Numerical experiment on multiple equilibria and stability in the thermohaline circulation.

Noriyoshi Takahashi[1]; Satoshi Sakai[2]

[1] Department of Geophysics, Kyoto Univ.; [2] Human and Environ. ,Kyoto Univ

It experimented about the multiplex solution of the thermohaline circulation under ideal conditions using the 3-dimensional ocean model. First, it carries out to from 60 east-and-west width and the equator to 60 latitude, and the sea with a depth of 5000m is considered. By the strength of the salt flux on the surface, two solutions, a heat convection solution and a salt circulation solution, appear. The former is obtained when salt flux is weak, and strong thermohaline circulation is seen. The latter is obtained when salt flux is strong, and there is no thermohaline circulation. When salt flux was gradually changed from each solution, the histeresis was acquired and the domain used as

a multiplex solution was obtained.

Next, the sea symmetrical with the equator is considered. Meridional width is from 60S to 60N, others are the same as the above. When salt flux was weak, the heat convection solution with strong thermohaline circulation symmetrical with the equator was obtained. While salt flux was strengthened very much, a salt circulation solution without thermohaline circulation and symmetrical with the equator was obtained. In the domain whose salt flux is a degree in the middle The solution with asymmetrical thermohaline circulation was obtained. This is the domain which had become a multiplex solution in the single ocean above. So it is considered that symmetry is broken and the asymmetrical solution appeared.

Furthermore, the two ocean which connected the ocean symmetrical with such the equator at the southernmost end is considered. In this case, it is expected that symmetry is broken further, like actual thermohaline circulation, the solution which it sinks at the northernmost end of one, and goes up at the northernmost end of another will be obtained as a stable one. It is due to discuss about this experiment result and the stability of a multiplex solution becoming asymmetrical solution.