

Supplementary Material

S1 Accuracy assessment of cloud masking

To quantitatively assess the performance of our framework, we conducted a random sampling of the classification result. For both cloud pixels and non-cloud pixel, a total of 862 samples was randomly generated and distributed densely and evenly across whole study area. Their reference labels are decided by visual interpretation with “true-color” images generated from MODIS/Terra R_{rc} images. The overall accuracy (OA), user s accuracy (UA), producer’s accuracy (PA), and Kappa coefficient are produced from an error matrix (Table S1).

Table S1 Validation of the result of cloud masking threshold proposed in this study.

	Non-cloud Pixel	Cloud Pixel	Total
Non-cloud Pixel	784	8	792
Cloud Pixel	1	69	70
Total	785	77	862
PA (%)	99.62	86.25	
UA (%)	98.99	98.57	
OA (%)	98.39		
Kappa	0.9011		

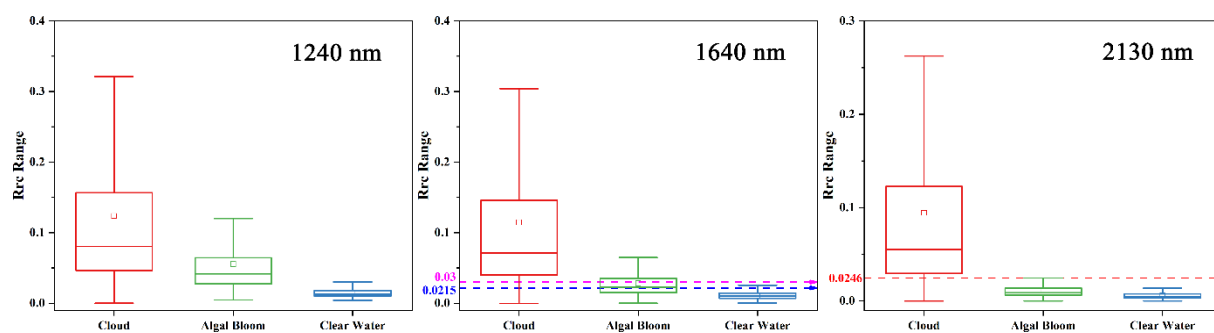


Figure S1 Statistics of endmember reflectance in different bands. According to the difference in reflectivity of different objects, $R_{rc,2130nm} > 0.0246$ is considered as the cloud threshold in this study.

