

Effects of distant shipping on ambient noise in the deep ocean

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Presentation to Symposium

convened by

NOAA Ocean Acoustics Program

National Marine Fisheries Service

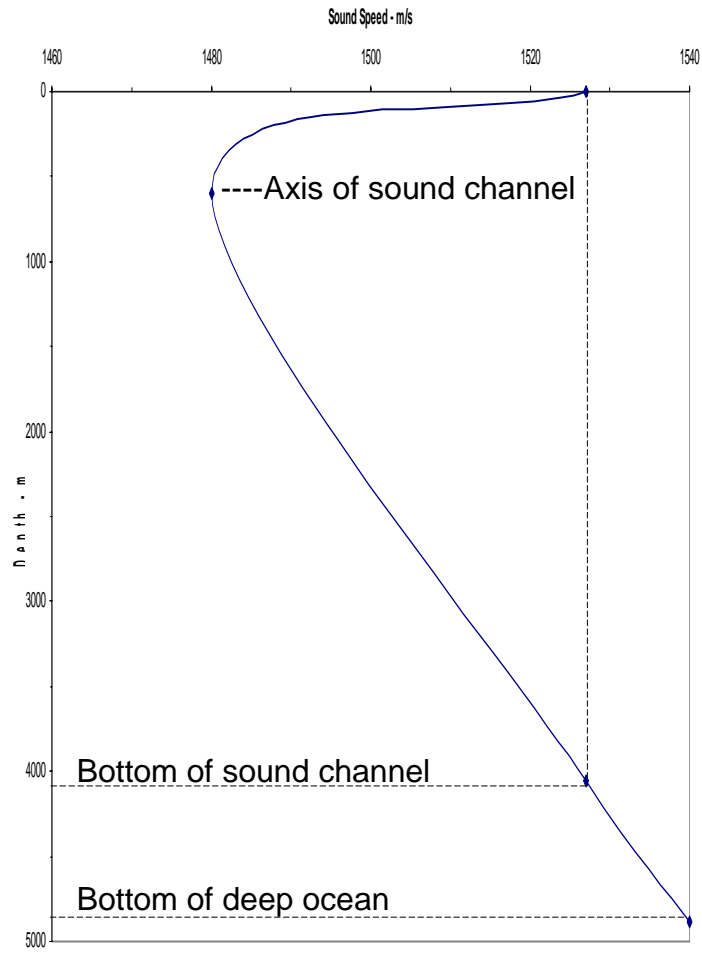
Silver Spring, Maryland

1-2 May 2007

“Distant” Ships

- Range more than 30-50 miles
- Fade into shipping noise background
- No single ship dominates the spectrum
- Noise transmitted in deep sound channel
- Higher frequencies fade at shorter ranges
- Attenuated noise levels above 500 Hz
- Spectral peak below 100 Hz
- Spectral uncertainty below 30 Hz

