

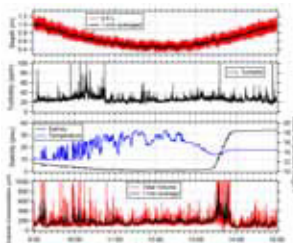
Coastal Engineering Laboratory

Staff	• Professor Shigeru KATO (E-mail : s-kato@ace.tut.ac.jp)
Laboratory URL	http://www.umi.ace.tut.ac.jp
Key words	Sediment dynamics, Coastal disaster mitigation, Coastal management, Beach change

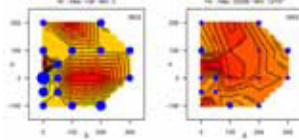
Researches on coastal environment and disaster mitigation are conducted from the viewpoint of Coastal Engineering. We are trying to solve problems and to make clear phenomena in coastal region using field observation, data analysis and numerical simulation. We hope to create useful results for our life and community.

Theme 1 ▶ Sediment dynamics and topographic change in coastal zone

Sediment transport in coastal zone has a great influence on coastal erosion, topographic changes and coastal environment. We are conducting the researches on the generation of the sediment transport in coastal zones (sea and river mouths), their spatial and/or temporal characteristics, the relationship among coastal high waves and currents, volumes of the sediment transport and coastal topographic changes, to aim for the protection of coastal erosion and the preservation of coastal environment. Various approaches, such as field observation, laboratory experiment and numerical simulation, are used for the elucidation of related phenomena and the investigation of countermeasures. We are also conducting the measurement of chemical element composition of the sand in rivers and beaches by using X-ray fluorescence (XRF) analysis, attempting to understand sediment transport in watersheds and coastal zones by using chemical composition as a tracer. This theme is the fundamental research for preservation and management of coastal environment.



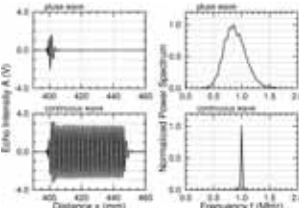
Results of field observation of sediment transport at a river mouth.



Spatial distribution of elemental content on a tidal flat, (Ni, Fe).

Theme 2 ▶ Development of measurement method for coastal sediment using ultrasonic waves

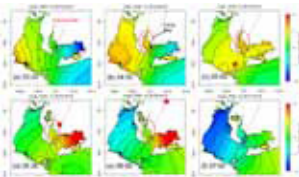
In order to understand the characteristics of sediment transport in water areas, such as rivers and coastal areas, we are attempting to develop a new technique for quantitative measurement of sediment concentration using ultrasonic waves. The goal of this research is to establish a new measurement method of sediment transport using ultrasonic waves. We are also attempting to develop a data analysis algorithm that will estimate the particle size distribution of sand grains from the acquired ultrasonic echo data.



Differences of transmitting wave profiles and their frequency spectrum between pulse wave (top) and continuous wave (bottom).

Theme 3 ▶ Coastal disaster mitigation for tsunami, storm surge and high waves

The risk of the occurrence of tsunami, storm surge and high waves has been increasing in coastal area. Numerical simulations, field observations and data analysis of these coastal disasters are carried out along Ise Bay, Mikawa Bay and the Enshu-Nada coast. We are trying to understand the characteristics of phenomena and the generation mechanism of disasters, to investigate the countermeasures for disaster spread into inland and urban region. The investigation on the evacuation during a disaster is also important. This research aims to contribute to regional disaster prevention.



Results of storm surge simulations in Ise Bay and Mikawa Bay.