ALBERTA INNOVATES

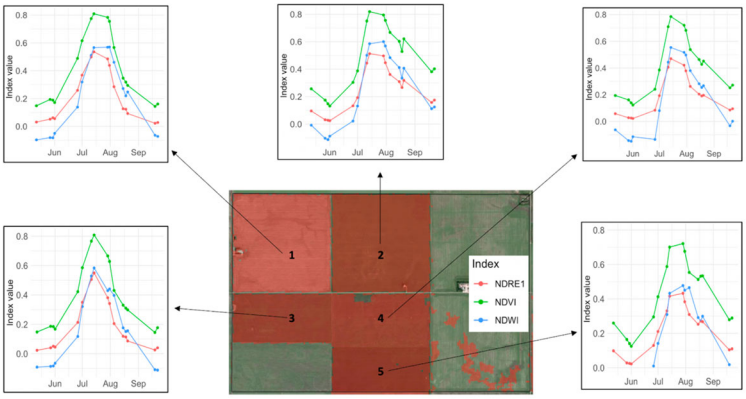
Clean Resources

SMART AGRICULTURE AND FOOD

Climate-smart agriculture: Big-data analysis to investigate what management practices work

Climate change and associated extreme weather events present a major challenge for food production. While farm management climate mitigation tools have advanced, climate adaptation tools and the understanding of climate resilient farm management practices have lagged. This project aims to develop the data sets and tools required to assess potential future climate impacts on crop production in the Canadian Prairie Provinces, as well as best management practices to help farmers adapt to climate change. This will be done by compiling data at regional and farm scales on weather, crop yields, and farm management practices for Alberta, Saskatchewan, and Manitoba.

Field-level satellite-based crop health analytics



FUNDING DETAILS

RECIPIENT:
The University of British Columbia
PI: Navin Ramankutty

PARTNERS:
Agriculture and Agri-food Canada

TOTAL BUDGET:
$369,355

AI FUNDING:
$298,320

PROJECT DATES:
February 2019 – January 2023

PROJECT TRL:
Start: 3
End: 5

APPLICATION

There have been several global-scale studies of the effects of climate change on crop production using statistical and crop models. However, such work has not been undertaken to the same extent in Canada, due to the lack of spatially resolved time series crop production data, and the lack of capacity in large-scale analysis methodology. This project will develop a new “big-data” analysis model to examine climate resilient farming practices in the Prairie Provinces.

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AGRICULTURE FUNDING CONSORTIUM

PROJECT GOALS

- Develop a big-data analysis model for the Canadian Prairie Provinces (Alberta, Saskatchewan, and Manitoba) to evaluate climate impact on crop yields (wheat, barley, canola), and to examine how farm management may help alleviate potential crop losses under different contexts.
- Develop an open code base, and easy-to-use methodology, and disseminate this to provincial governments and working groups, so that our analysis can be readily applied to other regions in Canada.

BENEFITS TO ALBERTA

- Increase the sustainability of Alberta's crop industry by anticipating climate change impacts and providing proactive management solutions.
- New knowledge on what kinds of farm characteristics or management practices (e.g., small, irrigated, diversified, uses crop rotations) lead to more climate resilient yields.
- Leadership in policy guidance for future agri-food programs (i.e., identification of policy incentives to mitigate adverse outcomes to our crop production capacity related to climate change).
- Provide a technology transfer package, including open code and methodology to other users and provinces to allow for national benchmarking of sub-provincial and provincial resilience to climate change in Canada.
- Develop leaders and collaborators in machine/deep-learning methods for predicting yield response at the farm/field-scale to climate trends, extreme weather conditions, and agronomic best management practices.

5 Scientific Manuscripts & 2 Presentations

2 Industry Communications

1 Policy Advisory Document

Open data & algorithms, adapted/novel methodology

5 Highly Qualified Personnel

CURRENT STATUS

May 2021

The team has compiled and harmonized regional-scale historical data for the Canadian Prairie provinces and have developed crop yield indices from satellite data. The team are working with statistical models to determine the influence of historical climate change and management practices on crop yields and forecasting the future impact of climate change on crop production. The team have added a model intercomparison project, working with scientists from Alberta Agriculture and Forestry, in which they will compare their statistical model predictions to those of Ecosys, a process-based model.