The Deep Sound Channel



Notes

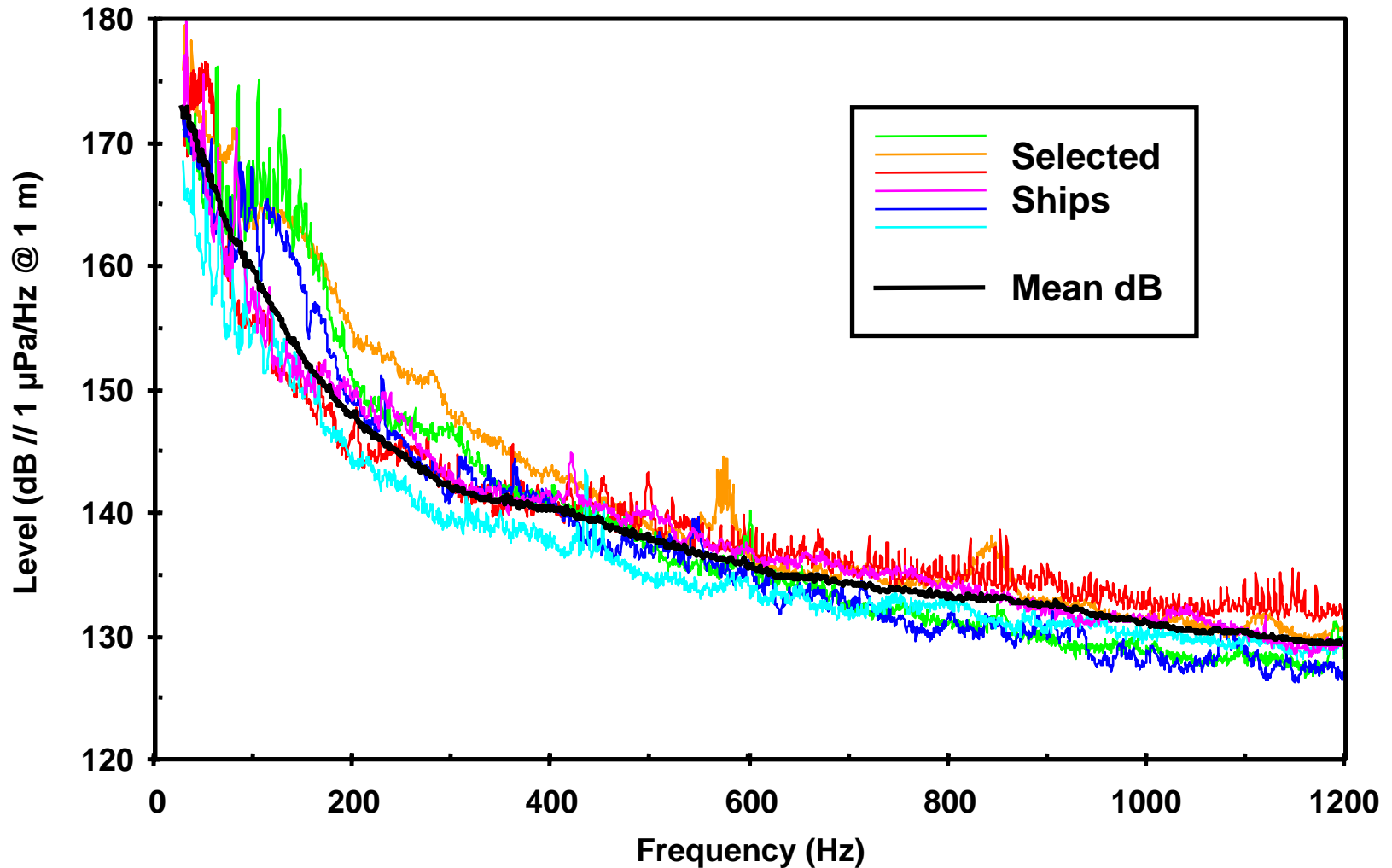
Mixed layer less than 100 meters.

