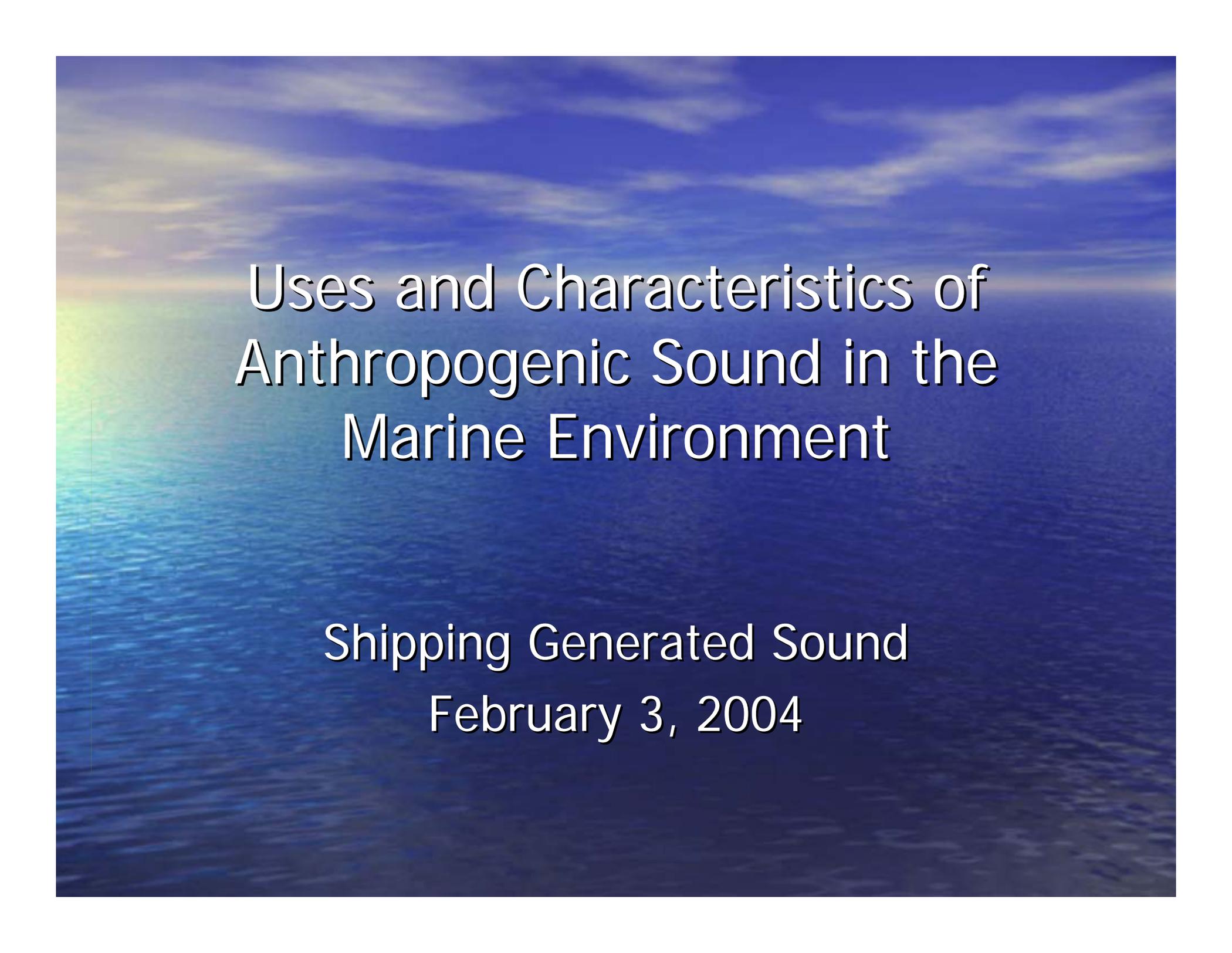


Presentation at the First Plenary Meeting
of the Advisory Committee on Acoustic
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Uses and Characteristics of Anthropogenic Sound in the Marine Environment

Shipping Generated Sound

February 3, 2004

References

- Ocean Noise and Marine Mammals, National Research Council, 2003
- Marine Mammals and Low-Frequency Sound, Progress Since 1994, National Research Council, 2000

Shipping Overview

- Large Commercial (cargo or people)
- Small Commercial (fishing, offshore supply)
- Military
- Research
- Utility craft (dredges, tugs)
- Recreational including personal watercraft

Large Commercial (cargo/people)

- Tankers (gas, oil, chemicals)
- Bulk carriers (dry)
- General cargo ("freighters")
- Containerships
- Roll-on/Roll-off and other special cargoes
- Cruise ships

Small Commercial

- Ferries
- Fishing
- Offshore Supply Vessels
- Inland and Coastal Tug/Barge Units
- Cruise ships (principally inland or near coastal)

Ship Types and Sound generation

- Larger ships have large propulsion systems and hull surface area
- Type of vessel dictates additional auxiliary equipment
- Type of vessel dictates voyage and commercial characteristics e.g. time charter versus "tramp"

Sound producing activities

- Propeller noise including cavitation
- Propulsion machinery including engines (steam, diesel, gas turbine) and gears
- Auxiliary machinery including generators, pumps, fans, blowers
- Cargo equipment including pumps, deck cranes and hydraulic lifts
- Hydrodynamic flow over hull
- Depth finders

Ship generated noise characteristics

- Broadband generation
- Sharp peaks (tones)
- Over large geographic area
- Transoceanic routes (great circles)
- Near coastal routes (straight/rhumb lines)
- Vessel specific profiles
- “Usual traffic noise” e.g. ship generated component of background

Ship generated noise characteristics (cont'd)

- 80-85% of ship radiated noise power attributed to broadband and tonal components produced by cavitation
- Geographic patterns depend on routing
- Other variations due to ship speed, load condition, onboard activities and overall condition of the vessel (maintenance)

Scientific and Policy Issues (related to sound generation by commercial shipping)

- Varying jurisdiction to regulate large geographic areas including high seas, exclusive economic zone and coastal waters
- Vessel and engine design
- Shipbuilding industry practices
- Existing international and national legislative and regulatory frameworks

Scientific and Policy Issues (cont'd)

- Potential use of noise generating equipment to promote marine mammal avoidance behaviors (North Atlantic Right Whale)
- 90% of world trade carried by sea
- Projected doubling or tripling over the next 20 years

A wide-angle photograph of a vast blue ocean under a clear blue sky with wispy white clouds. On the left side, a vibrant rainbow is visible, its colors reflecting on the water's surface. The text "Questions???" is centered in the middle of the image in a white, sans-serif font with a thin black outline.

Questions???