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A New Technique for Nighttime Sea Fog Detection from Satellite of Applying Unsupervised Learning

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Satellite remote sensing has advantages in identifying sea fog area rather than ground measurements. At nighttime, dual channel difference (DCD) method using IR and shortwave IR channel have been mainly used to detect sea fog, because the visible channel is unavailable. However, it has some problems in identifying fog by containing a number of other clouds and clear pixels. To improve sea fog detection in nighttime, we have developed a new method of applying unsupervised learning, based on sea surface temperature and cloud top temperature difference (STD) along with brightness temperature difference (BTD). In the perspective of machine learning, DCD method can be classified into supervised learning, which utilizes predetermined threshold value. Our technique uses EM algorithm in conjunction with Gaussian mixture model without any predetermined thresholds. This makes apply the daily variable thresholds, including the atmospheric characteristics of the day. It showed reasonable results from CALIPSO data, and proposed a new direction for improving fog detection at further studies.