Axis 500 to 1500 meters.

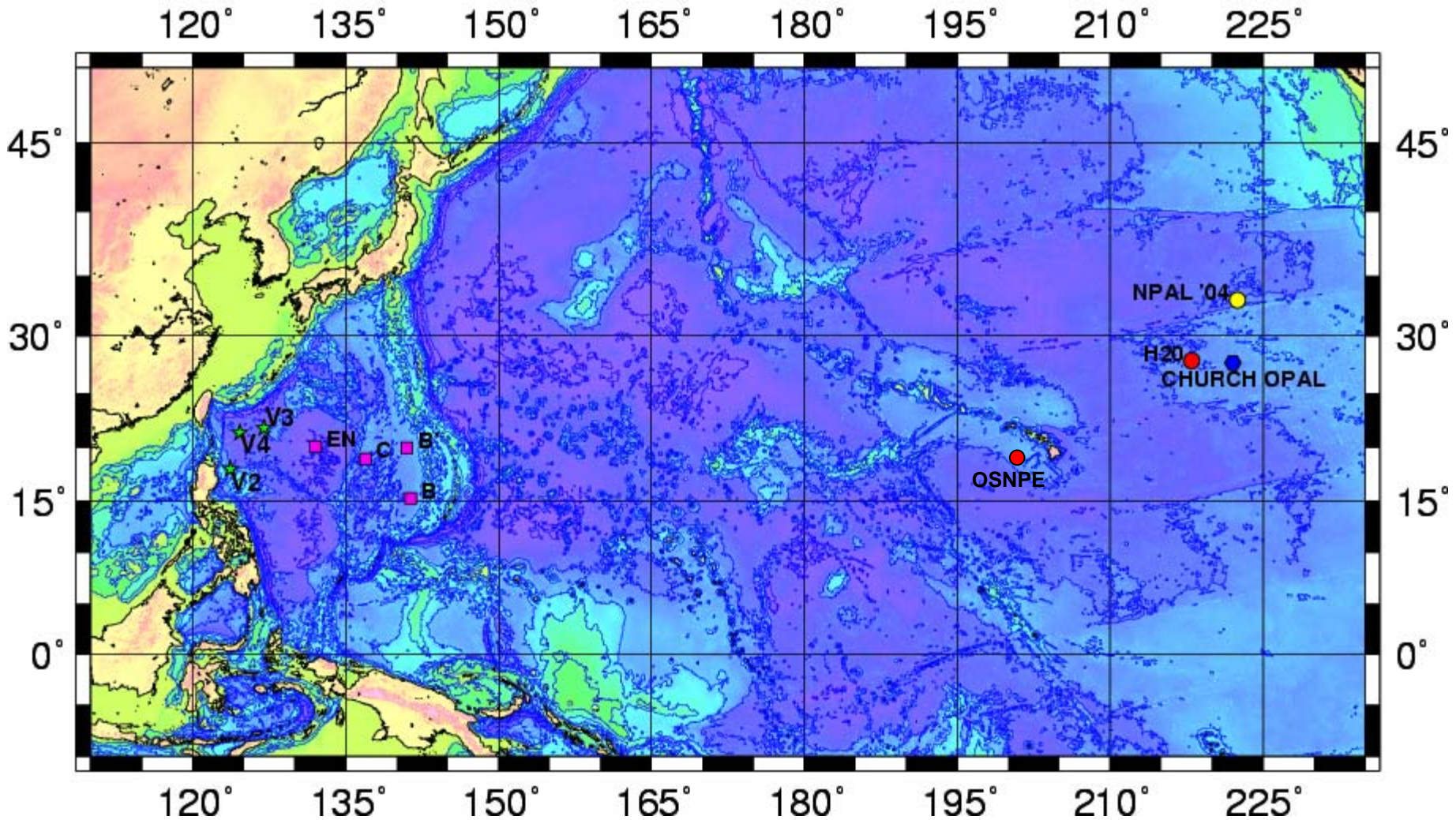
Channel bottom 3000 to 5000 meters.

