

## Special Program in Applied Mathematics and Applied Mechanics

*The dynamics of strait exchange flows*

Prof. Shinichiro Kida

2017 - 10 - 23 (Mon.)

13:20 - 15:20

308, Mathematics Research Center Building (ori. New Math. Bldg.)

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Part 1: Gravity (density-driven) currents on a slope Part 2: The role of open oceanic circulation and winds

The open ocean and the marginal seas are topographically separated and the exchanges of water mass between the two basins often occur through narrow straits. While straits are spatially small, strait exchange flows can thus control the uniqueness of the water mass properties in marginal seas as well as that of the open ocean. In Part 1, I will discuss the dynamics of this exchange flow where the marginal seas act as a source of dense water for the ocean, like that between the Mediterranean Sea and the Atlantic Ocean or the shelves of Antarctica and the Southern Ocean. Observations show that the dense water of the marginal seas enters the ocean as gravity currents down the continental slope, somewhat resembling extreme river discharge events. These gravity currents are shown to interact with the ambient oceanic water through mixing, instability, and geostrophic adjustment. In Part 2, I will discuss the dynamics of the exchange flow where there are multiple straits between the marginal sea and the open ocean, like that of the Indonesian Seas and the Japan Sea. Multiple straits can drastically change the dynamics of the strait exchange flow since they permit throughflows. Throughflows can be driven by remote open oceanic winds based on a mechanism known as the “Island Rule”, and I will show how the depths of straits and continental slopes constrain the magnitude of the throughflow transport and its variability.



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