From Seeds to Bytes: Data Transformations in the Agricultural Sector

by Rian Wanstreet

In 2015, Agricultural Economist Dr. Lowenberg-DeBoer wrote an essay in Foreign Affairs that contained the following statement: "Eventually, precision agriculture could take humans out of the loop entirely. Once that happens, the world won't just see huge gains in productivity. It will see a fundamental shift in the history of agriculture: farming without farmers." What was unstated, but is implicitly understood, was that replacing those farmers would be algorithmically- mediated robots.

Precision Agriculture (or PA) is a method of farming which uses tech and big data from historical records, satellites, and sensors to create what's called "prescriptions" which can tell a farmer (or farmers' machines) where to plant, how much water or fertilizer to use, how much phosphorus to apply, etc. It is marketed as being more efficient, cost-effective and sustainable, and there are reports that it is some of those things. For example, some studies indicate less water and fertilizer is used when PA systems are applied and—ostensibly—utilizing robots replaces the need for human labor. And there are an increasing number of robots.

PA is being heralded as a panacea to the demands of an ever-growing population, but the remarkable speed with which IoT technologies are being adopted on farms should give anyone familiar with the challenges of data management, security, and upkeep pause. As drones and robots replace workers and data-driven algorithms make decisions about where to plant, generational human knowledge is being replaced.

While scholars in social sciences and related disciplines have increasingly been looking critically at the repercussions of the shift towards datafication in various occupations, little attention has been paid to the impact of big data in the agricultural sector. Considering the quite important role agriculture plays in our society, this oversight is concerning. Additionally, PA technologies have the potential to exacerbate existing inequities between farmers and corporations. They are also ossifying sociotechnical assemblages which privilege certain worldviews about appropriate ways to farm which may run counter to contemporary goals of sustainability. As such, identifying the potential ramifications of the adoption of these technologies is an important goal for scholars, particularly because application of PA is still nascent and thus intervention that encourages transparent, environmentally friendly, and equitable implementation still possible.

This poster will outline the current state of these new communication technologies in the agricultural sector in the United States. I discuss the ways that societal discourse and knowledge-producers are encouraging PA uptake and highlight the top-level policy concerns from privacy, security, and regulatory perspectives. I surface several provocative issues and outline a critical research agenda that extends these questions globally.