Assessing Marginal Land Availability Based on Land Use Change Information in the Contiguous United States

Objective

Planting bioenergy crops on marginal land can avoid conflict with food production. Previous studies mainly assessed marginal land with biophysical characteristics; this study presents a framework to assess marginal land by using frequent land use change as an economic and biophysical marginality indicator.

Approach

❖ Assumption: Frequent land use change between crop and non-crop is an indicator of economically marginal land. This land is likely to have a lower opportunity cost of conversion from food crop to bioenergy crop production.

❖ Implementation: Identified cropland in transition using the time series of Cropland Data Layer (CDL) land cover product and determined the amount of marginal land with confidence vs. with uncertainty across the contiguous United States (CONUS), constrained by multiple data sources.

Results

❖ Land identified using our approach is biophysically and economically marginal, frequently transitioning between cropland and non-cropland.

❖ Only 1.4-2.2 and 14.8-19.4 million Ha of marginal land, with confidence and with uncertainty, respectively, would be suitable for bioenergy crop production in the CONUS based on this study.

❖ Marginal land area estimates from this study are substantially lower than other published studies in which marginality was based solely on biophysical properties or specific land cover types.

Significance

This paper presents a novel approach for characterizing economically marginal land suitable for bioenergy crop production in the CONUS.
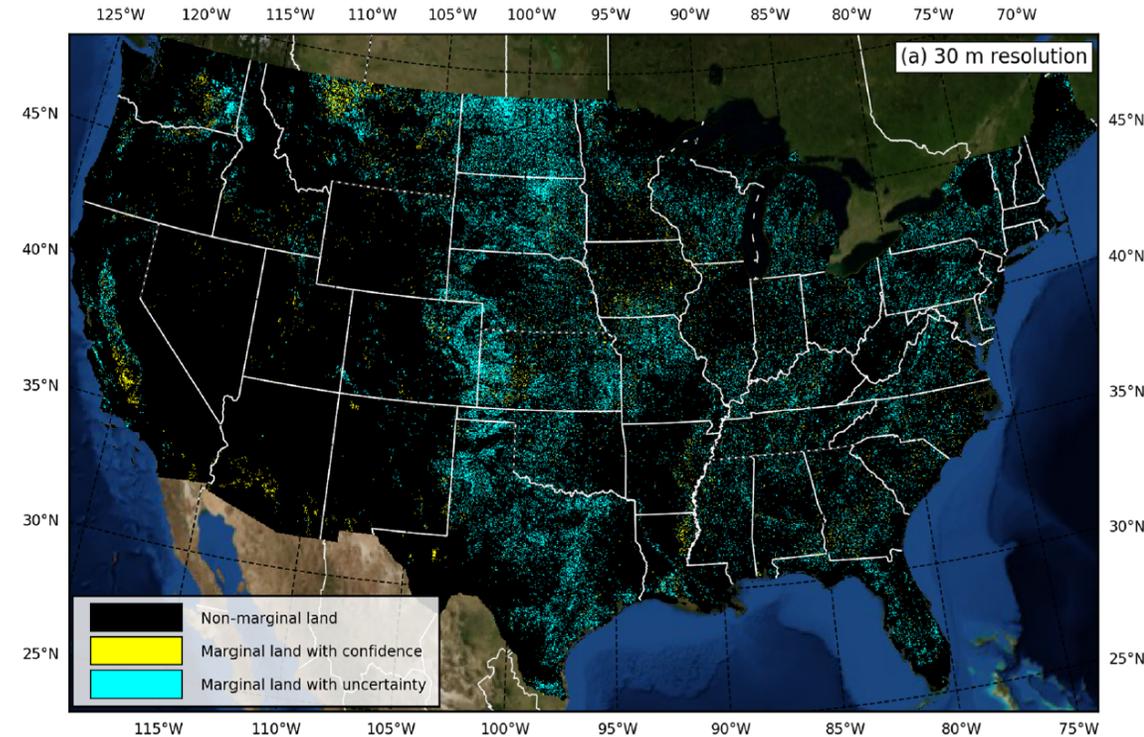
Economically marginal land distribution with confidence (yellow) and uncertainty (blue) across the CONUS.

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