

National HF Radar Technical Steering Team Meeting: July 19-20, 2011

Steering Team members

Project Manager:

- Jack Harlan, NOAA IOOS

Federal Partners:

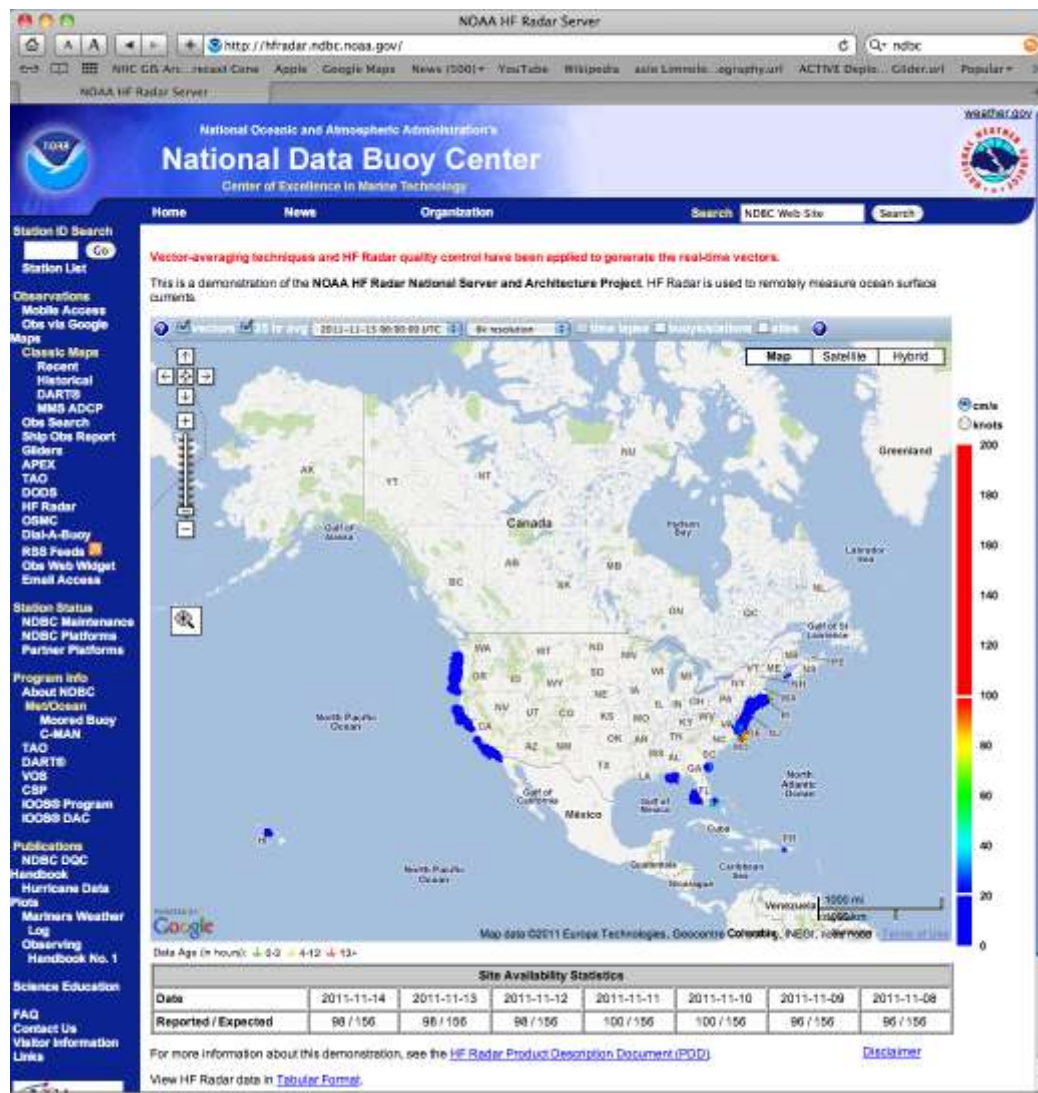
- Bill Birkemeier, USACE
- Pat Burke, NOAA CO-OPS
- Bill Burnett, NOAA-NDBC
- Ming Ji, NOAA NWS OPC
- Rich Patchen, NOAA CSDL

