

# **SIOC 209: ACOUSTICAL OCEANOGRAPHY**

**Instructor: Michael J. Buckingham**

**Spring Quarter 2020, Reading/study course**

This course concerns the use of sound to obtain information about ocean properties, ocean boundaries and ocean processes. Emphasis will be placed on ocean ambient noise and the spatial statistics (coherence, correlation and directionality) of stochastic acoustic fields. Physics-based techniques for recovering information from ambient noise fields will be introduced.

## **1. Introduction to AO**

## **2. Stochastic processes**

Power-spectral density

Cross-spectral density

Coherence function

Cross-correlation function

Wiener-Khintchine theorem

## **3. Ambient noise**

Wenz curves

Deep-water, wind-driven noise (Cron & Sherman model)

Shallow-water, wind-driven noise

Shallow-water, head wave

## **4. Wind-driven noise for recovering sediment properties**

Directional density function

Vertical coherence

Critical grazing angle

Sediment sound speed and attenuation

## **5. Atmospheric source (aircraft) for recovering sediment properties**

Head wave analysis

Horizontal coherence

Source-range window

**6. Rain noise**

Rainfall rates

Drop size