

Classification with imbalanced cloud data using deep convolutional neural network

*Daisuke Matsuoka^{1,2}, Masuo Nakano¹, Daisuke Sugiyama¹, Seiichi Uchida³

1. Japan Agency for Marine-Earth Science and Technology, 2. Japan Science and Technology Agency, 3. Kyushu University

Image classification using deep convolutional neural network is effective technique to detect extreme phenomena from climate data. However, the number of extreme phenomena such as tropical cyclone (TC) is overwhelmingly small compared with others. It is known that classification performance declines due to this imbalance between positive (TCs) and negative examples (non-TCs). In the present study, we developed a new negative data selection method for binary classification for cloud images. We analyze the relationship between the ease of classification and the characteristics of data, and optimize the training data in order to decrease the false alarm ratio (FAR). As the results, we succeeded in decreasing FAR from 32.8–53.4% to 60.0–70.0% in the western North Pacific in the period from July to November.

Keywords: Deep learning, Classification, Tropical cyclone