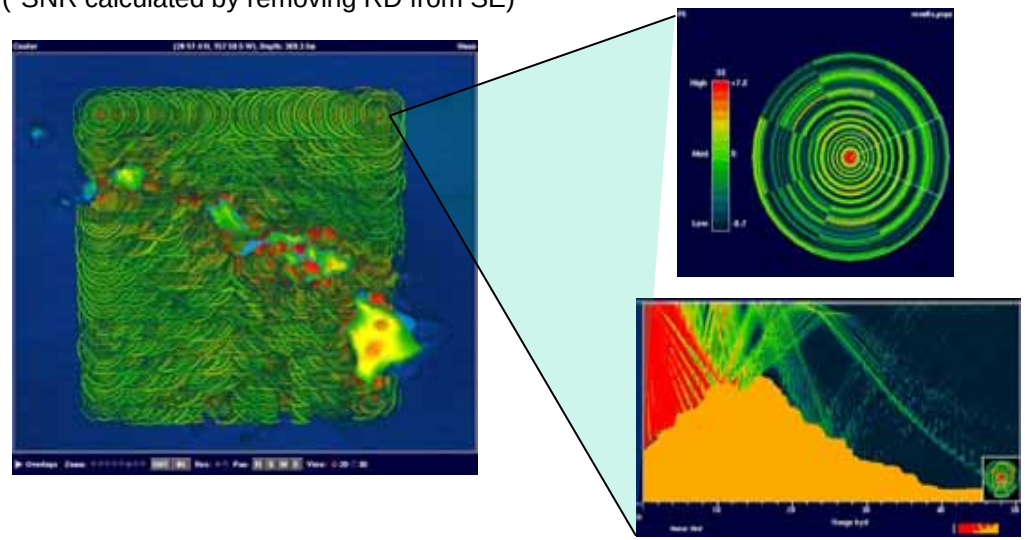
Analysis 19 Jul **14 Day Forecast**



Applying What We Know

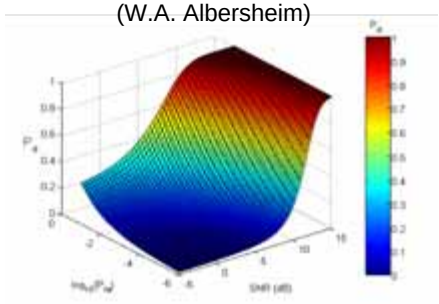
SNR* generated by STDA for gridded OPArea

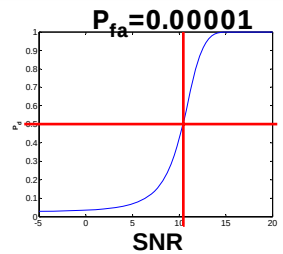
(*SNR calculated by removing RD from SE)



SNR transform to Pd

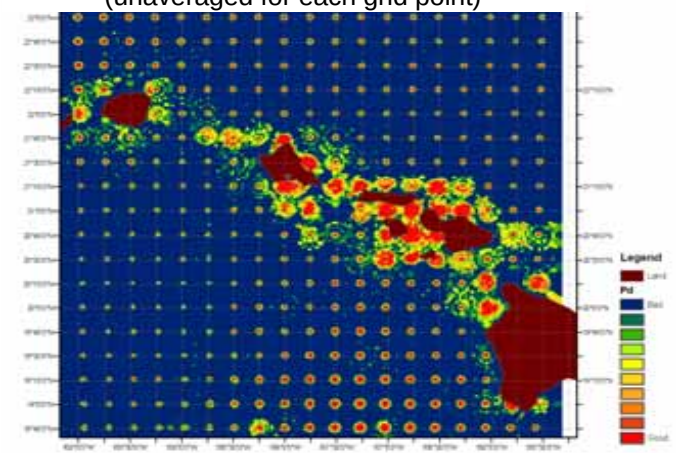
(W.A. Albersheim)





