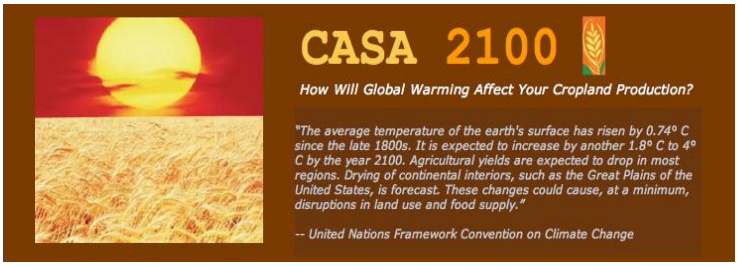

Potato Crop Production Monitored from Daily Satellite Sensor Data

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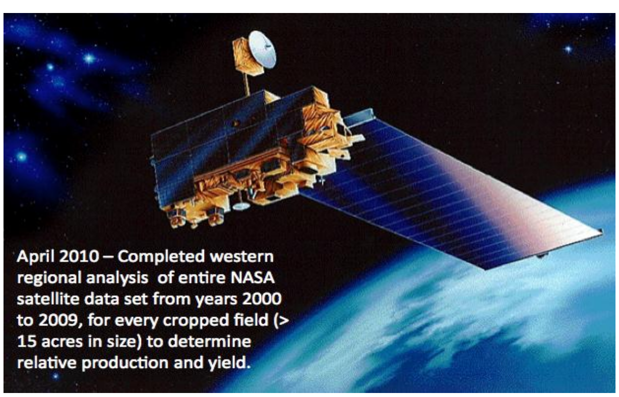
Background

Western growers face many challenges to the success of their field operations. Uncertainties in weather conditions and outbreaks of pathogens and pests are constant threats to production. The ability to accurately predict and prepare for changes in crop yields from one year to the next is a pressing need. Adapting growing practices to cope with climate change is now a concern for many field managers as well.

CASA2100 and the Satellite Yield Index (SYI)

CASA2100 is an operational system that begins from historical satellite remote sensing data collected at the level of individual agricultural fields. Crop yields are predicted from a combination of weather station records, soil properties, grower management data, and observed crop growth stage from satellite imagery. To support planning for sustainability, the linkages of crop yields from CASA2100 to field-level management practices can be ordered for *soil greenhouse gases, carbon offsets, nutrient uptake, and chemical leaching rates.*


April 2010 – Completed western regional analysis of entire NASA satellite data set from years 2000 to 2009, for every cropped field (> 15 acres in size) to determine relative production and yield.

Satellite observations uniquely capture the daily and seasonal dynamics of crop plants across a vast growing region. An optimized satellite yield index (SYI) has been developed for potatoes and other field crops, whereby the vegetation reflectance properties in multiple spectral bands can be combined to *track crop green cover and plant production throughout the year. S*atellite data covering the growing seasons of 2010 and 2011 has been extracted from the operational CASA2100 system and applied together with weather station records to predict tuber yield (in Figures below).

Figure 1. Comparison of (a) 2010 and (b) 2011 provisional Satellite Yield Index (SYI; darkest green-blue shades show highest values, i.e., highest potential crop planting and development) for late May in eastern Washington from the CASA Systems (Benton, Franklin, and Walla Walla Counties).

(a) 2010 (b) 2011

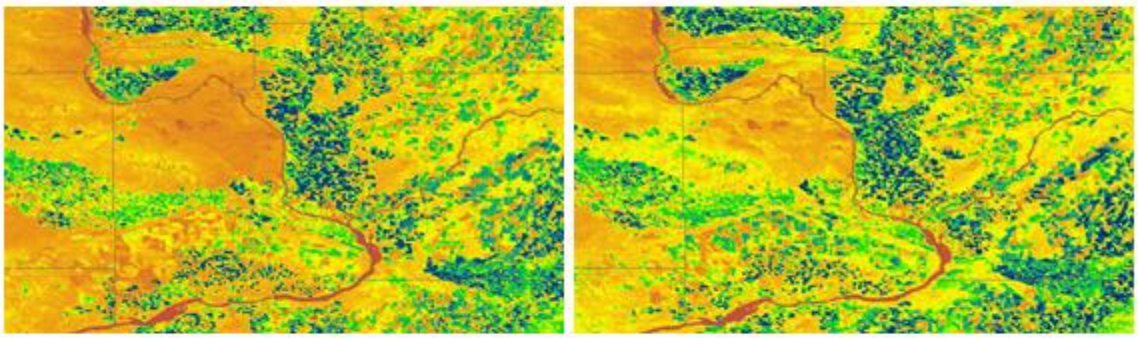
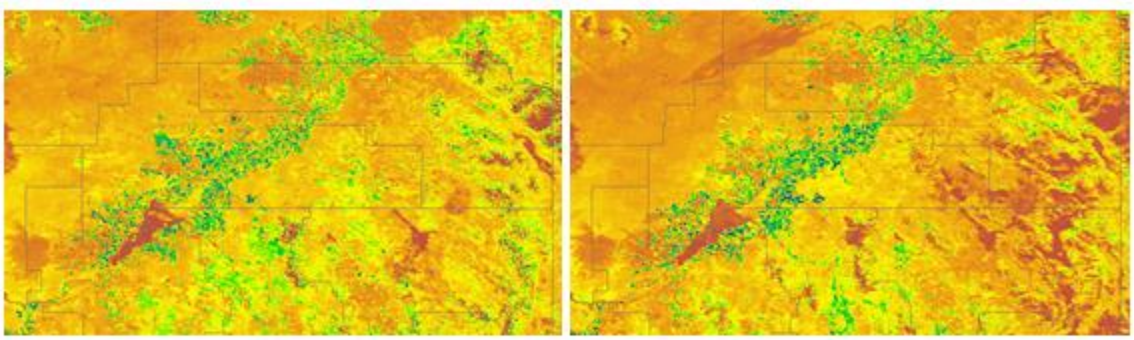