Elected by RAs:

- Larry Atkinson, Old Dominion
- Pierre Flament, U Hawaii
- Scott Glenn, Rutgers
- Jeff Paduan, Naval Postgrad
- Nick Shay, U Miami
- Eric Terrill, Scripps

Technical Experts:

- Don Barrick, COS
- Mike Kosro, Oregon State



<http://hfradar.ndbc.noaa.gov/>

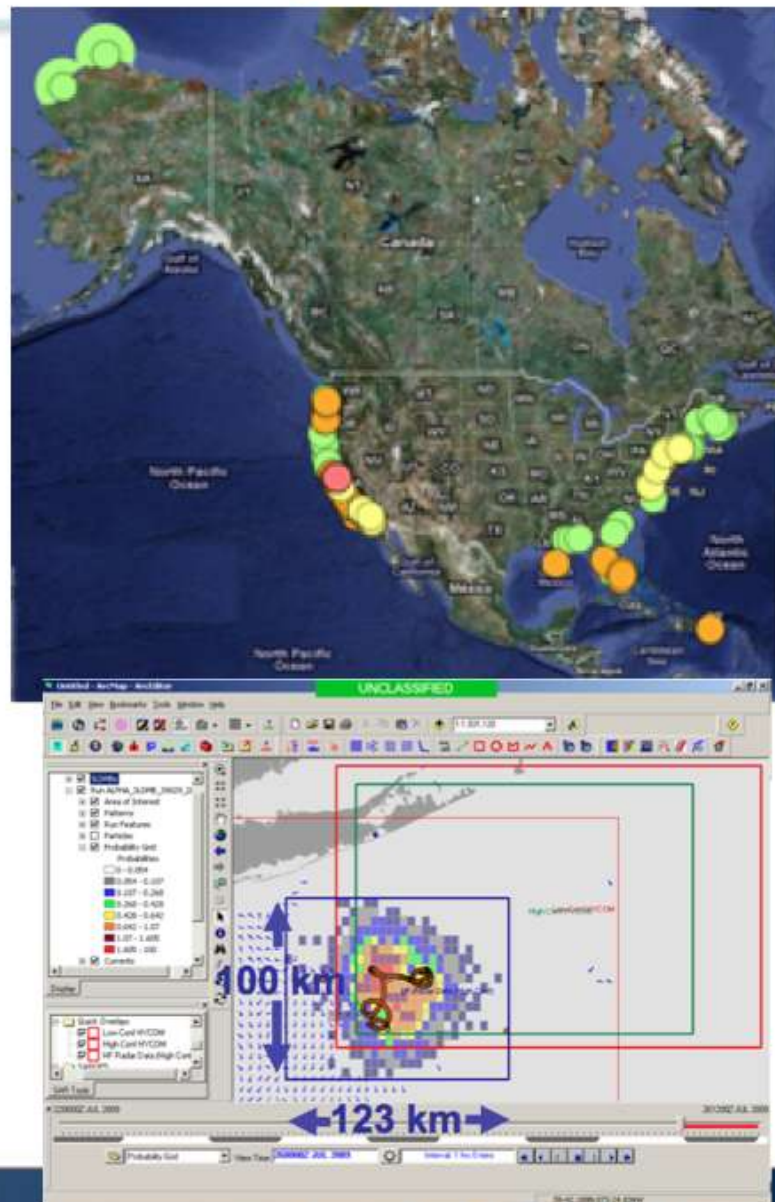
Examples of National Observing Networks

Stakeholders

- > 30 institutions operate HF Radars; represents a Federal/State investment of \$55M in last 15 years
- Used by >40 government/private entities
- Partnership with Industry: US-based CODAR Ocean Sensor

Who Depends on it

- USCG Search and Rescue: Oil spill response
- Water quality; Criminal forensics
- Commercial marine navigation
- Offshore energy; Harmful algal blooms
- Marine fisheries
- Emerging - Maritime Domain Awareness
- Emerging – Tsunami



