Earth Science and Astronomy

Underwater Acoustics and Ocean Information Technology

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Research Fields

- Acoustic Oceanology

  Sound has good advantage of radio wave or optics over ocean propagation. We use sound for ocean environmental monitoring. In addition, we design acoustic lens which has good convergence for acoustic camera.

- Sonar system

  Researches on the sonar system which detects objects using ocean sound are carried out. Our main objective is a development of a novel method using ocean ambient noise. The biological transient noises used as the noise sources of that method are also measured in the coastal water.

- Remote sensing of atmospheric and oceanic phenomena

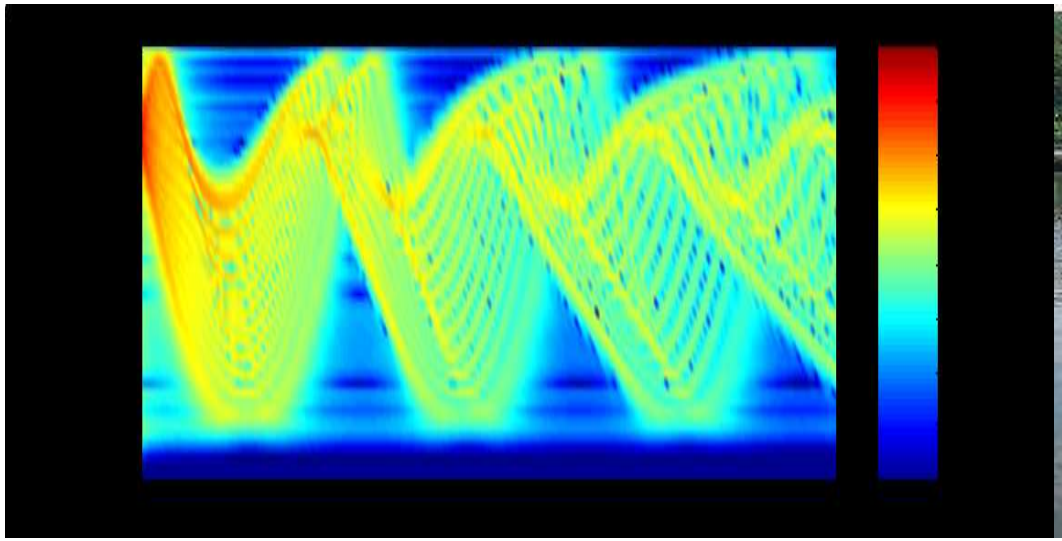
  We study the measurement engineering to observe atmospheric and oceanic phenomena that induced by the heat transport from the equatorial region to the polar regions. We also study the effects of our body exposed to electro-magnetic fields, acoustic noise, and oscillations. Our research fields are wide enough to support your interest.

Theme 1: Acoustic Oceanology

Ocean covers in exceed 60 % of the Earth's surface. Therefore, ocean environmental change affects a lot to the hole of the our planet environment. We approach to reverie ocean changes with acoustical methods.

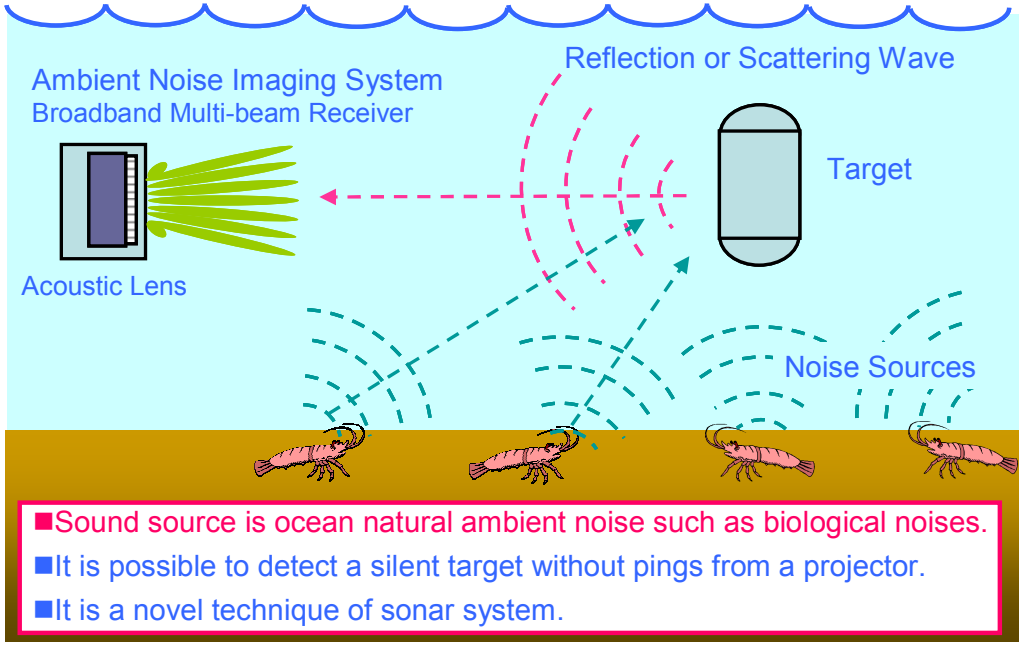
Sound propagation experiment at shallow water give us interesting results of bottom and surface reflection and refractions of travel sound. Tidal effects are also detected with propagated sound. We also analyze long distance sound propagation data performed at the Pacific ocean to find out ocean dynamics.

In addition, we investigate fundamental characteristic of acoustic lens which is important for acoustic camera.



Theme 2: Sonar system

In recent years, our main objective is a development of the ambient noise imaging system which is the novel technique using ocean ambient noise. The system development using the acoustic lens as the component engineering is carried out, and its performance is evaluated using the numerical analysis and the water tank experiment. And, the biological transient noises like snapping shrimps which are the noise sources of the ambient noise imaging are observed in the coastal water, and these characteristics are used as the indexes of the system design.



Theme 3: Remote sensing of atmospheric and oceanic phenomena

We introduce one of our researches, the observation at the Sea of Okhotsk.

The meteorological effects of the Sea of Okhotsk, the southernmost sea which is frozen during winter season in the northern hemisphere, is complicated because sea ice blocks heat exchanges between the ocean and the atmosphere though it has heat conductivity. Hence, we implemented observations at Okhotsk Sea. Left photo shows a tent on the Lake of Saroma, a saltwater lake connected to the Sea of Okhotsk. We installed every equipments in the tent and observed for 24 hours. Right photo shows an airplane mounted the microwave radiometer to detect microwave emission from sea ice on Lake Saroma and Okhotsk Sea.