Visualize water current using vitamin B_2

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The deep ocean current mainly sinks in the polar regions such as off the coast of Greenland and in the Weddell Sea in the south pole. Then, it comes up to the surface in the Pacific and the Indian Ocean after making a circuit of Earth. Therefore, this current plays one of the important roles in long-term heat transportation in the polar regions, low latitudes and middle latitudes and has a great influence on Earth climate. However, there are many things that haven't been solved yet. The mechanism of upwelling is a prime example. The reasons for its sinking in the polar regions are low temperature and the high salinity of water. Nevertheless, the mechanism of its upwelling in the Pacific and the Indian ocean hasn’t been solved yet and people have been still studying.

These days global warming clearly begins to have an influence on our lives, so it is necessary to take measures against it. However, it is important to understand Earth’s potential climate control function more deeply to make global warming slower and realize the best living environment for all living things, including human beings.

For this reason, we have experimented by reproducing submarine topographies in an aquarium on the basis of a hypothesis that they have an influence on upwelling, and we have searched into what causes upwelling to discover the mechanism of its upwelling. Concretely, we set ices on the left end of the aquarium to reproduce low seawater temperature at polar regions and set mimicked seamounts made of plaster to reproduce submarine topography such as ridge, hotspots in Indian ocean. Also, we visualized water current using aqueous solution dissolved blue ink and try watching turbulence caused by current’s hitting seamounts and upwelling water. In addition to those, not only visualization but also measurement did we make by setting High speed Response Temperature Progs (given by Shimazu-Rika) one by one and changing their height to measure water temperature by 0.01℃ every 0.1 second, and try quantifying water current too detail for us to watch.

However, visualizing with ink has various problems. For example, because of aqueous solution’s uniformity, ink will spread all over the aquarium and the ink’s concentration is getting lower, so it gets more difficult to perceive ink. Besides, from the beginning, ink is difficult to perceive. Therefore, we focused on vitamin B_2’s fluorescent action and thought that we can improve such ink’s defect if we use powdered vitamin B_2 instead of ink. For this reason, we tried to visualize water current using vitamin B_2. Also, we groped for a method to use powdered vitamin B_2 for almost indefinite time without consuming powder by putting ingenuity into powder as it has advantages.

The new visualization method found through this study will be very useful in making a consideration about the deep ocean current from now on, this will make it easier to visualize sea turbulence and will be possible to observe accurately. Also, the way we present this time is considered that it can be applied to various fields on visualizing the current, at this conference, nothing is more pleasing if the way we use vitamin B_2 becomes popular from now on. We will announce visualization of sea turbulence we

experiment using vitamin B_2 we mentioned above and the ability of vitamin B_2.

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