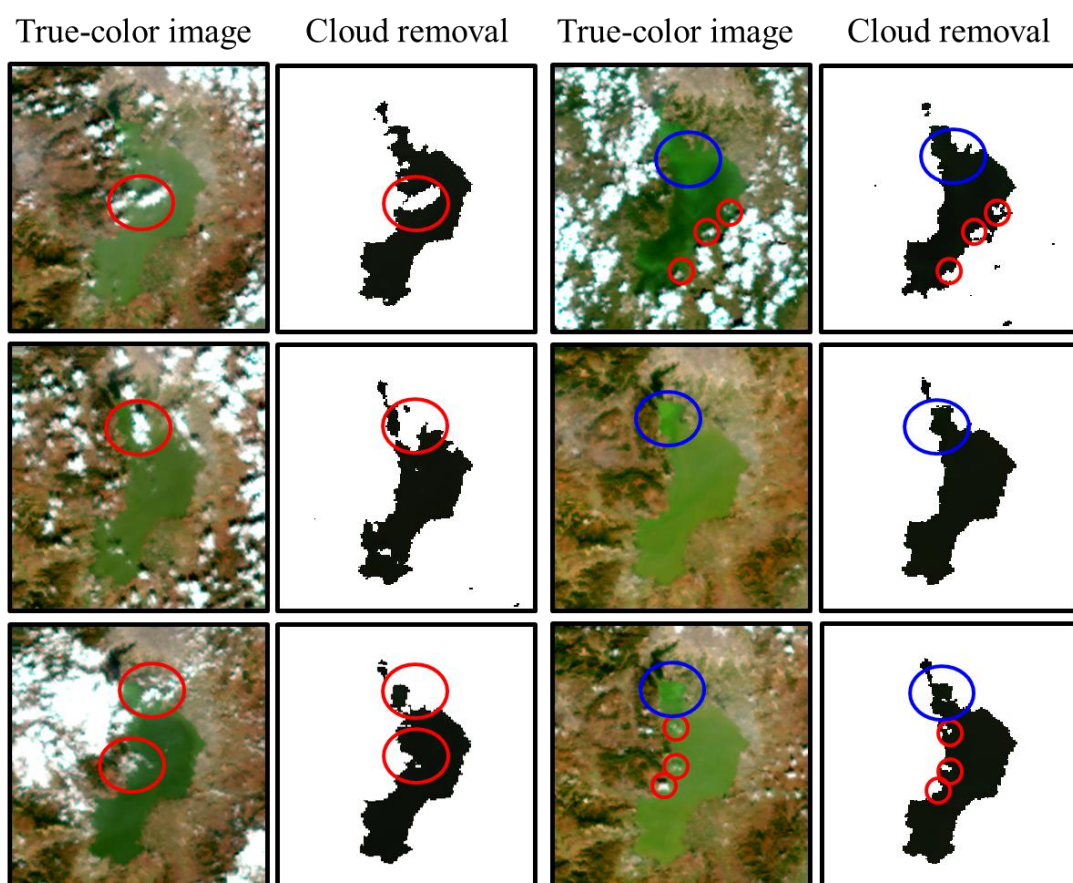


Figure S2 Example of cloud removal with the cloud threshold ($R_{rc,2130} = 0.0246$). The red circles mark the clouds, and the blue circles mark the dense algal blooms. The thresholds used in this study accurately removed cloud pixels and preserved dense algal bloom pixels

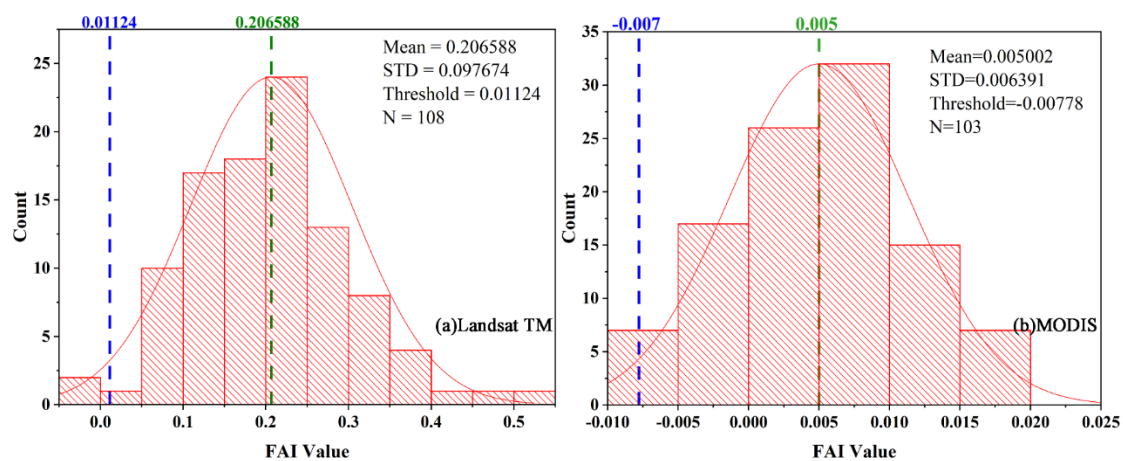


Figure S3 Statistics of FAI thresholds for Landsat images and MODIS images.

