Geostatistical Integration of Yield Monitor Data and Remote Sensing Improves Yield Maps. (S04-ping640525-oral)

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Abstract:
The objectives of this study were to (i) examine whether spatially dense multi-spectral satellite imagery can improve the accuracy of yield maps and (ii) compare different geostatistical procedures for integrating yield monitor and remote sensing data to create interpolated yield maps. This study was conducted in two fields (irrigated maize and rainfed soybean) located in Nebraska with the imagery obtained near physiological maturity in 2002. Ordinary kriging (OK), cokriging (CK), simple kriging with varying local means (SKLM), and kriging with external drift (KED) were compared using yield monitor data as primary variable and three different vegetation indices as secondary variables. At both sites, SKLM performed best in terms of the precision of grain yield maps and maps that depicted true yield patterns. Compared to hand-sampled independent validation points, utilizing the most suitable vegetation index at each site and SKLM as interpolation method resulted in root mean squared errors of yield predictions of 0.892 Mg/ha for maize and 0.267 Mg/ha for soybean, which represented a nearly 20% relative improvement over OK. Incorporating the satellite image decreased errors associated with yield monitor operations and allowed better prediction in areas where no reliable yield measurements were available.

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