

Presentation at the First Plenary Meeting
of the Advisory Committee on Acoustic
Impacts on Marine Mammals
3-5 February 2004
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This presentation is the sole product of the author(s) and does not reflect the view of the Marine Mammal Commission or the Advisory Committee on Acoustic Impacts on Marine Mammals.

Navy Generated Sound in the Ocean



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3 February 2004

Overview

- Navy Mission
- The Threat
- The Challenge
- The Tools
- Issues

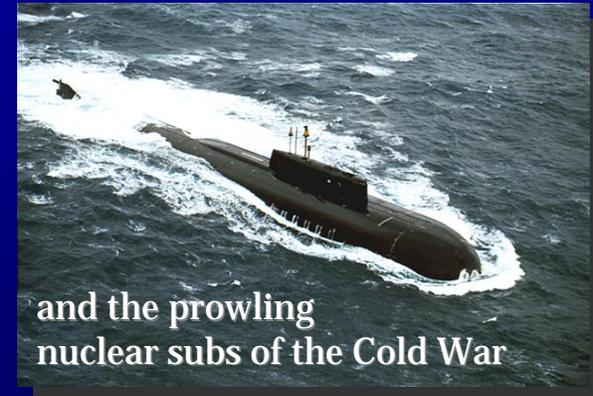
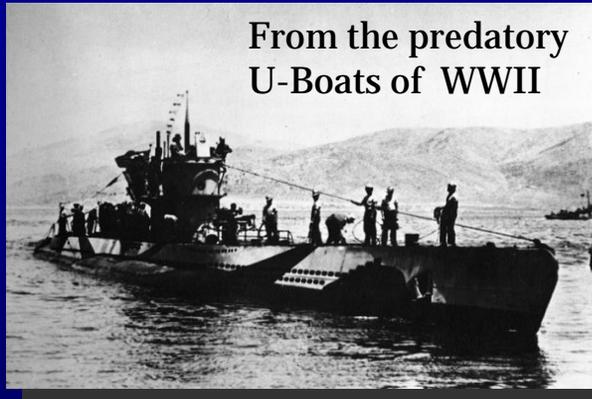


Navy Mission

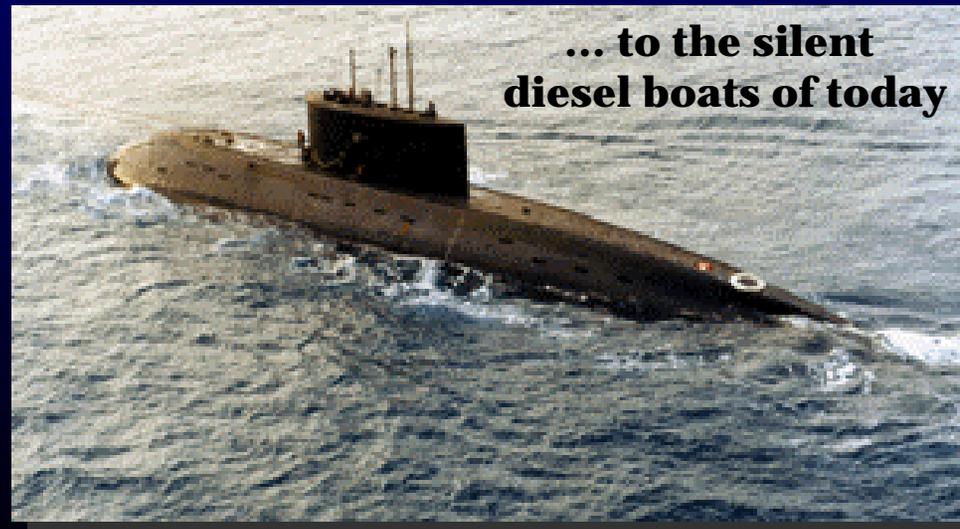


- Protect U.S. Territory
- Protect Navy Vessels/Battlegroups
- Protect Freedom of the Seas
- Global Presence

The New Submarine Threat – from deep ocean to shallow coastal waters



- **inexpensive**
- **very quiet**
- **with smart weapons**
- **operating in complex coastal environments**



Attack Submarines for Sale

Diesel-powered attack submarines now being sold to developing nations are smaller and slower than are the superpowers' nuclear versions (such as the U.S. Los Angeles-class vessel pictured immediately below). Nevertheless, they pose a significant threat to shipping and to naval forces that might wish to intervene in regional conflicts.

