HF Radar Outline

- What It Does
  - Some Examples
- What It Looks Like
- What NOAA Is Doing With It
What It Does

• Provides Maps of Ocean Surface Currents
• Speed and Direction
• Covering Thousands of Square Kilometers
• Near-real-time
• Hourly
• 0.2 km to 6 km Spatial Resolution
Existing Applications

- Federal, State, Local Agencies
  - USCG Search & Rescue
  - Water quality monitoring
  - Rip current prediction
  - Marine navigation
  - Fisheries and ecosystem management
  - Oil Spill response, both NOAA and state
The Technology
Receive and Transmit Antennas
HF Radar Electronics Enclosure
Radar Specs

- Velocity Resolution: 2 to 4 cm/s *
- Range Resolution: 0.2 to 6 km **
- Temporal Resolution: 10 to 60 min
- Range Extent: 1 to 200+ km *
- Velocity Accuracy: 5 to 10 cm/s

*Depends on Transmit Frequency, Signal Processing
** Depends on RF bandwidth
Now, The Big Picture
• 11 RAs serve the entire US Coastline, including Great Lakes, the Caribbean and the Pacific Territories
• RAs are the legal entities that seek out user needs; design and implement the Regional Coastal Ocean Observing Systems (RCOOS)
US HF Radar Prior to 2004

- No central data repository or standards
- Funding from grants, Congressionally-directed funds
- ~50-60 HFRs in use by research institutions
- Using “experimental“ radio licenses
- Self-Organized
- User base not well-defined
- **NOT OPERATIONAL**
National HF Radar Network

- **Research toward Operations: HF Radar Current Measurement Capability:**
  - Create national HFR data servers to provide
    - Near-real-time and retrospective data
    - Create real-time quality control algorithms
    - Adopt, adapt or create data/metadata standards
    - Obtain standard radar frequency licenses
    - Acquire, deploy, and operate a national HFR surface current monitoring system
Network Data Infrastructure

>100 Sites Ingested
HFR Network Growth: Jul ’04-Jun ‘08
What HF Radar Provides

Scripps National HF Radar Data Server
Applications

- Federal, State, Local Agencies
  - USCG Search & Rescue
  - Water quality monitoring
  - Rip current prediction
  - Marine navigation
  - Harmful Algal Bloom Forecasts
  - Fisheries and ecosystem management
  - Oil Spill response, both NOAA and state
  - Hydrodynamic Modeling
Present IOOS Efforts

- **International/national transmit licenses**
  - January 2011 World Radiocommunications Conference

- **Standards for Data, Files, Metadata, Quality Control**

- **National Plan w/Federal & Regional Input**
  - Comprehensive: from Gap Analysis to Detailed O&M Procedures
Summary

- Mature Technology (30+ years) for Measuring Ocean Current Velocities over Large Coastal Areas
- Numerous Mission-Critical Applications
- Hourly, Near-real-time
- Spatial Resolution ~1 to 5 km
- Relatively Low Maintenance
- NOAA IOOS is Developing a Data Management and Distribution System for the Nation
Example Applications/Products

• Long Beach Harbor Product
• NOS/CO-OPS Tidal Velocity
• NOS/OR&R HAZMAT Spill Response Trajectories
• SoCal Hyperion Wastewater Outfall
• NoCal Ocean Beach Wastewater Outfall
• S FL US Army Corps of Engineers Dredging
• Inspection of Hyperion Outfall Pipe (never internally inspected for 50 years).
  Serves City of Los Angeles. One of the world’s largest coastal populations.
• Close to a billion gallons of sewage to be diverted to an in-shore/shallow outfall.
• Concern of extent of impact and public health risk in the Santa Monica Bay.
Both offshore and surfzone circulation required observation.

HF radar derived surface current map.

Surf-zone forecast driven by waves.
Near Future

New Compact CODAR Antenna
One Pole = Receive & Transmit
No Side Whips