

SDC 2019 Annual Meeting Abstracts

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Title: Probabilistic global maps of crop-specific areas from 1961 to 2014



Agriculture has substantial socioeconomic and environmental impacts that vary between crops. However, information on how the spatial distribution of specific crops has changed over time across the globe is relatively sparse. The absence of time-varying spatial information inhibits our ability to establish baseline sustainable agriculture production indicators to which future data can be reasonably compared to. Time series maps of crop specific agricultural areas would enable us to better understand the global agricultural geography of the 20th century. We introduce the Probabilistic Cropland Allocation Model (PCAM), a novel algorithm to estimate where specific crops have likely been grown over time. Specifically, PCAM downscales annual and national-scale data from the UN's Food and Agriculture Organization to approximate crop-specific harvested areas of 17 major crops globally from 1961-2014. We find that PCAM maps compare relatively well with an existing spatial dataset of crop-specific areas circa 2000. PCAM estimates compare less well with time series county-level agricultural census data for the United States. Importantly, deviations between census data and PCAM benchmark estimates (driven by soil and climate suitability) can be used to infer the importance of other factors of agricultural production (e.g., labor, agricultural policy, extreme climate) in future work. Our results provide new insights into the likely changes in the spatial distribution of major crops over the past half-century. We improve our ability to spatially assess sustainable agriculture production indicators both globally and sub-nationally by providing historical levels for future comparisons.