

## Super-resolution for seafloor topography using deep convolutional neural networks

\*Mitsuko Hidaka<sup>1</sup>, Daisuke Matsuoka<sup>1</sup>, Tatsu Kuwatani<sup>1</sup>, Yukari Kido<sup>1</sup>, Junji Kaneko<sup>1</sup>, Takafumi Kasaya<sup>1</sup>, Eiichi Kikawa<sup>1</sup>

1. Japan Agency for Marine-Earth Science and Technology

Understanding the detailed information on seafloor topography is required to deal with natural disaster prevention, assessing and mitigating environmental problems, biogeographic studies, mineral mining, and a range of other topics. JAMSTEC has launched the new research program "Mathematical Seafloor Geomorphology" to establish a method to provide high resolution seafloor topography from existing low resolution data, by using super-resolution techniques based on deep convolutional neural networks (DCNNs). We applied two different algorithms of DCNN, a Super-Resolution Convolutional Neural Network (SRCNN) and a Super-Resolution Generative Adversarial Network (SRGAN) to improve the resolution of the data obtained from the middle part of the Okinawa Trough (southwest Japan). Both SRCNN and SRGAN produced better high super-resolution performance for both root mean square error (RMSE) and peak signal-to-noise ratio (PSNR) compared with bicubic interpolation. We will present the results, and would also like to discuss the effects of training data selection on the super-resolution performance.

Keywords: seafloor topography, super-resolution , SRCNN , SRGAN