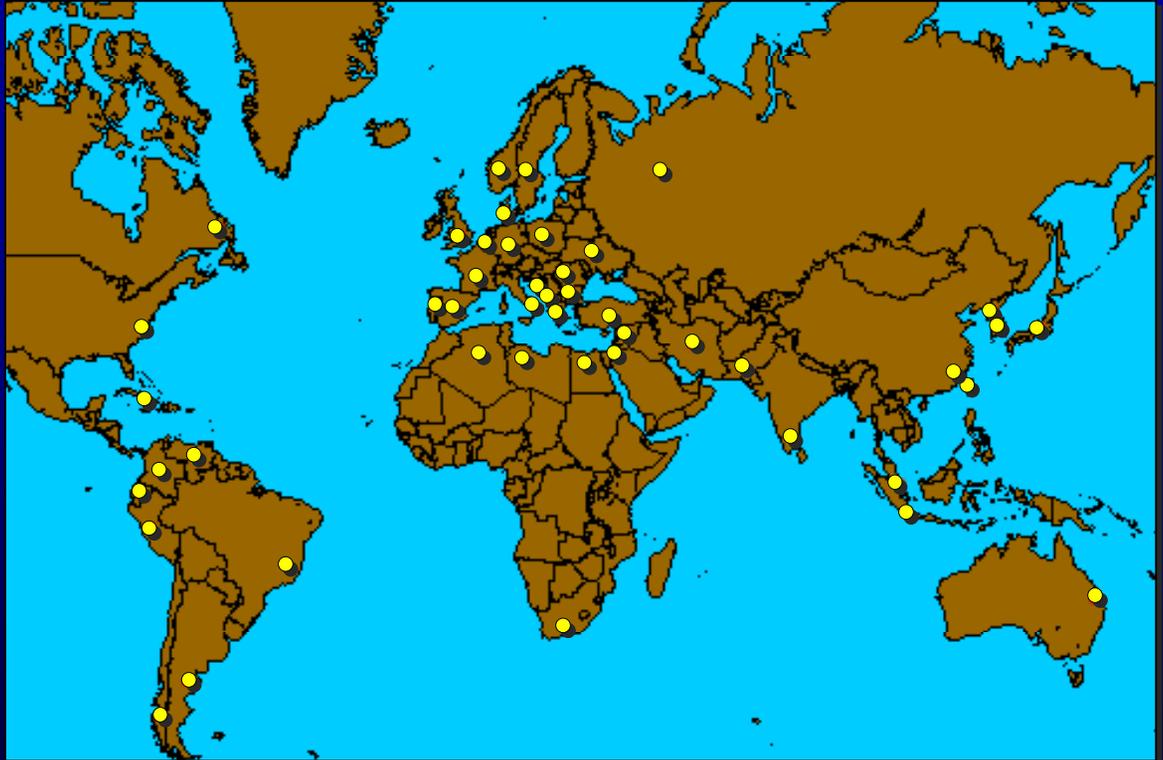
	LENGTH (METERS)	MAXIMUM SPEED (KNOTS)	DIVING DEPTH (METERS)	ARMAMENT
LOS ANGELES U.S.	110	30	450	4 Torpedo tubes 16 Missile tubes 18 Torpedoes 4 Subroc missiles 12 Submarine-launched cruise missiles 6 Harpoon antiship missiles
AGOSTA FRANCE	68	20.5	300	4 Torpedo tubes 20 Torpedoes or Exocet missiles
KILO RUSSIA	73	25	N/A	6 Torpedo tubes 12 Torpedoes or 24 mines
TYPE 209 (SSK-1500) GERMANY	64	22.5	N/A	8 Torpedo tubes 14 Torpedoes Strap-on mine-laying pods
UPHOLDER U.K.	70	20	> 250	6 Torpedo tubes 18 Torpedoes or Harpoon antiship missiles
VÄSTERGÖTLAND SWEDEN	49	20	> 300	10 Torpedo tubes 18 Torpedoes
ZEELEEUW NETHERLANDS	68	21	300	4 Torpedo tubes 20 Torpedoes or Harpoon antiship missiles

Attack Submarines for Sale

Small, Lethal,
Technologically Sophisticated

Submarines Worldwide 2004

Today 45
Countries have a
total of 380
Submarines
Worldwide
(Nuclear & Non Nuclear)