Average seafloor depth 4500 meters.

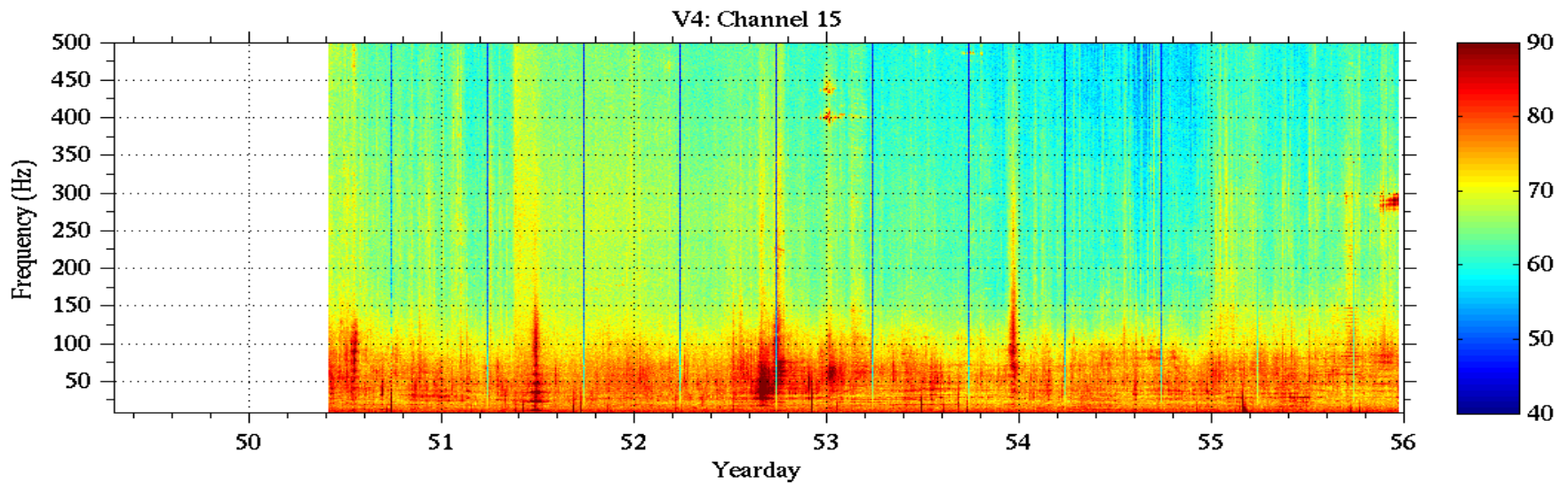
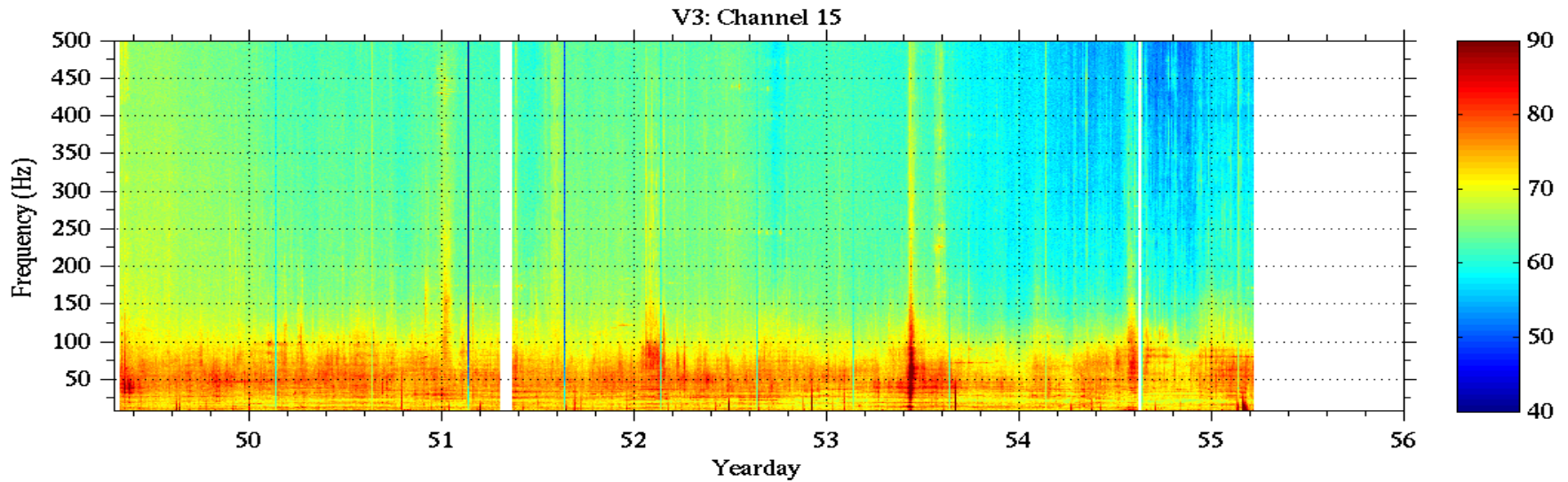
Source Level Spectra for Merchant Ships (1988-91)