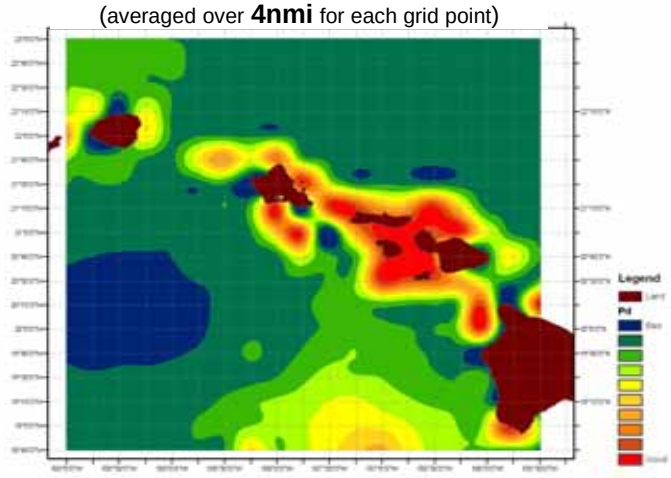
Pd Radials

(unaveraged for each grid point)



Pd Map

(averaged over **4nmi** for each grid point)



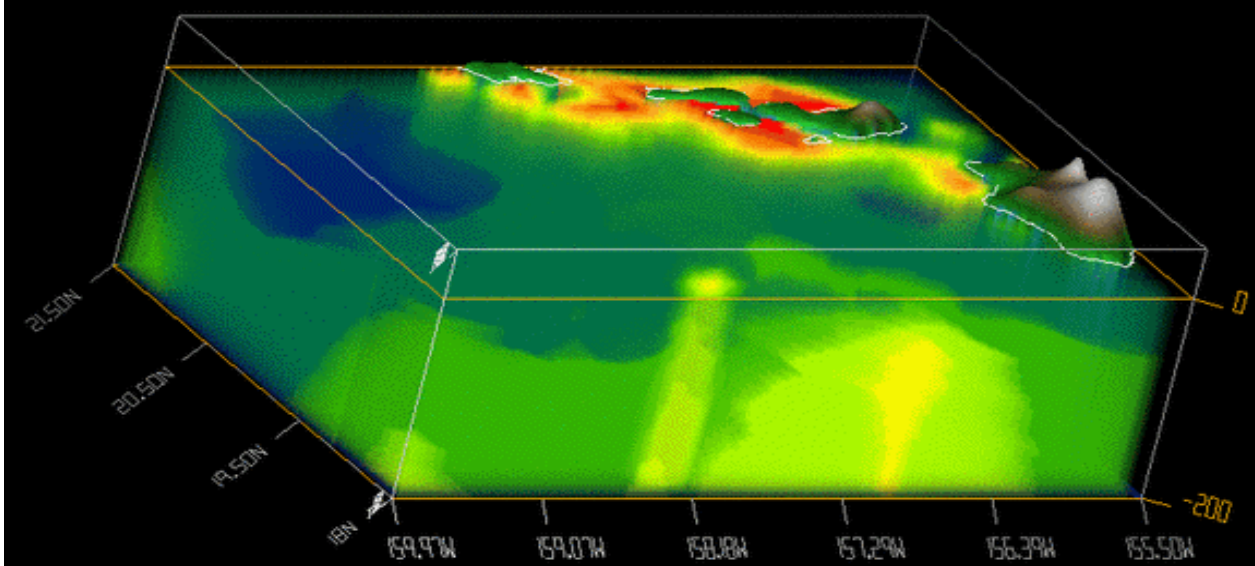
Advanced Capabilities

Probability of Detection (Pd) Map

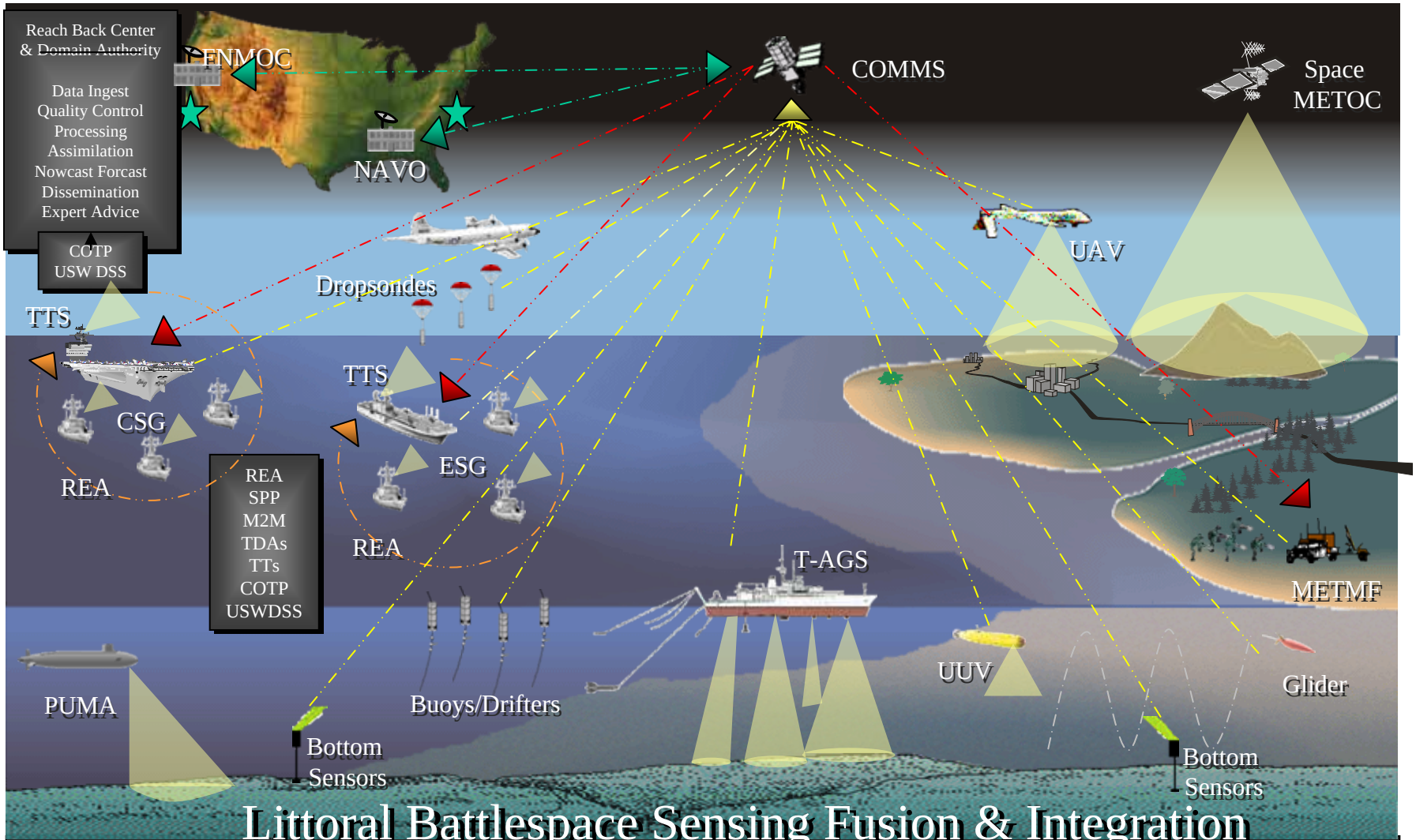
Varying in Time

Volume View (Op Area by 200 m in depth) for 5-25 July 06

Threat at 200 ft, Detector between 0 and 650 ft



LBSF&I – Operational View



Littoral Battlespace Sensing Fusion & Integration

REA = Rapid Environmental Assessment
M2M = Machine to Machine
TDA = Tactical Decision Aid

SPP = Sensor Performance Prediction
COTP = Common Operational Tactical Picture
USWDSS = Undersea Warfare Decision Support System

Challenges

- Providing a product matched to Navy needs
  - Meeting Fleet Capability Requirements
- Modeling, Simulation & Application to the COP
  - Profound and meaningful integration
  - “Dialable” Fleet Synthetic Training
- Connectivity and Reachback