N. KOREA



IRAN



CHINA

Countries with Submarines

China	62
N. Korea	16
India	16
Pakistan	9
Iran	3
USA	69
Russia	46
UK	14
France	10
Japan	16
Australia	6
Canada	3
Germany	12
Turkey	12
Algeria	1

Croatia	(4)
Denmark	2
Egypt	4
Greece	(4)
Israel	3
Italy	6
Libya	1*
Netherl.	4
Norway	6
Poland	4
Portugal	2
Romania	1*
Spain	6
Sweden	5
Ukraine	1

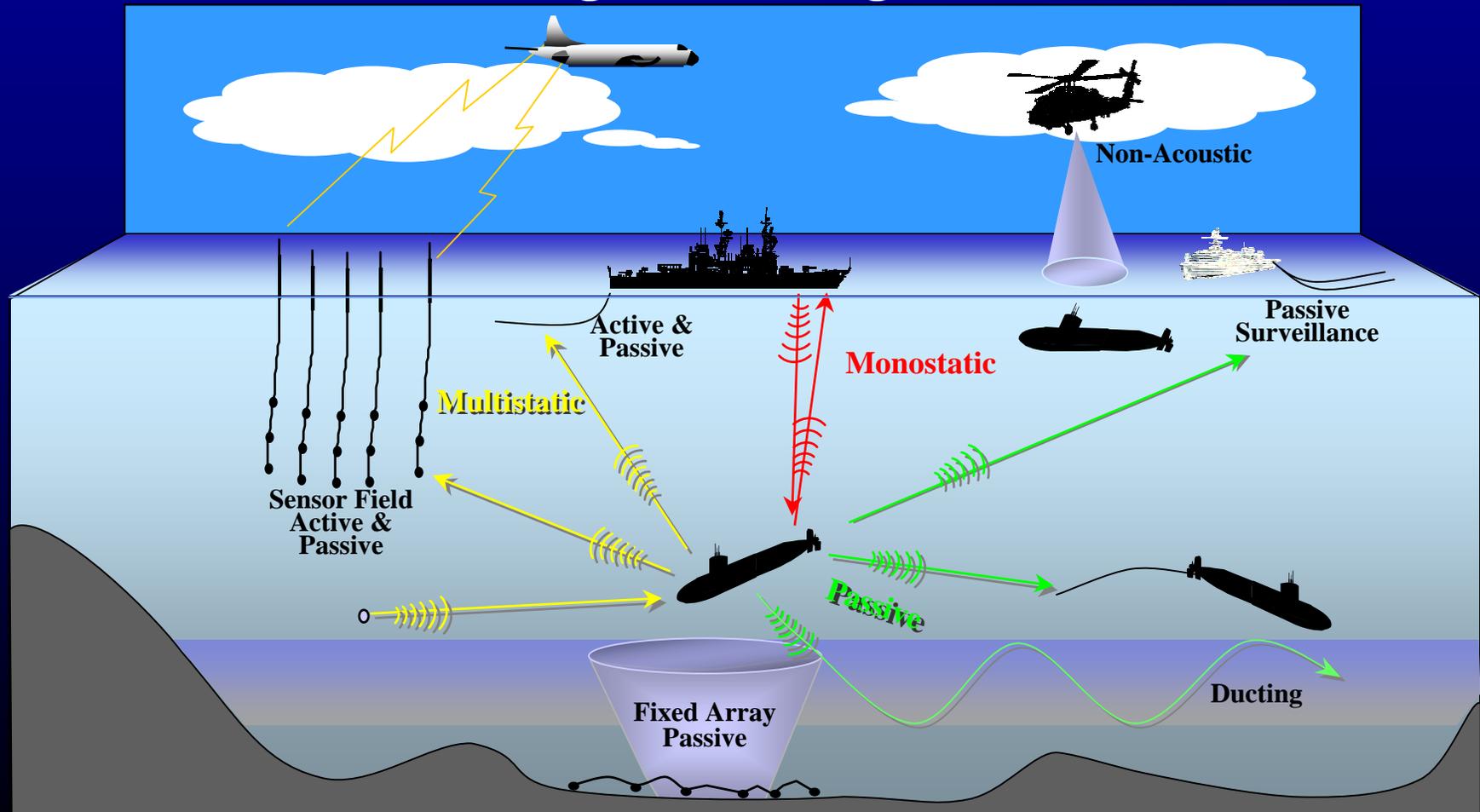
Serbia	1*
Argentina	3
Brazil	4
Chile	2
Colombia	2
Ecuador	1
Peru	6
Venezuela	2
Indonesia	(2)
Malaysia	(1)
Singapore	4
S. Africa	(4)
S. Korea	9
Taiwan	9
Vietnam	2*

List includes nuclear and non-nuclear.

