GC31G-01: Biogeoscience opportunities to address agricultural supply chain risk: observations, methods, and applications

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Food and agriculture is the largest global industry, at $7.8Tn annual value, and is also the least digitized industry. As a consequence, the inefficiencies in this industry are staggering: yield gaps below potential are 20-70% worldwide, and of the crops that are produced, 20-50% are lost from the time of harvest up to consumption. Where some frame the challenges in agriculture as "grow more with less," a more useful analysis is around risk and uncertainty. In emerging markets, lack of geospatial data makes it difficult to recommend improved seeds or fertilizers for particular locales, therefore risky to make operating loans, impossible to accurately price crop insurance, and ultimately poses challenges in making contracts for delivery to processors that bring ag products into the food system. In developed markets, the ever increasing demands around immediacy, transparency, quality, crop novelty and food safety are straining the capacity of growers and processors to keep up. We have come to see this as a challenge in developing predictions joining both buyers and sellers around a shared set of facts on harvest timing, total yield, and post harvest quality. While these challenges have been met historically from government agencies and marketing boards reporting seasonal and regional forecasts, in many instances these are insufficient for making critical operational decisions on short timescales. In this talk, we will present a new set of measurements and analytical tools that enable unprecedented granularity in predictions to reduce risk and uncertainty in the food and ag supply chain, with special attention to applications that have potential to be economically self-sustaining.