



Fine mapping of crop patterns in the North China Plain from 2013 to 2022

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A nuanced understanding of crop patterns is pivotal for accurate crop yield and irrigation water use calculations, holding profound implications for national food security and sustainable environmental development. In the water-scarce North China Plain (NCP), where agricultural intensity faces challenges due to groundwater suppression and ecological restoration, this study employs random forest classification on Sentinel-2 Multispectral Instrument (MSI) and Landsat 8 Operational Land Imagery (OLI) time series to reveal the spatial and temporal dynamics of crop patterns from 2013 to 2022. Our classification, featuring a finer scheme (nine categories), higher spatial resolution (10/30 m), and extensive field sampling points, aligns well with China's statistical yearbooks. The annual mapping exposes a shift towards economic forests, mainly from other food crops, across all NCP provinces. Distinct spatial patterns emerge, with wheat-maize rotation decreasing at higher latitudes, countered by an increase in single maize and economic forests. Despite these shifts, wheat-maize rotation remains dominant, and seasonal fallow is concentrated in regions with poor irrigation, notably in groundwater funnel areas. Overall, our crop pattern mapping provides a robust dataset for water conservation and land management, contributing to regional resilience planning.