() Planned * Non-Operational

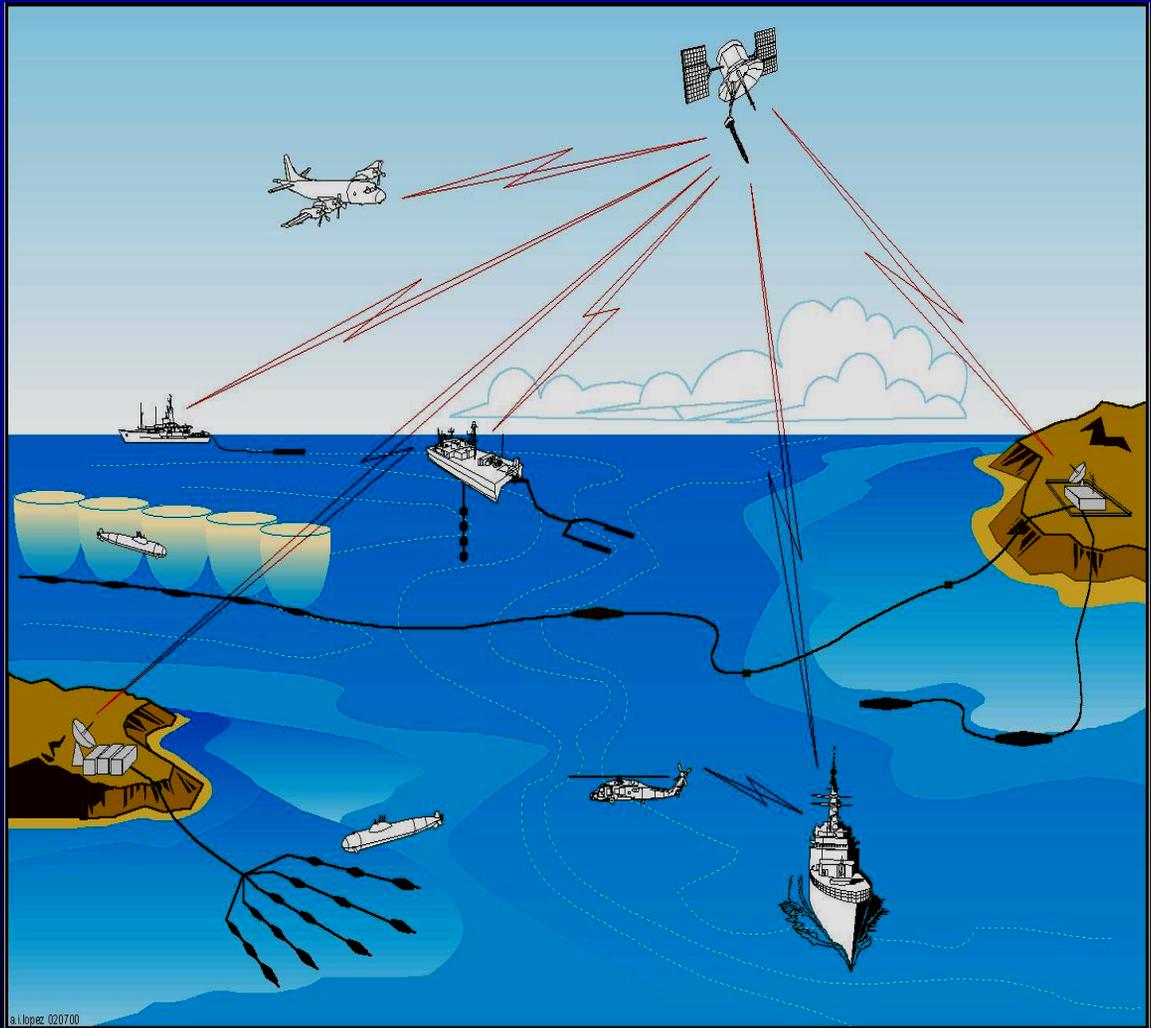
Complex Environments and Tactical Situations Require Different Detection Systems

The right tool at right time



ASW TOOLS

- Active Acoustics
 - Quiet Contacts
 - Known since WWII
 - Finding and Localizing
- Passive Acoustics
 - Noisy Contacts
 - Line of Bearing
- Other
 - Radar
 - Magnetic
 - Visual



Active acoustics is a VITAL SENSOR

Active Sonar in Perspective (As of 2 Feb 04)

- 294 Navy ships/submarines
- 58% of vessels have sonar
- 133 ships/submarines underway
- ~ 77 vessels underway have sonar

We employ sonars for . . .