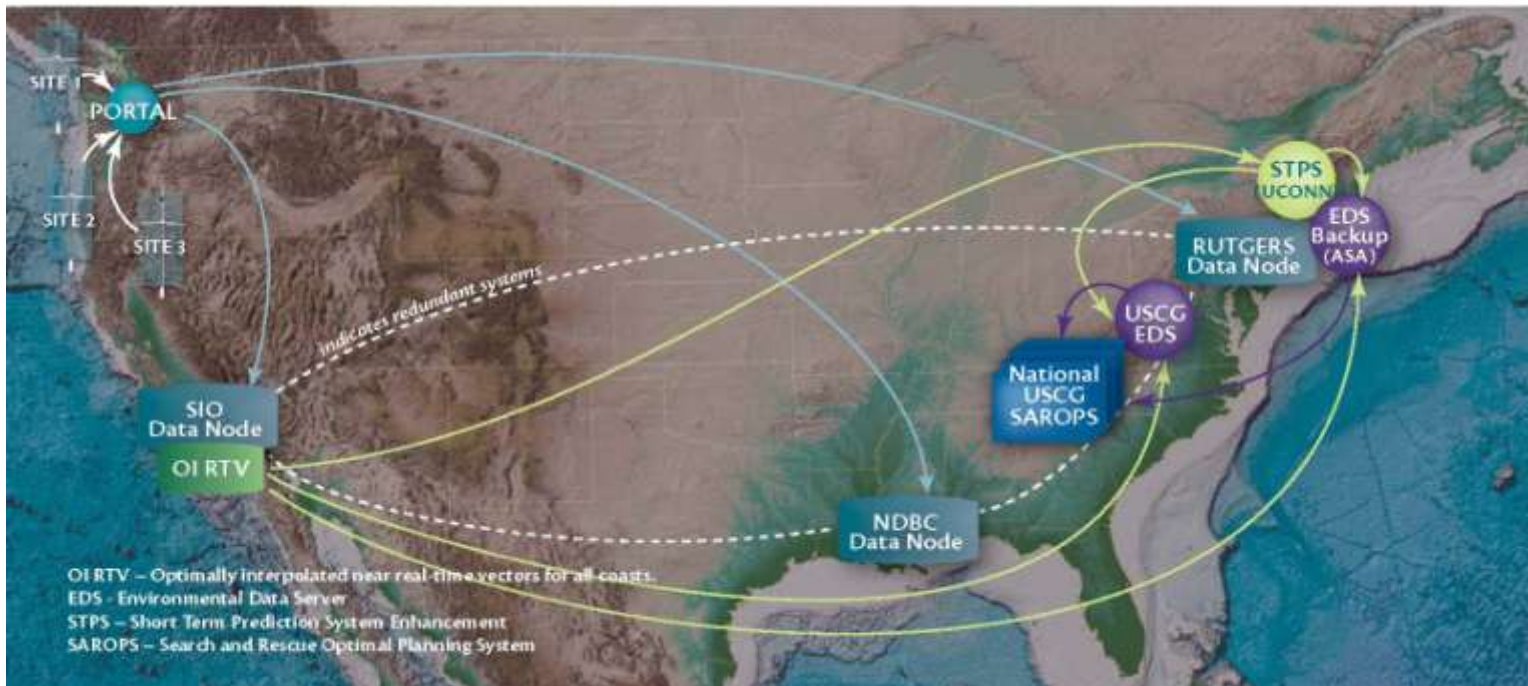
Decreases search area by 66% in 96 hours

