HF Radar Network (HFRNet) Data Management and Applications

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Agenda

- Overview
- Data Acquisition
- Site Diagnostics
- Data Distribution
Overview

Years of Operation: 9 years
Number of files: >7 million
Participating Organizations: 31
Number of Physical Sites: >130
Network Architecture

Data Acquisition

Example Node to Site Aggregator communications

Example Site Aggregator to Site communications

Site - the individual field installations of HF radar equipment
Portal or Site Aggregator - a local regional operations center which maintains multiple installations

Node - Centralized locations which aggregate data from multiple regions
Scripps and NDBC
West Coast Repository & Engine

RUTGERS
East Coast Repository

ORBIT2ORB

“Node Server”

Intake Directory

HFRMASTOR

“Portals”

Radials and metadata,
Real-time vector (RTV),
graphics

“Storage Resource”

Intake Directory

HFRMASTOR

Web Servers

PUBLIC ACCESS
Radial diagnostics are summarized in a balloon with a link to the most recent radial image, file information and time histories of latencies and radial solutions.
Network diagnostics are summarized monthly based on file acquisition.
Data Distribution

HFRNet Data Availability

1. Online Visualization –
   http://cordc.ucsd.edu/projects/mapping/maps/fullpage.php
   Online visualization of HF radar surface currents with ability to change date, resolution, colorbar, and station information

2. Web Overlays -
   http://cordc.ucsd.edu/projects/mapping/api/
   Application programming interface (api) that allows programmers to overlay the currents into any website

3. THREDDS Data Server (TDS) access -
   http://sdf.ndbc.noaa.gov:8080/thredds/catalog.html
   http://hfrnet.ucsd.edu/thredds/catalog.html
   TDS service that allows folks to acquire or used the data via thredds for processing and/or visualization.

4. Data Archiving – HFRNet (NDBC): Totals and Radials
   - Operators: Range Series and beam pattern
   - Future: All above through
Data Distribution

Google Maps Visualization

Features include:

- 12 zoom levels
- Coordinate Locator
- Site Diagnostics
- Total Vectors at 500m, 1km, 2km & 6km
- Hourly and 25 Hour Averaged Data

6km grid
Data Distribution

Google Maps API
THREDDS

http://hfrnet.ucsd.edu/thredds/catalog.html

Catalog: HFRNET/USHI/RTV/HFRADAR, US Hawaiian State, 2km Resolution, Hourly RTV

- Data format: NetCDF
- Data type: GRB
- (C) HFRNet/USHI/2km/hourly/RTV

Documentation:
- Summary: HFRADAR, US Hawaiian State, 2km Resolution, Hourly Combined Total Vector (RTV)
- HFRNet Documentation
- Rights: This is a research project and may contain errors. Please contact the providers of this data to ensure accurate values before making any critical judgements.

Access:
1. OGC WMS: thredds.wms/HFRNet/USHI/2km/hourly/RTV
2. OGC WFS: thredds.wfs/HFRNet/USHI/2km/hourly/RTV
3. OGC WCS: thredds.wcs/HFRNet/USHI/2km/hourly/RTV
4. NetCdfSubset: thredds.ncs/HFRNet/USHI/2km/hourly/RTV
5. WMS: thredds.wms/HFRNet/USHI/2km/hourly/RTV
6. WCS: thredds.wcs/HFRNet/USHI/2km/hourly/RTV
7. UDDC: thredds.uddc/HFRNet/USHI/2km/hourly/RTV
8. 190: 190

Creators:
- Mark Otero
  - email: motero@ucsd.edu
  - http://www.ucsd.edu/search?link=awr9599&redirectType=mailto%2Cmark%20awr%20ucsd%20ucsd

Viewers:
- Integrated Data Viewer (EDI, web-based)
- NetCDF-java Tools (web-based)
- Coda2 (browser-based)
Data Distribution
Total Velocities
APPLICATION: SEARCH AND RESCUE
Application to Search and Rescue
United States Coast Guard
Office of Search and Rescue

Point measurement vs. Field of measurements:
Hurricane Floyd Simulation

Search area reduced by factor of 4 (>10)

Courtesy Art Allen, USCG Office of SAR
25 MHz Status 2002
25 MHz Status 2002

BI Region: 95th Percentile Separation

U.S. Coast Guard Research and Development Center
1082 Shenecossett Road, Groton, CT 06340-6448

Report No. CG-D-09-03

USE OF COASTAL OCEAN DYNAMICS APPLICATION RADAR (CODAR) TECHNOLOGY IN U.S. COAST GUARD SEARCH AND RESCUE PLANNING

FINAL REPORT
JUNE 2003
5 MHz Status 2004
Status 2004

U.S. Coast Guard Research and Development Center
1082 Shennecossett Road, Groton, CT 06340-6048

Report No.

INTEGRATION OF COASTAL OCEAN DYNAMICS APPLICATION RADAR (CODAR) AND SHORT-TERM PREDICTIVE SYSTEM (STPS) SURFACE CURRENT ESTIMATES INTO THE SEARCH AND RESCUE OPTIMAL PLANNING SYSTEM (SAROPS)

FINAL REPORT
November 2005
U.S. Integrated Ocean Observing System

11 Regional Associations
18 U.S. Federal Agencies

International Component

Regional Component

National Component

Global Ocean Observing System

U.S.*Integrated*Ocean*Observing*System

Global'Ocean'Observing'System

IOOS Relationships

International Component

Regional Component

National Component

Global Ocean Observing System

11'Regional'AssociaMons'

18 U.S.'Federal'Agencies

11'Regional'AssociaMons'
To seek, discover & apply new knowledge & understanding of our coastal ocean.
MARACOOS REGIONAL THEMES & SUCCESS STORIES

1) Maritime Operations – Safety at Sea

2) Ecosystem Decision Support - Fisheries

3) Water Quality – a) Floatables, b) Hypoxia, c) Nutrients

4) Coastal Inundation - Flooding

5) Energy – Offshore Wind

Since 2007
## Themes and Capabilities

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Optimizing HF Radar for SAR using USCG Surface Drifters

Art Allen
U.S. Coast Guard

Scott Glenn
Rutgers University

and the Mid-Atlantic Regional Coastal Ocean Observing System
Search Area After 96 Hours

HYCOM
36,000 km²

CODAR
12,000 km²
May 4, 2009: After a year of testing, NOAA Announces on U.S. Department of Commerce Website that MARACOOS CODAR is Operational in SAROPS

U.S. IOOS Goal for 2010-2011: Bring all sustained regional-scale HFR networks up to operational status in USCG SAROPS

3 West Coast Regions for California & Oregon
HFR Current Mapping Product Development
Road Map for Search and Rescue

First Standard Range Codar deployed on East Coast near Atlantic City, NJ

Hurricane Floyd Simulation Predicts Factor of 4 Reduction in Search Area Using Field of Currents vs. Point Measurement

Standard Range Network Proves to be Useful in Coast Guard Research and Development Pilot Study

Long Range Network Shown to be Effective in Second Coast Guard SAROPS tool

Mid Atlantic HF Radar Network Operational with US Coast Guard

MARCOOS Establishes First Regional High Frequency Radar Network

Radial and Total Sensitivity Study Undertaken to Provide Best Data to Environmental Data Server

Optimal Interpolation Combination Method Effective in Filling Spatial Gaps in Mid Atlantic Tests

National HF Radar Network Operational with US Coast Guard

“A Plan to Meet the Nations Surface Current Mapping Needs” Implemented
Thank You