- exercises/training
- research & development
- real world operations



Most of Navy's sonar use is passive, prefer to remain silent

Active Sonars

High, Mid, Low Frequencies

- **High-frequency > 10kHz**

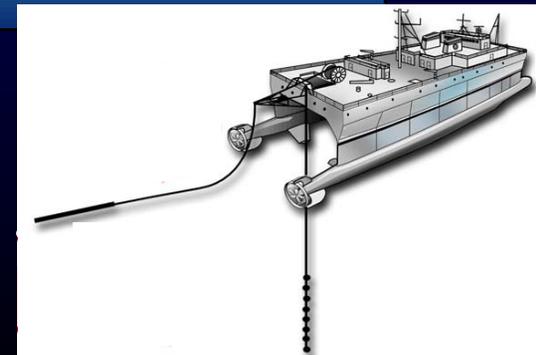
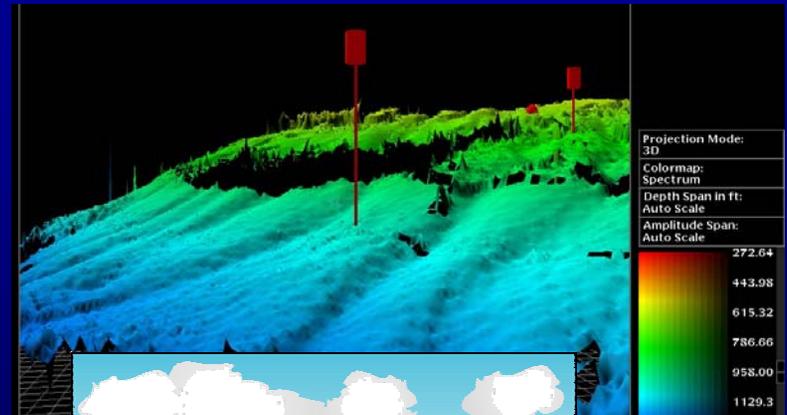
- Mine Hunting Sonars
- Torpedo Sensors
- Fathometers
- Acoustic Energy Greatly Attenuated
- Typical Range < 5nm

- **Mid-frequency 1kHz-10kHz**

- Ship and Submarine Sonars
- Force Protection and Tactical Prosecution
- Moderate Attenuation
- Typical Range ~30nm

- **Low Frequency < 1kHz**

- Long Range Search & Surveillance
- Less Attenuation
- Typical Range 10s to 100s of nm



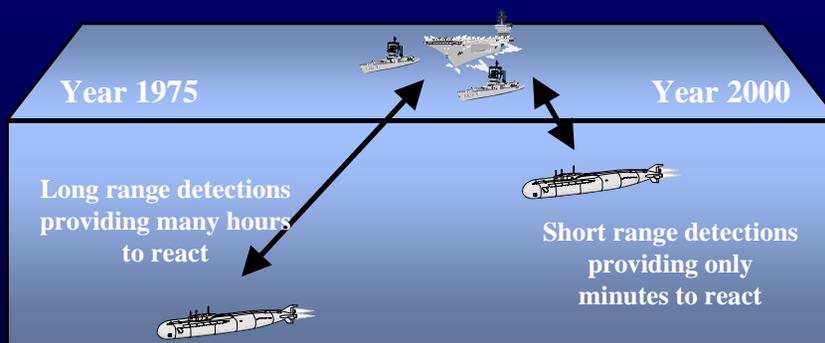
Why the US Navy Needs Mid Frequency Active Sonar Systems

- Standard method for localizing submarines
- Used in conjunction with passive systems
- Operational since the 1940's
- Will not be replaced by LFA

