

# RHEEM LAB.

## [Sea Surface Measurement by Active Microwave Remote Sensing and Development of Ocean Renewable Energy]

Department of Mechanical and Biofunctional Systems

<http://seasat.iis.u-tokyo.ac.jp/rheem/>

### Ocean Environmental Engineering

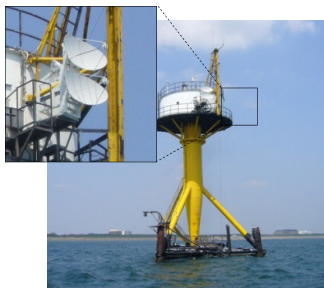
Graduate School of Frontier Sciences, Department of Ocean Technology, Policy, and Environment

## Remote Sensing of Sea Surface by Microwave Pulse Doppler Radar

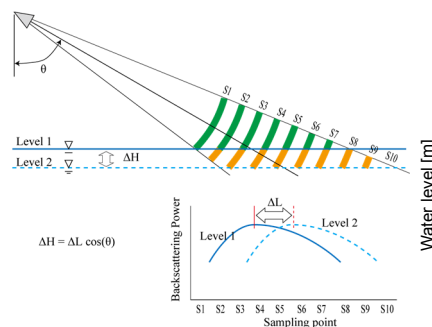
A real-time sea surface observation system by using a microwave pulse Doppler radar has been developed. The system is installed on a coastal site or an offshore platform and can observe various ocean phenomena, e.g. tsunami, tide and wave. The features of the radar are as follows.

- Real-time observation
- Remote sensing
- Easy maintenance

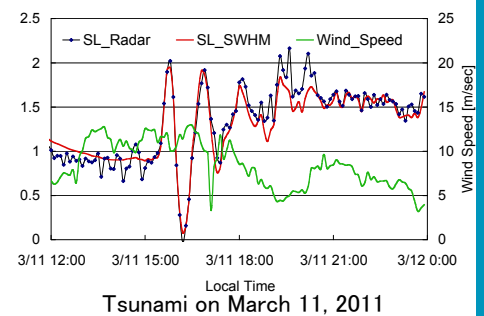
These advantages are effective in countermeasures against coastal disasters.



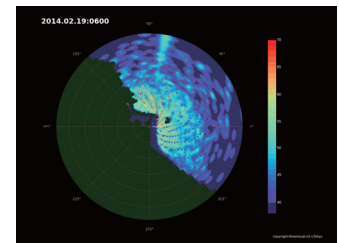
Hiratsuka experimental tower and pulse Doppler radar



Concept of tide observation



Tsunami on March 11, 2011

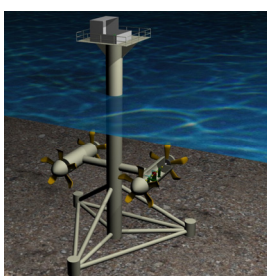


Sea ice observation using doppler radar system

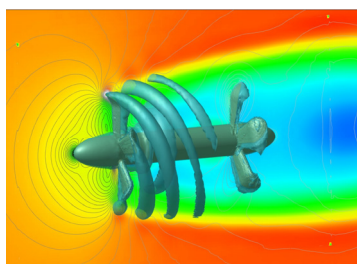
Sea ice monitoring is important to develop resources in the cold ocean. Using the difference in microwave backscattering from the sea and ice, sea ice can be detected by microwave radar. The radar which can observe sea ice position and speed in high resolution has been developed.

## Development of Marine Renewable Energy

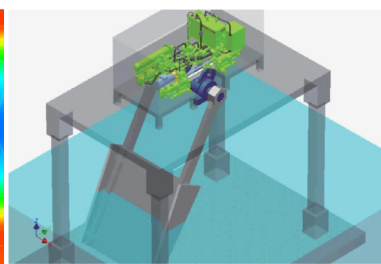
Renewable Energy is expected as a sustainable energy source which is less carbon dioxide emission. The most important thing is development costs, and the costs depends on the system efficiency. In ocean renewable energy such as tidal power or wave power, we have to transform the natural energy to mechanical energy, and to electrical energy. We need to improve the total system efficiency. We are now using Hydraulic drive system and developing the high efficiency power generation system which can adapt to oceanic energy.



100kW, 250kW, Tidal power turbine with fixed yaw and pitch



40kW Wave power turbine  
Site: Kuji, Iwate



5kW tidal power turbine  
Site: Shioyama, Miyagi

