Demonstration on Agricultural crop and land cover statistics

Gordon Reichert, Sylvie Michaud
Statistics Canada

October 3rd 2018
Context

- Official statistics are asked to present more timely and more disaggregated data

- Satellite imagery offers opportunities for official statistics and for the Sustainable Development Goals

- Today’s presentation will showcase what is being done in the agriculture program
Context

• Motivation for Statistics Canada:
  • Field Crop Reporting Series - farm surveys
  • estimates seeded area, harvested area, expected yield and production
  • under increasing pressure to reduce response burden and cost of the traditional surveys
  • maintain relevance, accuracy, timeliness, accessibility, interpretability and coherence.

• Objective: Develop a robust crop yield model for the principal field crops of Canada.
Develop a robust crop yield model for the principal field crops of Canada

• Three data sources:

1. Coarse resolution satellite data
   • 1km: AVHRR – NOAA (1987 – present)
   • 250 m: MODIS (2000 – present)

2. Historical and current year statistical survey estimates

3. Agroclimatic data
Partnerships

• Collaborative work
  • Statistics Canada and Agriculture and Agri-Food Canada

• Researched and evaluated existing models
  • Successful examples
    • European MARS Crop Yield Forecasting System
    • China Crop Watch
    • Regional yield forecasting products from Queensland,
    • Australia’s Agricultural Production Systems Research Unit (APSRU)

• Material Transfer Agreement
  • Agriculture and Agri-Food Canada’s yield model transferred to Statistics Canada
Develop a robust crop yield model

- StatCan modified the model within SAS

- Tested on 19 crops published within the September Farm Survey
  - Publication rules applied based on rules for data availability and quality
  - 15 crops published

- National Level
  - Provinces of Alberta, Saskatchewan, Manitoba, Ontario and Quebec
  - Accounts for about 98% of the agricultural land in Canada
First Data Source; Normalized Difference Vegetation Index: 1987-2018

November Farm Survey
Spring Wheat Yield:
2013: 56.5 bu/ac (record yield)
Normal: 30.8 bu/ac

http://geodepot.statcan.gc.ca/ccap-peec/start-debut-eng.jsp
Second Data Source: Survey data

Crop survey data by Small Area Data Region:

- Harvested area
- Yield
- Production

Historical: November Farm Survey

Current year: June, July, November Farm Survey

CANSIM Table 001-0071
http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=0010071&&pattern=&stByVal=1&p1=1&p2=50&tabMode=dataTable&csid
Third Data Source: Agroclimatic data

- 80 potential predictors; maximum number of input variables set at five
LOOCV completed by crop

- 19 crops (15 published)
- Census of Agriculture Region (82)
- Provincial level (10)
- National level (1)

- Equal to 1767 comparisons
Yield model in the global data platform

• Description of the model

• Video: to facilitate learning (under development)

• Links to FCGEO platform (Canadian geospatial platform)

• Sample data
Way forward

The use of satellite imagery offers opportunities

There is a need to accelerate learning, provide an environment where people can experiment, assess quality

The benefits of a platform might be in facilitating collaboration using trusted:

• methods
• data
• partnerships
Global Platform Crops Yield Project

Canadian Crops Yield...

Last modified: Oct 16, 2018, 2:20 PM
Owner: alexandrecyr

https://developers.officialstatistics.org/projects/gp
# Crops Yield Project

## Activity

<table>
<thead>
<tr>
<th>Type</th>
<th>Status</th>
<th>Message</th>
<th>Owner</th>
<th>Created</th>
<th>Last modified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create</td>
<td>Done</td>
<td>Project created</td>
<td>alexandrecyr</td>
<td>Oct 16, 2018, 2:20:34 PM</td>
<td>Oct 16, 2018, 2:20:34 PM</td>
</tr>
</tbody>
</table>
Crops Yield Project Files

Projects / Canadian Crops Yield Model (CCYM) / View

Files  Running  Clusters

Duplicate Rename Move Download View Edit

Files: tmp, anaconda_project.yml, AVHRR_r1km_2010to2014.zip, AVHRR_r1km_2015to2017.zip, Bands_Weeks_AVHRR_Semanos_Band.xlsx, StatCan_Yield_Model_2018_Dubai_final.pptx

Name  Last Modified
tmp  a day ago
anaconda_project.yml  a day ago
AVHRR_r1km_2010to2014.zip  19 hours ago
AVHRR_r1km_2015to2017.zip  19 hours ago
Bands_Weeks_AVHRR_Semanos_Band.xlsx  a day ago
StatCan_Yield_Model_2018_Dubai_final.pptx  a minute ago