Abstract

Wide area sonar such as ocean acoustic waveguide remote sensing (OAWRS) has been shown to be a useful tool for instantaneously imaging large shoals of fish distributed over continental shelf regions. Here, we show that the population density of fish groups can be accurately estimated by using incoherent averaging of the matched filtered returns. Numerical Monte-Carlo models are applied to simulate the active imaging system and determine the statistics of the received matched filtered intensity scattered off remote fish groups in an ocean waveguide environment. The model includes multiple scattering of the dense fish groups and uses a range-dependent acoustic model to simulate the fluctuating ocean environment. We find the conditions for which the multiple scattering is important and show that it is a function of both the fish density and target strength for a given distribution of fish.

State of the Art with wide area sonar imaging using Ocean Acoustic Waveguide Remote Sensing (OAWRS)

OAWRS can instantaneously image schools of fish, underwater vehicles, and other targets.

Conclusions

Through Monte-Carlo modeling, we can predict the statistics of the scattered matched filtered returns from randomized distributions of fish propagated through a fluctuating ocean waveguide as imaged by wide area sonar such as OAWRS.

Acknowledgements

This work was funded by the Office of Naval Research and the Sloan Foundation. Administrative help was provided by CENSSIS.

References

