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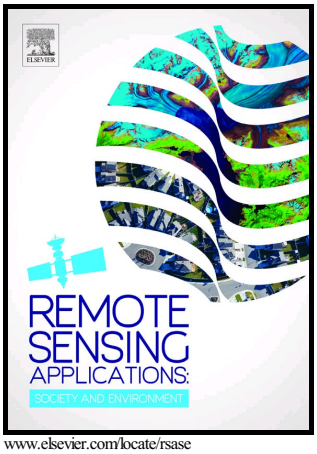

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Semi-automatic classification method for mapping the rice-planted areas of Japan using multi-temporal Landsat images

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Abstract.

The rice-planted areas of Japan have decreased continually with reduced rice consumption in the country. Remote sensing techniques are indispensable for providing up-to-date, public data for surveying the locations of paddy fields that have been abandoned or converted to upland crop farming. This study proposes a simple method, using multi-temporal Landsat data, for determining the threshold water index to consistently monitor the spatial distribution of the rice-planted area of Japan without using complex interactive manual operations. This method is much simpler compared to previous methods that semi-automatically or automatically determined the threshold water index based on statistical analyses using manually selected training data or the difference in histogram distribution information between flooded and non-flooded pixels. After comparing six water indices, the Normalized Difference Water Index calculated from green and short-wave infrared reflectance performed best when identifying the rice-planted area with the lowest estimation error (RMSE = 203 ha). It was also found that the proposed method had a higher sensitivity to small-size paddy fields than the previous methods, especially when using Landsat data that included many narrow rice-planted areas distributed along the valley regions. The proposed technique enabled us to consistently check the state of utilization of paddy fields across multiple

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