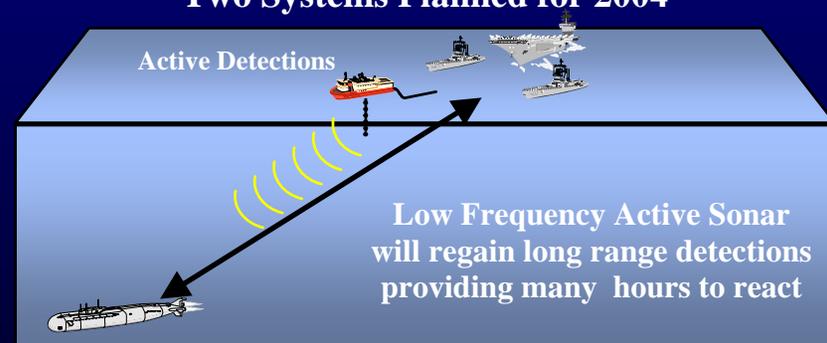
Why the US Navy Needs a Low Frequency Active Sonar System

Since the 1970's, quieter submarines have shortened detection ranges and could threaten our forces at sea and our nation. Low frequency active sonar will enhance our nation's ability to detect and defend itself against these quieter submarines.

Current Passive Sonar Systems



Low Frequency Active Sonar System – Two Systems Planned for 2004



Low-Frequency Active Sonar provides a significant capability not currently available with other systems

Why the US Navy Needs Low Frequency Active Sonar

1970's

Passive Detection Range

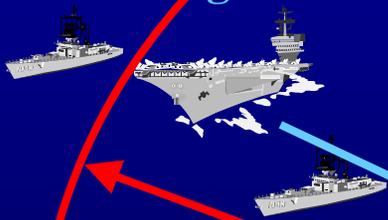
- Noisy submarines detected further away
- Short weapons range

