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Evaluation and Calibration of Remotely Sensed High Winds from the HY-2B/C/D Scatterometer in Tropical Cyclones

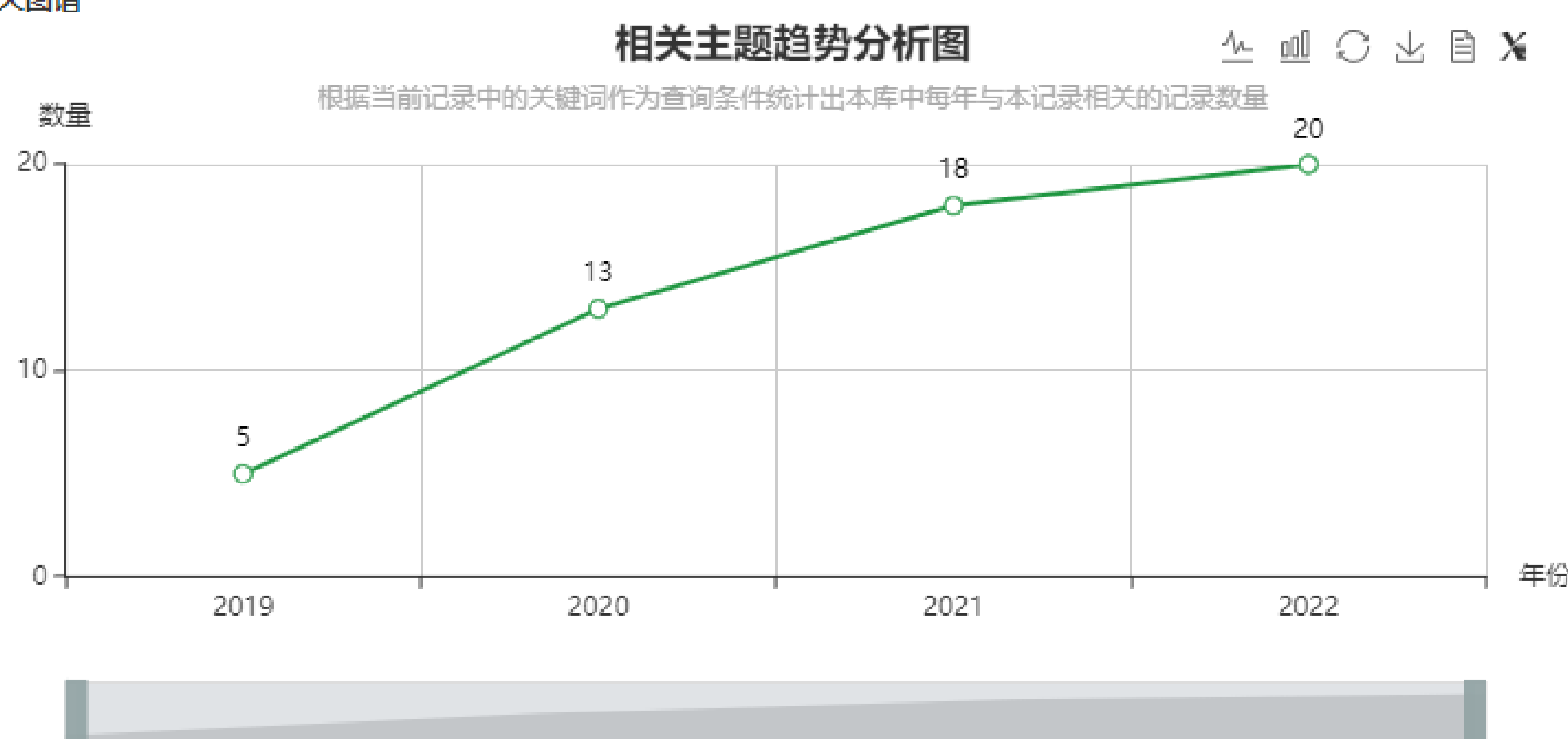
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摘要	Haiyang-2 scatterometers (HY-2A/B/C/D) have limitations in high wind speed retrieval due to the complexity of the remote sensing mechanism and the influence of rainfall on the radar cross section under the conditions of tropical cyclones. In this study, we focus on the evaluation of Chinese scatterometer operational wind products from HY-2B/C/D over the period from July 2019 to December 2021. HY-2B/C/D scatterometer wind products are collocated with SMAP (Soil Moisture Active Passive) L-band radiometer remotely sensed measurements. The results show that the underestimation of high wind speed occurs in the HY-2B/C/D wind speed products. The machine learning algorithms are explored to improve this underestimation issue, including the back propagation neural network (BP-NN), K-nearest neighbor (KNN), support vector machine (SVM), decision tree (DT), random forest (RF), and Bayesian ridge (BR) regression algorithms. Comparisons show that the BP-NN algorithm shows the best performance with a small RMSE (root-mean-square error) of 3.40 m/s, and high correlation coefficient of 0.88, demonstrating an improvement of 20.4% in RMSE (root-mean-square error) compared with the HY-2B/C/D wind speed products. In addition, the revised high winds are in good agreement with the ground truth measurements from the SFMR (Stepped Frequency Microwave Radiometer), which are useful for tropical cyclone disaster prevention and mitigation and are of vital importance in the numerical simulation of storm surges.
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