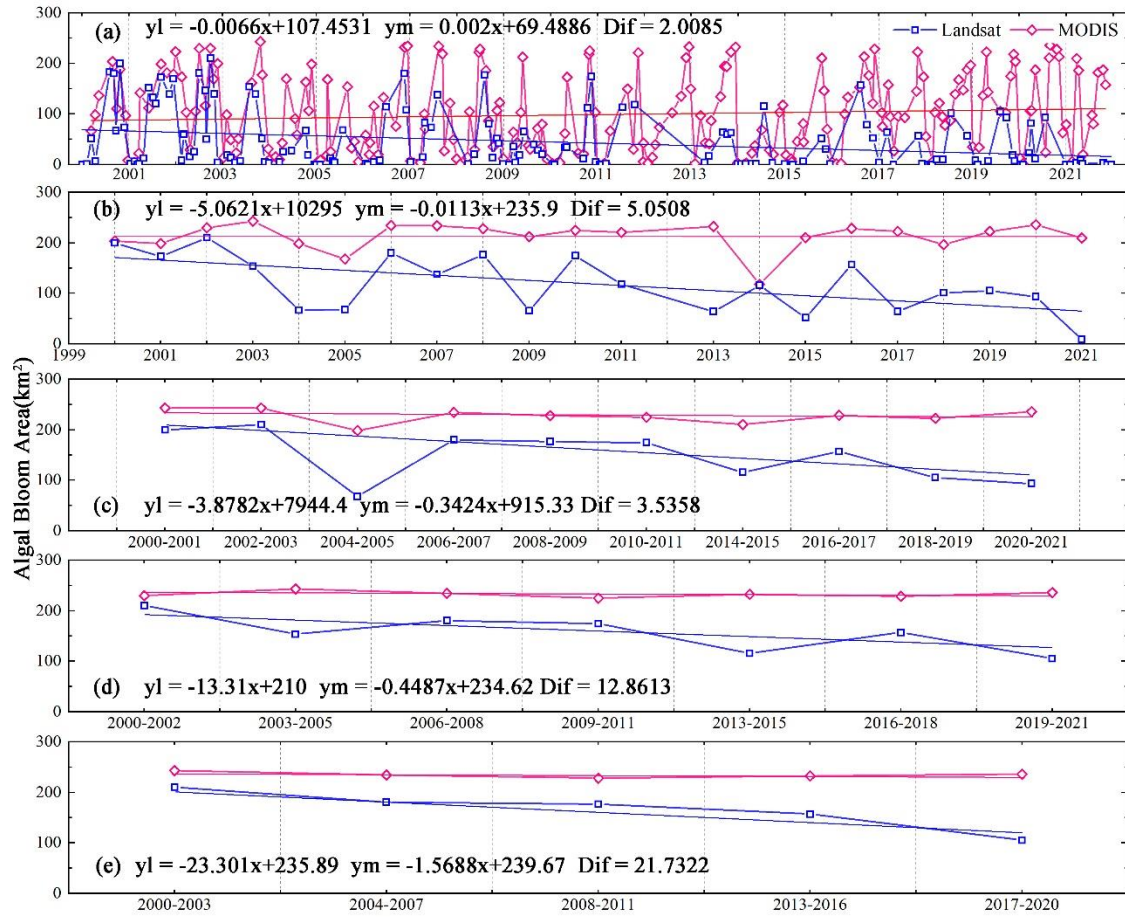


Figure S4 Time series of the different time-scale of max bloom area in Lake Dianchi between Landsat and MODIS results (during 2000-2021). The time intervals of (a), (b), (c), (d), and (e) are 1 month, 1 year, 2 years, 3 years and 4 years, respectively. Dif represents the difference between MODIS and Landsat time series. The lower the Dif, the greater the similarity of the trend between the trend of time series.

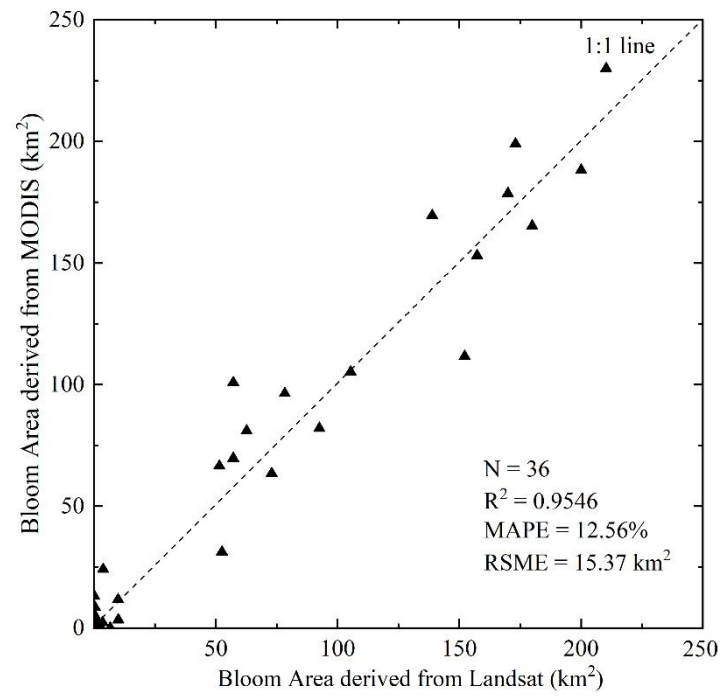


Figure S5 Comparison of algal bloom area derived from MODIS and Landsat imagery.