Weapons Range

Why the US Navy Needs Low Frequency Active Sonar

1990's

Passive Detection Range



- Quieter submarines aren't detected until close in

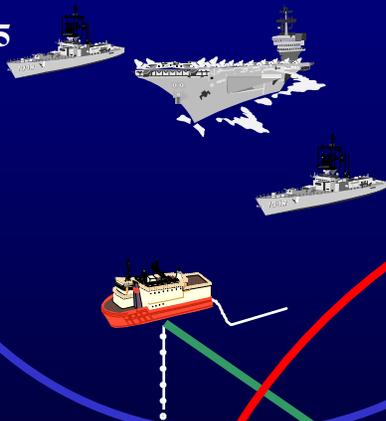
Weapons Range

- Longer weapons range makes ships vulnerable prior to detection

Why the US Navy Needs Low Frequency Active Sonar

Today

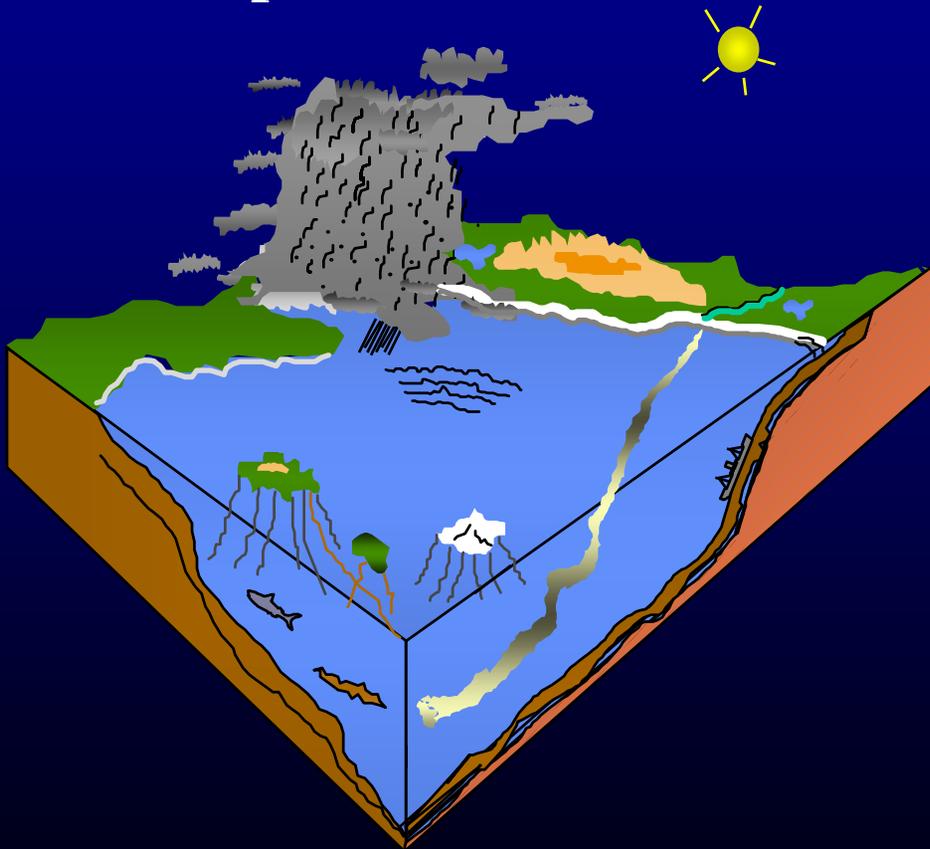
Year 1975



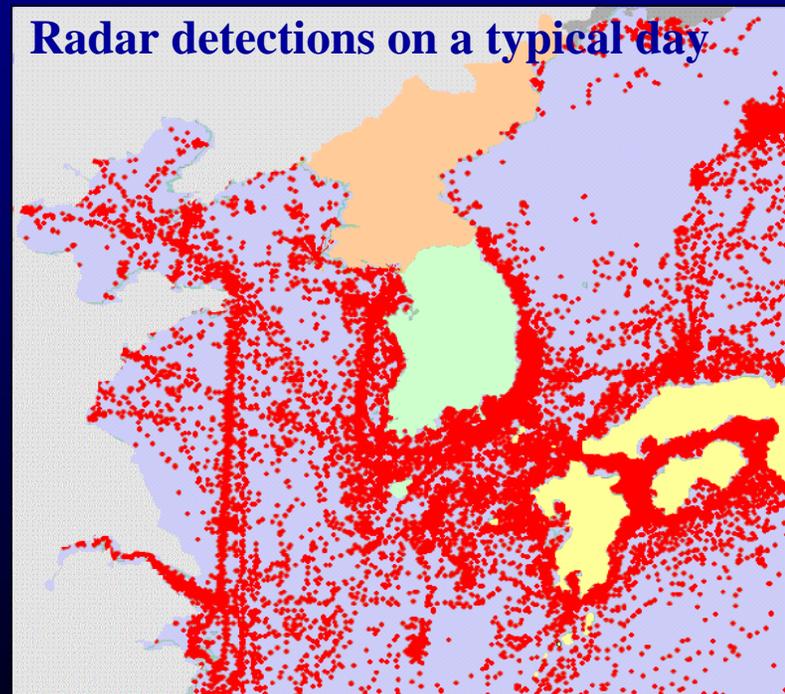
Low Frequency Active Sonar will
regain long range detections
providing many hours to react

COASTAL ASW IS DIFFICULT

Complex Environment



Shipping Density



“The Challenge: Where’s The Submarine?”

