SOUND RAY PREDICTION NORTH OF OAHU DETERMINED FROM CHARACTERISTICS OF WATER MASS AND BOTTOM

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ABSTRACT

During a period of one year from May 1968 to April 1969 monthly cruises and flights were made north of Oahu to collect oceanographic and bathymetric data for purposes of determining the acoustical variability.

This oceanographic and bathymetric data was used in a computer ray program to determine the effectiveness of long range (900 km) low frequency (100 hertz) sound propagation from various positions and depths of sound source during summer and winter seasons.

Traces made with this program showed that during the late summer when the surface temperatures were very high, rays from sound sources near the surface traveled to great depths along their paths and were almost completely attenuated due to bottom reflection from a very irregular bottom. On the other hand, during the mid and late winter when the surface temperatures were as much as 10°C cooler and the mixed layer was much deeper, the rays were confined to a much narrower sound channel and were much less attenuated due to bottom reflection. This leads to the conclusion that, in general, low frequency sound of 100 hertz and having a sound level of 100 db per hertz band width at 1 yard can be expected to be detectable on Oahu if the sound originates at 30° north latitude and is not reflected from the bottom along its path.