National HF Radar Network

National
Portals

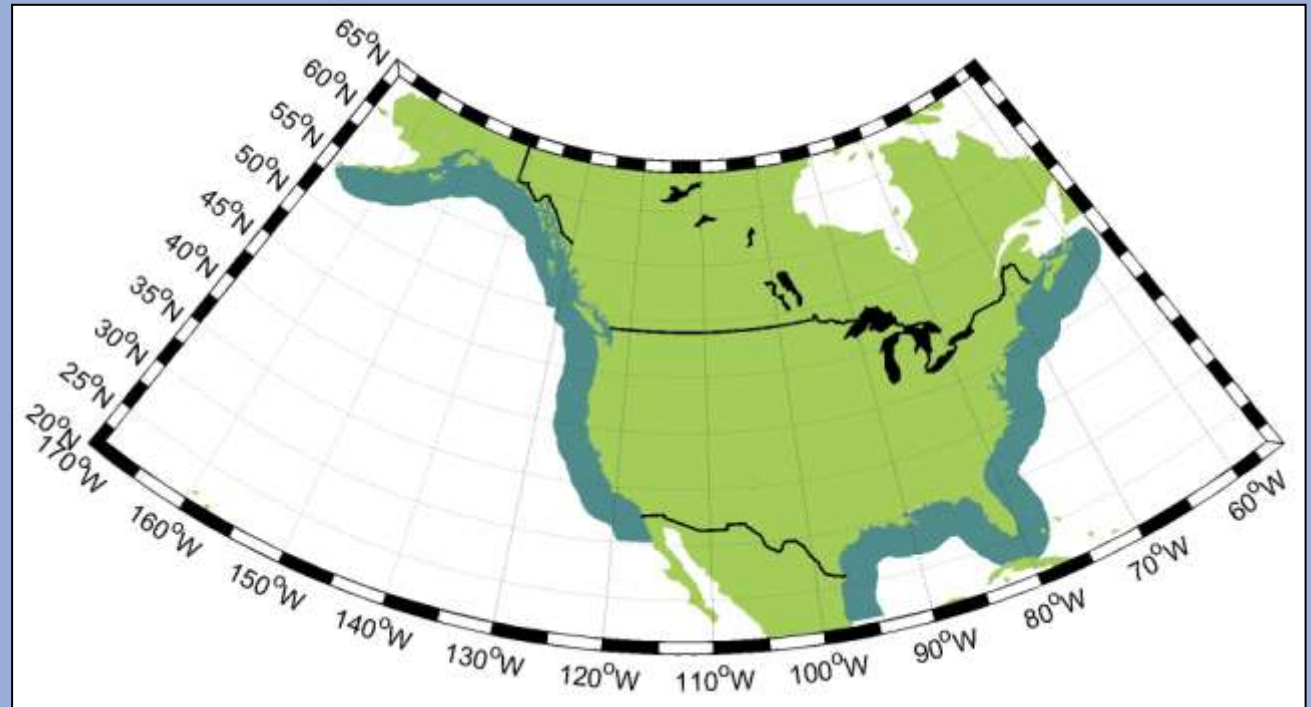


Portals > Nodes > EDS > SAROPS



National HF Radar Grid

- Grid based on equidistant cylindrical projection to preserve orthogonality throughout and provide a practical dissemination format
- Base grid extends 300km offshore with 1km nominal resolution and is landmasked
- In addition to landmasking, points falling within 0.5km of land are removed