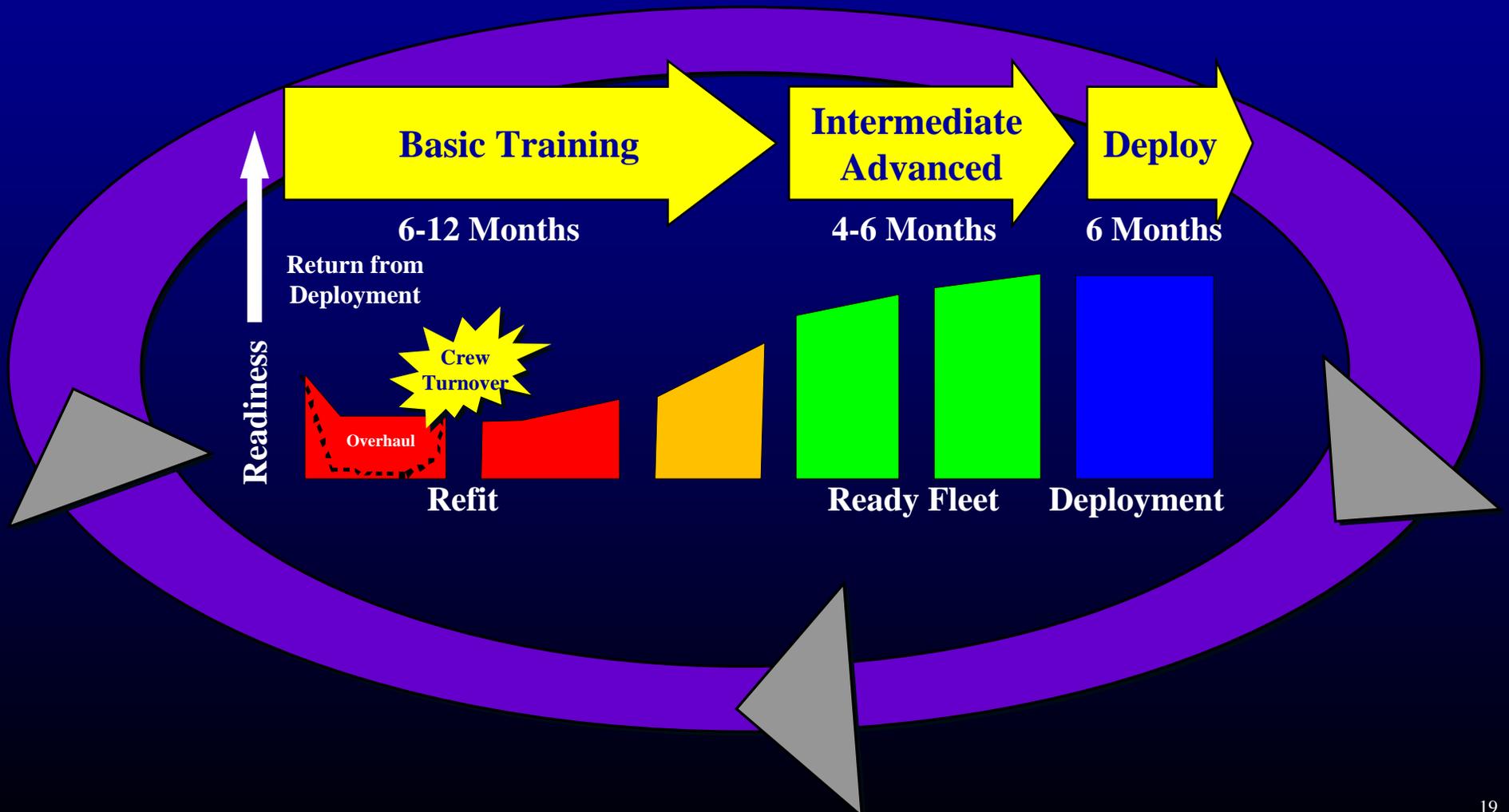


Sonar Search Display

- Numerous lines corresponding to commercial shipping
- Each line has to be investigated and classified as either a submarine or a surface ship
- Classification process is manpower intensive and depends on highly skilled operators to interpret

How Do We Train?

Inter-deployment Training Cycle (IDTC)



Other Navy Noise Sources

- Systems Test and Evaluation
- Ship Shock Trials
- SINKEX
- Live-fire Training



Summary

- Navy focus has shifted to coastal environment
- Extending detection ranges is a crucial ASW priority
- Navy's mission demands the use of sound in the water
- Human performance skills require real-world experience
- Navy must ensure national security while respecting environmental concerns
- Navy must have good science to clarify impacts and formulate policy

Back-up Slides

Navy Marine Mammal Protective Measures

- **PLANNING:** Consideration of historical marine mammal location information during exercise planning
- **DETECTION:**
 - Well-trained lookouts posted 24 hrs/day
 - Passive acoustic detection for marine mammal presence
 - Pre-and post-event monitoring for marine mammals
- **OPERATIONS:**
 - Operational restrictions in vicinity of marine mammals
 - “buffer zone”
 - Alterations, delays, cancellation of operations
 - Reduced power to sonar and duty cycles
 - Limit operations at nighttime or in adverse weather conditions
 - Train in deep rather than shallow water
 - Simulate restricted channel or ‘choke point’ transits



National Defense Authorization Act and the Marine Mammal Protection Act

- National Defense Waiver: EMERGENCY ONLY
 - SECDEF must consult with Commerce, Interior
 - Consistent with virtually EVERY OTHER environmental statute
- Harassment:
 - ‘Significant potential to injure’ and ‘likely to disturb’ focuses enforcement on biologically significant vice benign disturbances
- Mitigation:
 - Considers personal safety, practicality, and impact on the effectiveness of the military readiness activity

National Defense Authorization Act and the Marine Mammal Protection Act

- Small numbers:
 - Elimination of ‘small numbers’ removes impossible legal requirement to distinguish between ‘small’ and ‘negligible.’ Retains scientifically-based ‘negligible impacts’
- Specific Geographical Area:
 - Elimination of ‘specified geographical region’ removes a legal Catch-22 for a military that must train and fight worldwide. The military must and will still consider its impacts on geographic regions in its environmental processes.
- Includes **scientific research activities** ‘conducted by or on behalf of the Federal Government’