Pacific Test Sites

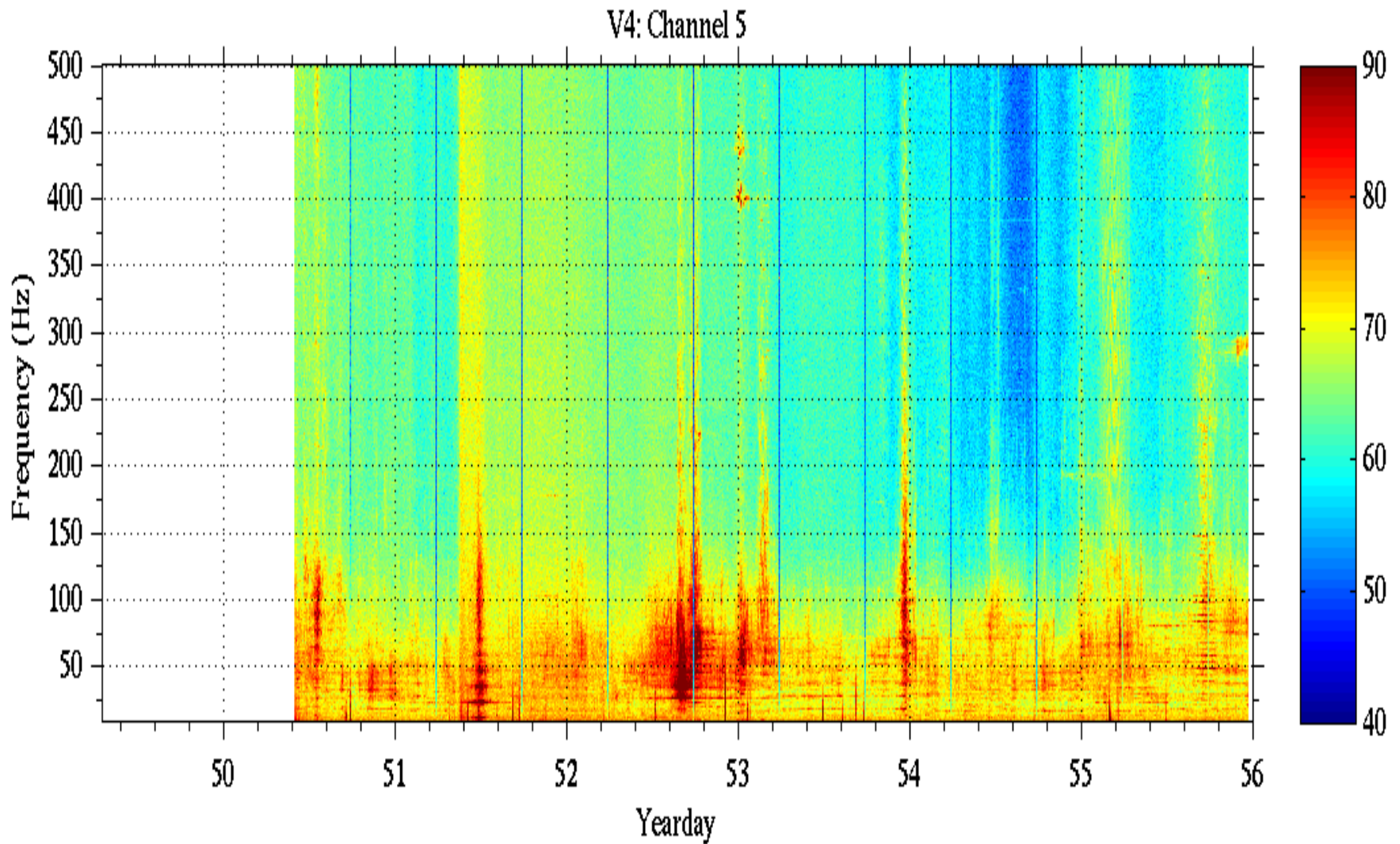


Two Sites in Philippine Sea

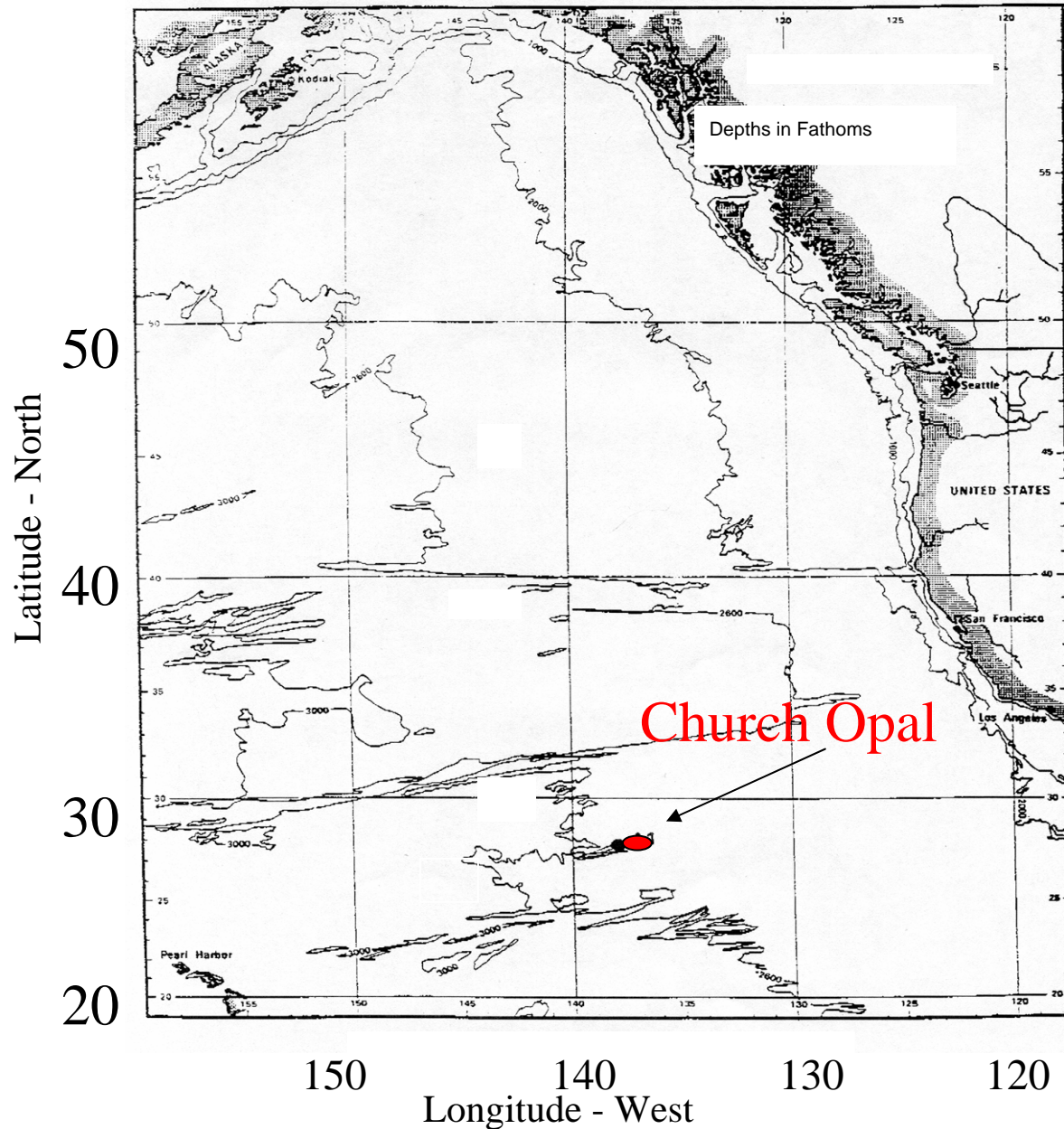


Data in February 1988 by U.S. Navy

