Mapping Croplands of Southeast Asia, Japan, and North and South Korea using Landsat 30-m time-series, random forest algorithm*

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ABSTRACT:
Southeast Asia (e.g. Myanmar, Thailand, Vietnam, Indonesia), Japan, and North and South Korea, 17 countries in total, have a population of 846 million people, which is about 9% of the world's population; it is predicted to increase to 1 billion by 2050. This population expansion will coincide with a reduction in arable land due to an increase in urban and industrial development, increasing precipitation variability, and sea level rise. Additionally, these 17 countries are leading exporters of rice, sugar, shrimp, cassava, oil palm, pulses & beans, cocoa & coffee, tropical fruit, and spices. To help address the future food demand, in support of the Global Food Security-Support Analysis Data (GFSAD) project, this study mapped a wall to wall 30-m cropland product for the nominal year 2015 at 30-m resolution using 10 band cloud free composites derived from, Landsat-7&8 data from 2013-2016. The study adopted random forest (RF) machine learning algorithm and generated croplands versus non-croplands knowledge using several thousand training samples derived from sub-meter to 5-m very high spatial resolution imagery. The RF algorithm was run separately in seven distinct zones based on political divisions, agro-climatology, and elevation to ensure knowledge base that can distinctly separate croplands from non-croplands. All computing was performed on Google Earth Engine (GEE) cloud platform. Accuracies (overall, producer's and user's) accuracies of the croplands exceeded 80% as determined by an independent accuracy assessment team. Overall croplands areas of 17 countries was 128 Mha compared with UN FAO reported cropland areas of 137 Mha.

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