Figure 2. Comparison of (a) 2010 and (b) 2011 provisional Satellite Yield Index for late May in eastern Idaho from the CASA Systems (Bingham and Bonneville Counties).

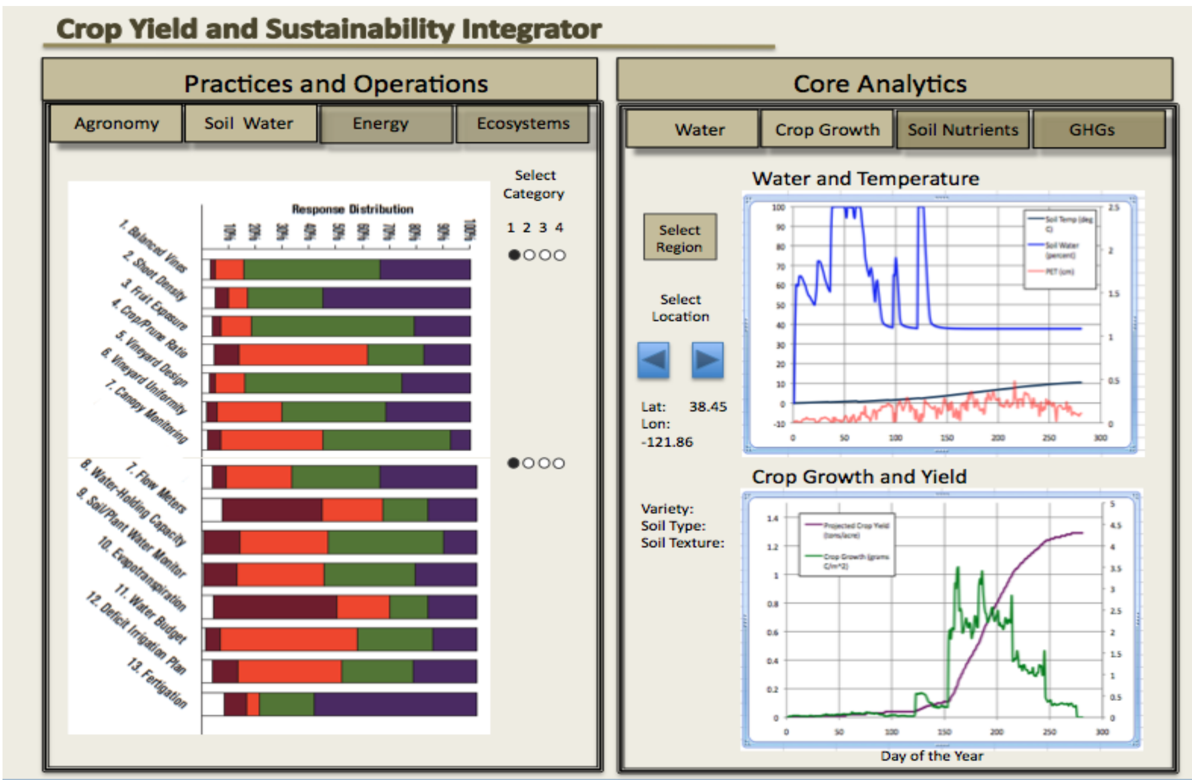
(a) 2010 (b) 2011



Operational Services Now Available from CASA2100

Services now available from the CASA2100 system include analysis of past and present satellite remote sensing data sets for estimation of crop yields at the individual field level, plus modeling* analysis of crop water use and soil greenhouse gas emissions (Example in Figure 2 below). Such data provision services include the delivery of digital daily summaries, namely estimates of ***crop production, annual crop yield, soil water and nutrient use, greenhouse gas (soil carbon dioxide and nitrous oxide) emission fluxes, for selected field locations or scaled-out for entire growing regions of the country***.

Figure 2. Prototype of CASA2100 display window for review and analysis of crop growth and yield predictions, according to reported management practices and field operations provided by growers. Multiple fields may be displayed for comparison of the outcomes of different grower management decisions.



* Based on CASA model as previously developed in 2007 and described in the peer-reviewed journal publication: Potter, C., S. Klooster, A. Huete, and V. Genovese, 2007, Terrestrial carbon sinks for the United States predicted from MODIS satellite data and ecosystem modeling, *Earth Interactions*, 11: 1-21.