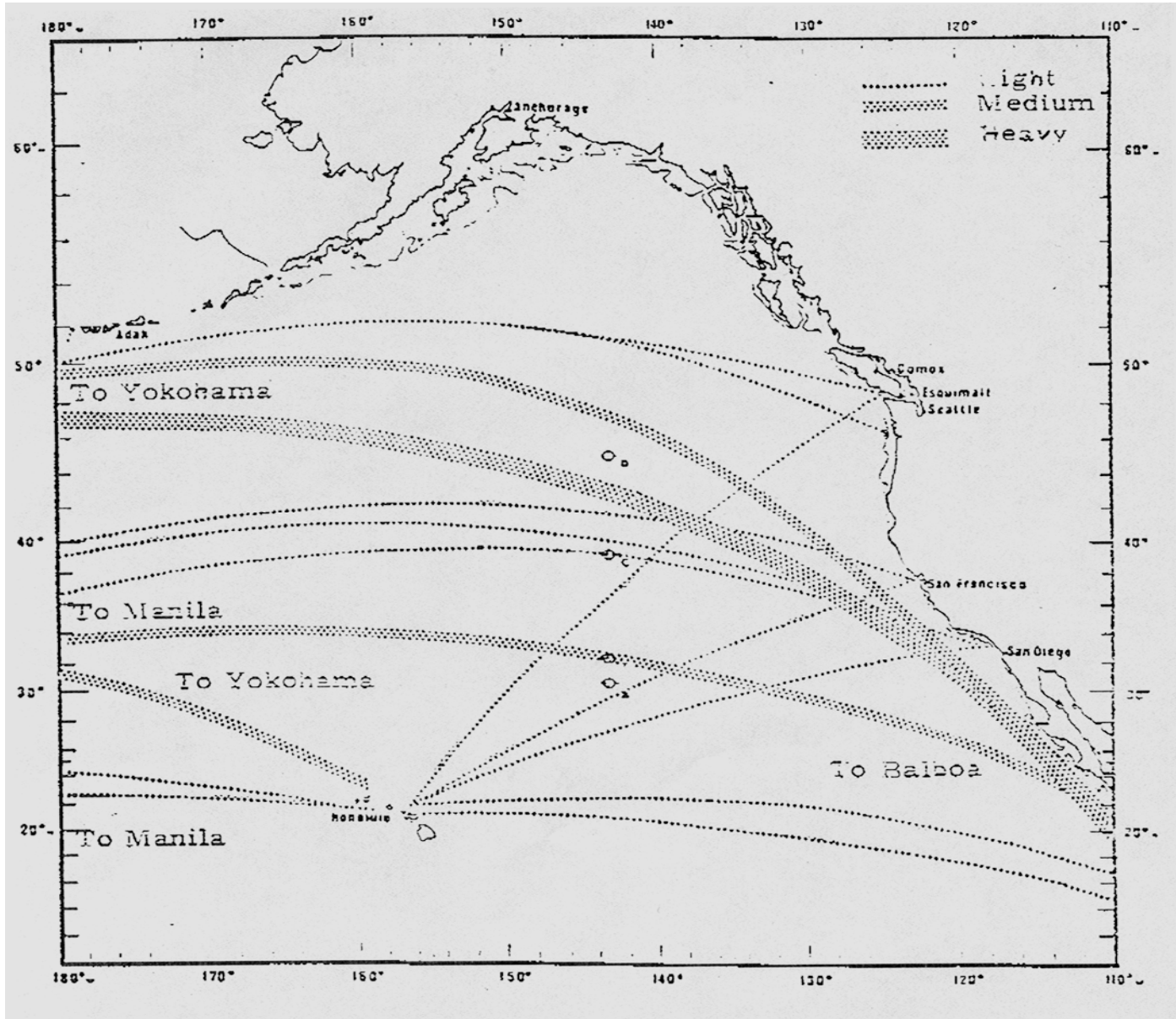
Deep hydrophone at Site V4



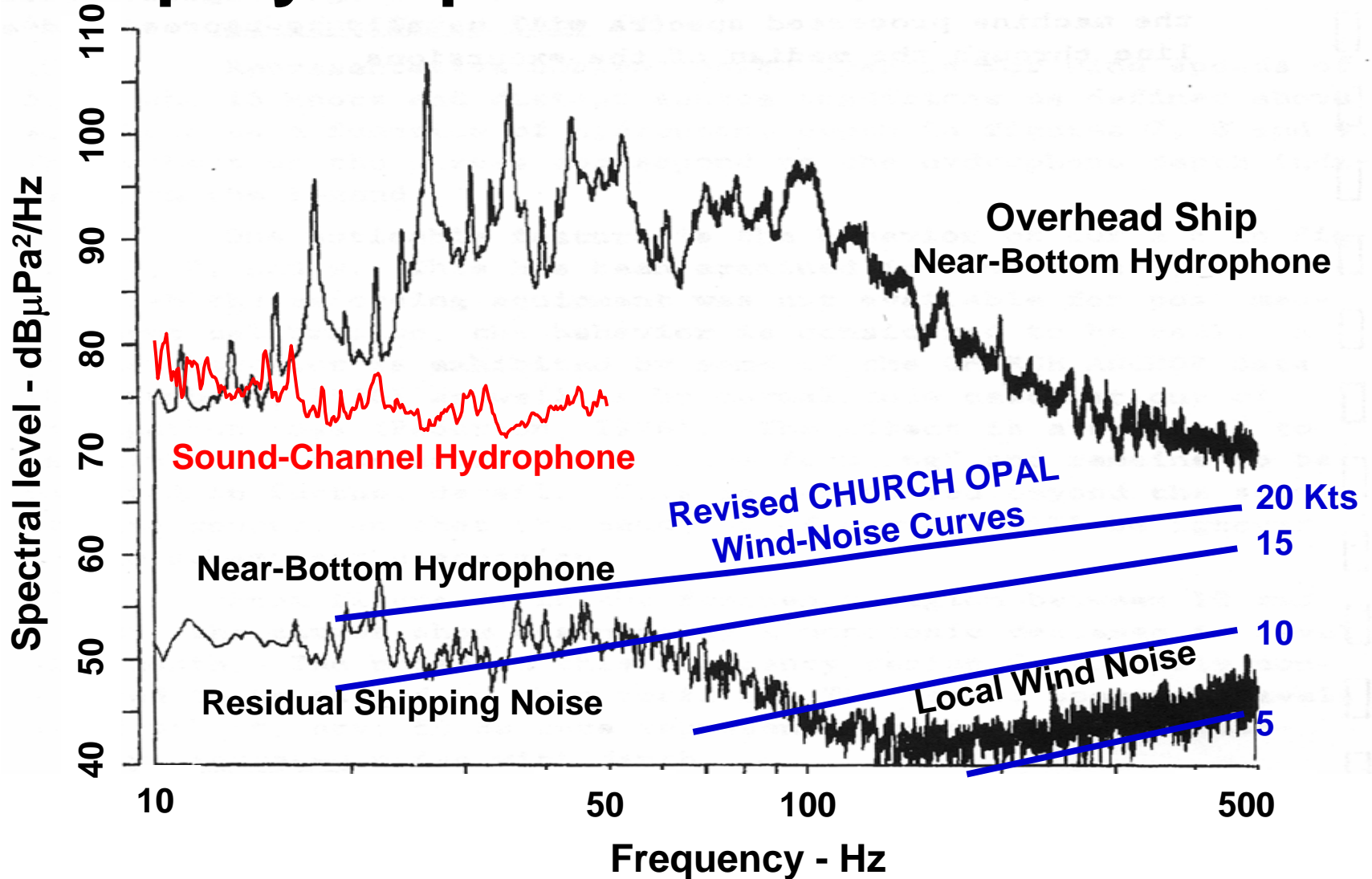
Location of CHURCH OPAL experiment



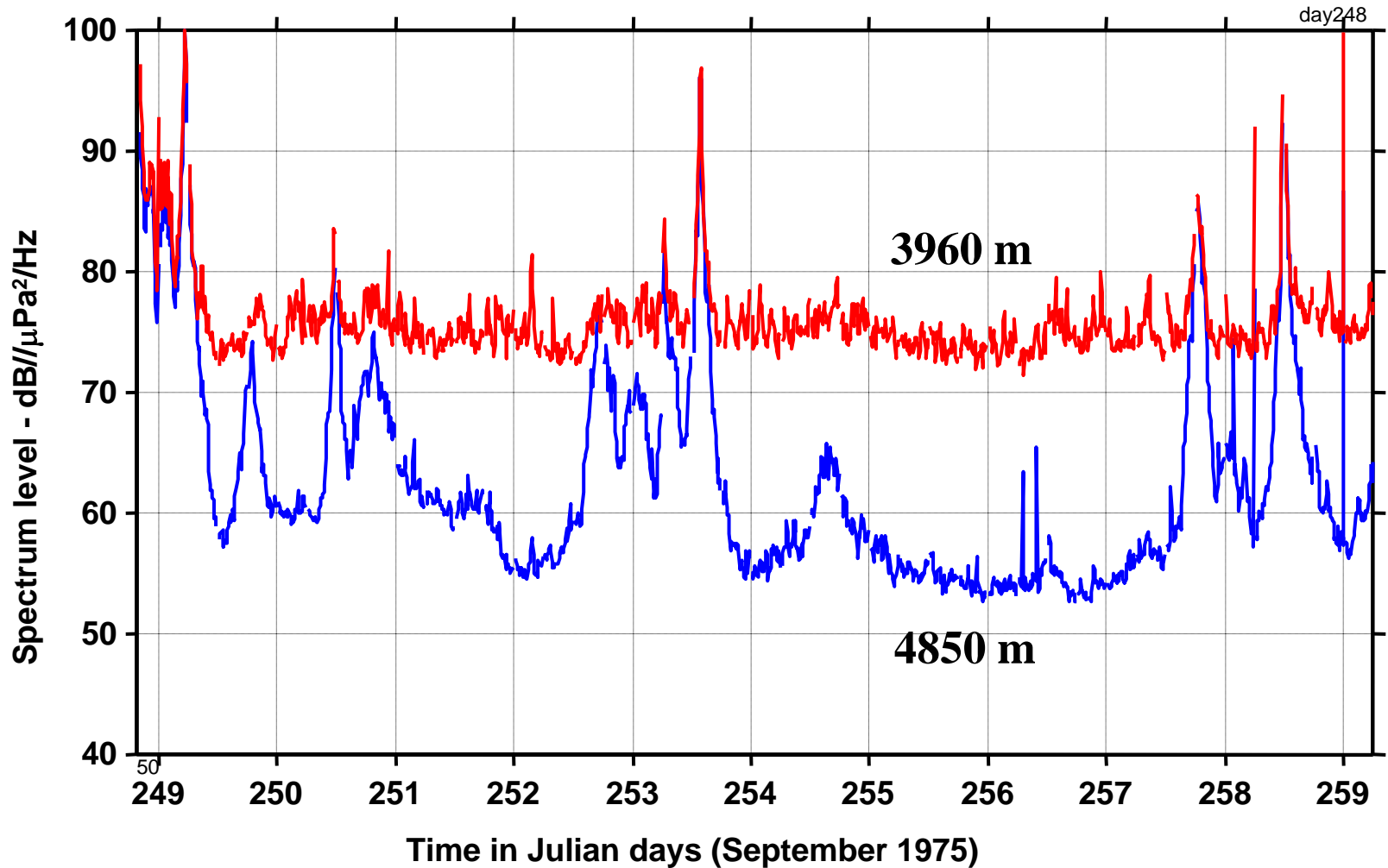
Major shipping lanes in North Pacific



Deep hydrophone at CHURCH OPAL



50 Hz noise for two hydrophones at CHURCH OPAL



Distant Ship Noise Summary

- Distance greater than 30-50 miles
- Noise fades into background
- Many ships contribute to background
- Broad expanse of open ocean
- Insignificant above 500 Hz
- Noise peak about 50-60 Hz
- Acoustic baseline for long-term trends