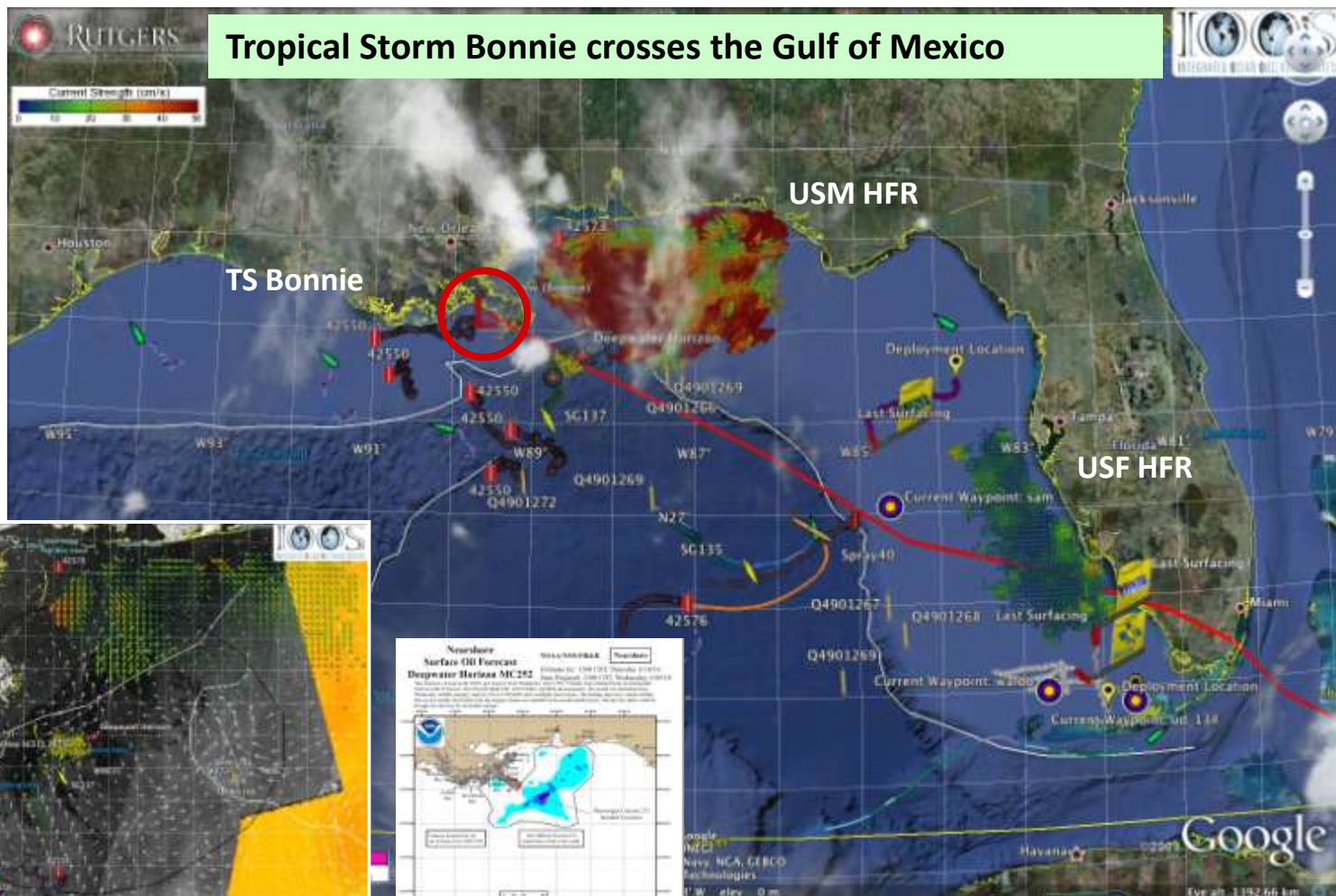
Resolution:

500m, 1, 2 & 6 km

IOOS Coordinated Rapid Response: *Deepwater Horizon Oil Spill*

Contributed Assets:

- HF Radar Networks
USF, USM
- Gliders
iRobot, Mote, Rutgers,
SIO/WHOI, UDel, USF
- Drifters & Profilers
Horizon Marine, Navy
- Satellite Imagery
CSTARS, UDel
- Ocean Forecasts
Navy, NCSU
- Data/Web Services
ASA, Rutgers, SIO



Tropical Storm Bonnie crosses the Gulf of Mexico

TS Bonnie

USM HFR

USF HFR

USM HFR validation of SABGOM Forecast in region with satellite detected oil slicks

HFR used for Oil Slick Forecasts by NOAA/NOS/OR&R

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- Annual Meeting – NCAR, Boulder, Colorado – 1.5 Days

- Goals:

- 1) Revisit Tiger Team Topics from the 2010 Meeting in Washington, DC

- a) Freshwater HF Radar – Jeff Paduan (Lead)

- b) Waves & HF Radar – Don Barrick (Lead)

- c) Modeling & Data Assimilation – Rich Pachen (Lead)

- d) Budget Line for HF Radar – Scott Glenn (Lead) – “Rendered Moot”

