Monitoring mangrove forest change in China from 1990 to 2015 using Landsat-derived spectral-temporal variability metrics

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Reliable information of national-level mangrove forest change in China is urgently needed for Chinese government to make appropriate policies of mangrove forest conservation. Yet, employing traditional methods (all based on single-date remotely sensed imagery) to accurately map mangrove forest in China is relatively difficult, given the influence of tide variability on the spectrum of a large proportion of mangrove forest and the spectral similarity between mangrove forest, cropland, and natural terrestrial vegetation. However, the temporal profile of spectrum for mangrove forest is likely to be distinctive, due to the influence of tide variability on mangrove forest spectrum. Therefore, in this study, we investigated the potential of using some robust spectral-temporal variability metrics (quantiles), capturing characteristics of temporal profiles for different land cover types, to reliably separate mangrove forest. We also mapped mangrove forest in China for 6 periods (1986-1992, 1993-1997, 1998-2002, 2003-2007, 2008-2012, and 2013-2017) and analyzed mangrove forest change over past decades using all available Landsat imagery. Producer's and user's accuracies of the land cover type "mangrove forest" for all periods are high (>90%), indicating the effectiveness of our method. We found that mangrove forest in China has significantly increased, from 10774 ha in the period 1986-1992 to 19220 ha in the period 2013-2017. There is also a potential for employing our method to map global mangrove forest around 2015.