Feature extraction and visualization for Ocean General Circulation Model via Multivariate Analysis

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Abstract:

With advances in supercomputing technology, high-resolution large-scale simulation study has been focused in the field of ocean science. However, it is difficult to intuitively understand characteristic features defined as multivariable hiding in the high-resolution dataset. In order to obtain scientific knowledge from large-scale simulation data, it is important to effectively extract and to efficiently express the characteristic feature.

The aim of this study is how to efficiently extract and how to effectively visualize ocean currents which affect the heat transportation. In this research, new multi-dimensional transfer function, which assigns 2 or more values to color and opacity, to emphasis the ocean currents and vortices is proposed (Fig. 1). Furthermore, multivariate analyses to extract ocean currents, thermohaline circulation and other characteristic features are developed. This presentation describes the methodologies and experimental results of these methods. Evaluation of visualization results and feedback to the parameter optimization will be also reported.

Fig. 1 Visualization result of Sea Surface Temperature (SST) and Sea Surface Velocity (SSV) using 2-dimensional color map and Line Integral Convolution (LIC) method. Color and Brightness indicate SST and current speed, respectively.