- 2) Discuss the Buildout of the National HF Radar Network based on the \$5M Budget Proposed in the President’s FY2012 Budget Request

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A) Freshwater HF Radar Results:

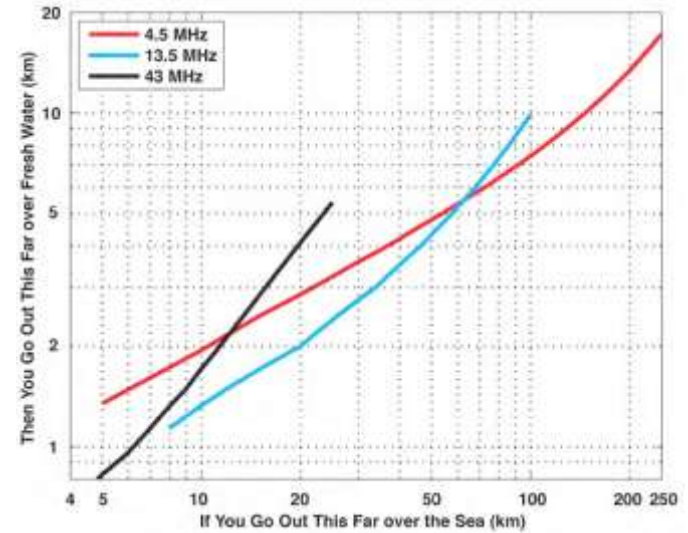
- Theory for attenuation is “extremely” good.
- More wave conditions examined in 2011.
- Final report will include the new results.
- Expect less limited success at higher frequencies.

B) Waves and HF Radar Results:

- Wave Data Status:
 - Significant Wave Height (H_s) is robust on existing systems.
 - Wave Period & Direction is at an intermediate level of maturity.
 - First 5 Spectral Coefficients have not matured sufficiently.
- More research on wave data spectral & mapping validation.
- Development of quality control, file formats and metadata.

C) Modeling & Data Assimilation Results:

- Forecast model assimilation of HF Radar currents - necessary capability for a mature network.
- Work required to compile community status & success stories for HF Radar data assimilation.



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President'S FY2012 Budget Request, OMB Passback Language:

"Passback provides and (sic) additional \$5M to improve monitoring of near shore currents using technologies such as HF Radar. The utility of HF Radar was most recently highlighted during the deepwater spill with real-time network data provided by OR&R, to provide trajectory maps and to identify oil that might make its way into the loop current. Funds should be prioritized on the operation of existing radar systems located in regions of offshore oil production (and) in the vicinity of major ports and harbors."



IOOS: A Plan to Meet the Nation's Needs for Surface Current Mapping, September 2009:

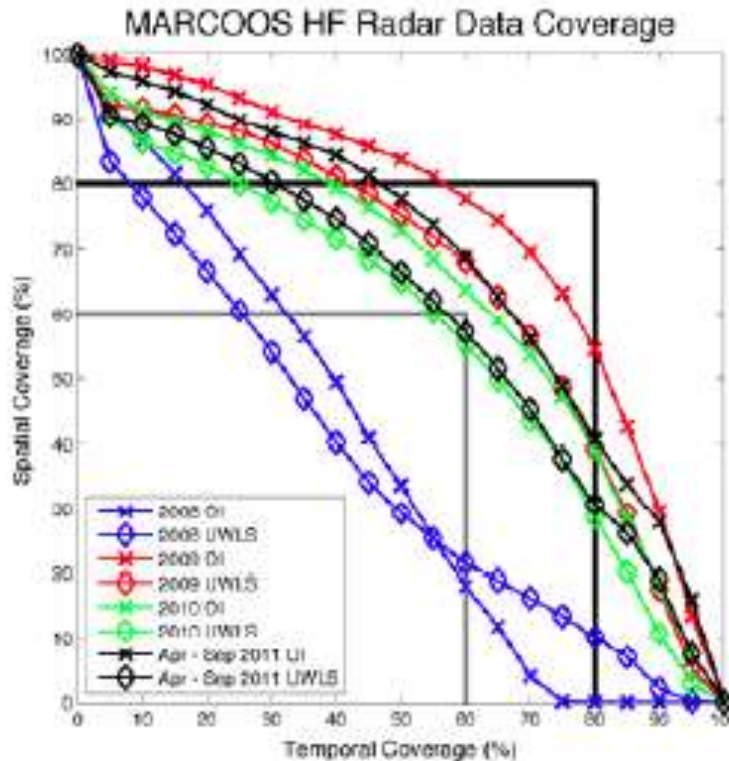
Page 21, Table 5. Full 5-Year Buildout

Estimated annual cost for new HF Radars and to maintain existing HF Radars - \$20 M / year.

(Initially: 50% Acquisition, 50% Operations;
After 5 years: 25% Acquisition, 75% Operations.)

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Guidance from the U.S. Coast Guard on the data requirements for operations:



A performance metric for the national HF radar network has been put forward in the Congressional Justification document that requires an 80% uptime and 80% spatial coverage (“80/80 metric”) for each HF radar.

Figure 1: Temporal and spatial data coverage metric for the High Frequency radar network.

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Steering Team Deliberation (majority of day 1):

Question: How do we prioritize a \$5 M initial investment when there is \$20 M in community need?

Team's answer: Prioritize operation of what is already deployed to achieve the 80/80 goal where we can, demonstrate success, and further grow the investment.

Steering Team Cost Estimates for Operating the 2010 Network:

1) The Steering Team estimates that the required funds for annual operations and maintenance (O&M), recurring costs and spare parts of the existing 123 radars is approximately \$6.6M.

2) In addition to O&M, a number of tasks (see table below) are required annually at the national level to fully operationalize the network. The costs of these tasks total approximately \$1M.

3) Combining 1) O&M support for all 123 radars with 2) the additional necessary tasks for operationalizing the national radar network yields a **total annual support of approximately \$7.6M.**

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Priority 1 Radars for a \$5 M Investment:

Search & Rescue:

All Long range CODARs and 8 MHz WERAs = $42 + 3 = 45$

U Miami WERAs = 4

Subtotal = 49

Oil Spill Response:

All Long range CODARs and 8 MHz WERAs = $42 + 3 = 45$

SF Bay 42-MHz CODARs = 4

U Hawaii radars = 4

SF Bay Approach 25-MHz CODARs = 2

Subtotal = 55

Major Ports and Shipping Lanes:

NY/NJ Harbor 25-MHz CODARs = 3

Delaware Bay 25-MHz CODARs = 3

Chesapeake Bay 25-MHz CODARs = 4

Tampa Bay WERAs = 2

San Diego 25-MHz CODARs = 4

Subtotal = 16

Regions can operate non-Priority 1 HF Radars out of existing RA funds if they choose.

Sum (excluding duplication) = $49+11+16 = 75$ Radars for Priority 1

(# CODARs = 62; #WERAs = 13)

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Item/Task	A. FY2012 Cost Priority 1 Radars	B. FY2012 Cost All Radars
O&M*	2786	4569
Recurring Costs**	750	1230
Spare Parts***	500	820
New Radars	0	0
SAROPS – STPS Mtee	150	150
SAROPS – OI & Data Flow	75	75
Servers	350	350
QC Dev	150	150
Archiving - NODC/NDBC	100	100
Meetings – Steering Team	30	30
GEO	100	100
ORFM Services & Travel	60	60

Total **5051** **7634**

Annual O&M:

75 Radars *(2 Techs / 7 Radars) * \$130 K = \$2,786 K
 123 Radars *(2 Techs / 7 Radars) * \$130 K = \$4,569 K

Annual Recurring Costs:

75 Radars * (\$10 K / Radar) = \$750 K
 123 Radars * (\$10 K / Radar) = \$1,230 K

Annual Spare Parts:

75 Radars * (1 Spare / 15 Radars) * 100 K / Spare = \$500 K
 123 Radars * (1 Spare / 15 Radars) * 100 K / Spare = \$820 K

Still Missing:

- Regional Coordinators for Field Operations
- Data Assimilation in Dynamical Models
- Training