Extreme weather: envisioning Ontario agriculture

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What's this project about?

- create and deliver information about current and future climate extremes* that will affect Ontario's agriculture sector and rural communities
  - *what do WE mean by extreme?
- develop a decision support tool to characterize risk and vulnerabilities associated with climate change and extremes in agriculture, allowing users to plan for and mitigate risks by evaluating different adaptation choices

  - spatial scenario development – impacts on crops and livestock*
    - map-based, field-level mapping; expectations
    - data realities: weather stations (time), GCM resolution
    - how to translate what the weather data and climate models tell us into possible impacts to crops and livestock
- use of seasonal, phenology-linked indices with links to specific crops and operations

(some) Issues with existing information

- there are problems using limited weather data, or climate model projections, to characterize extreme weather
  - how extremes usually considered? (climate model variability)
  - spatial-temporal resolution of models ≠ farm-scale / local level planning

- many "challenges" making sense of existing data, dealing with gaps, figuring out which datasets are relevant to what locations

- after the data (and climate model predictions) are "cleaned up" and assigned to different parts of a study region, how do we make sense of them, and make them relevant to agriculture ?

- DISSEMINATE

Why focus on scenarios & phenological impacts?

- every climate change model run is a scenario, not a prediction

- those models lack spatial and temporal detail, **but** there is demand for information relevant to locally evaluating levels of risk and potential tradeoffs

- crop modelling typically focuses on yield,
  - usually work best at very local levels, have high data needs, assume conditions not changing

- focusing on **phenological impact** allows us to identify times when crops are particularly vulnerable to climatological events, and assign a typical impact to crop yield; concentrate on relative impacts rather than specific physiological processes

Study area: eastern Ontario

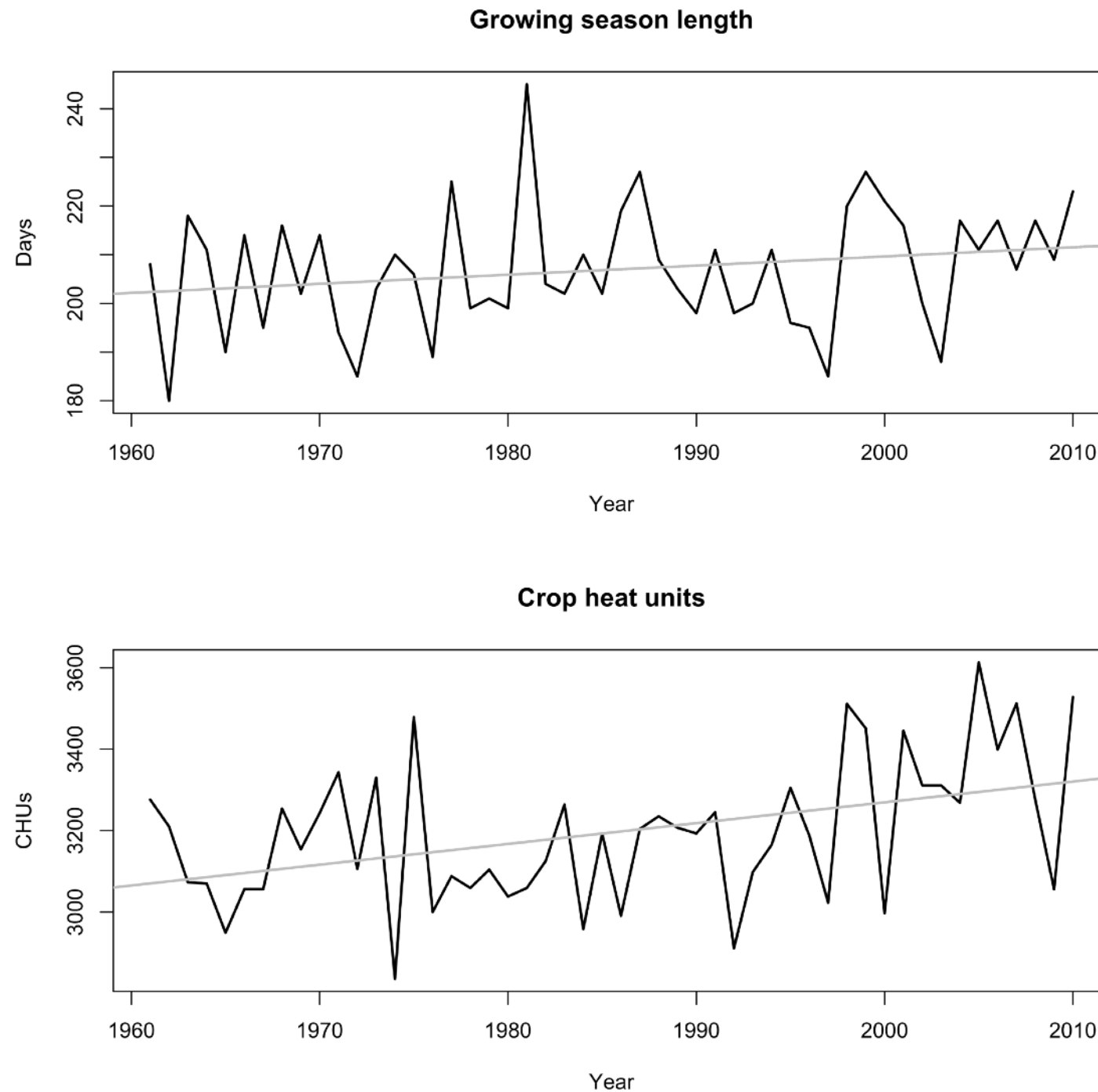A. Zaytseva's M.Sc. Thesis (Carleton University).
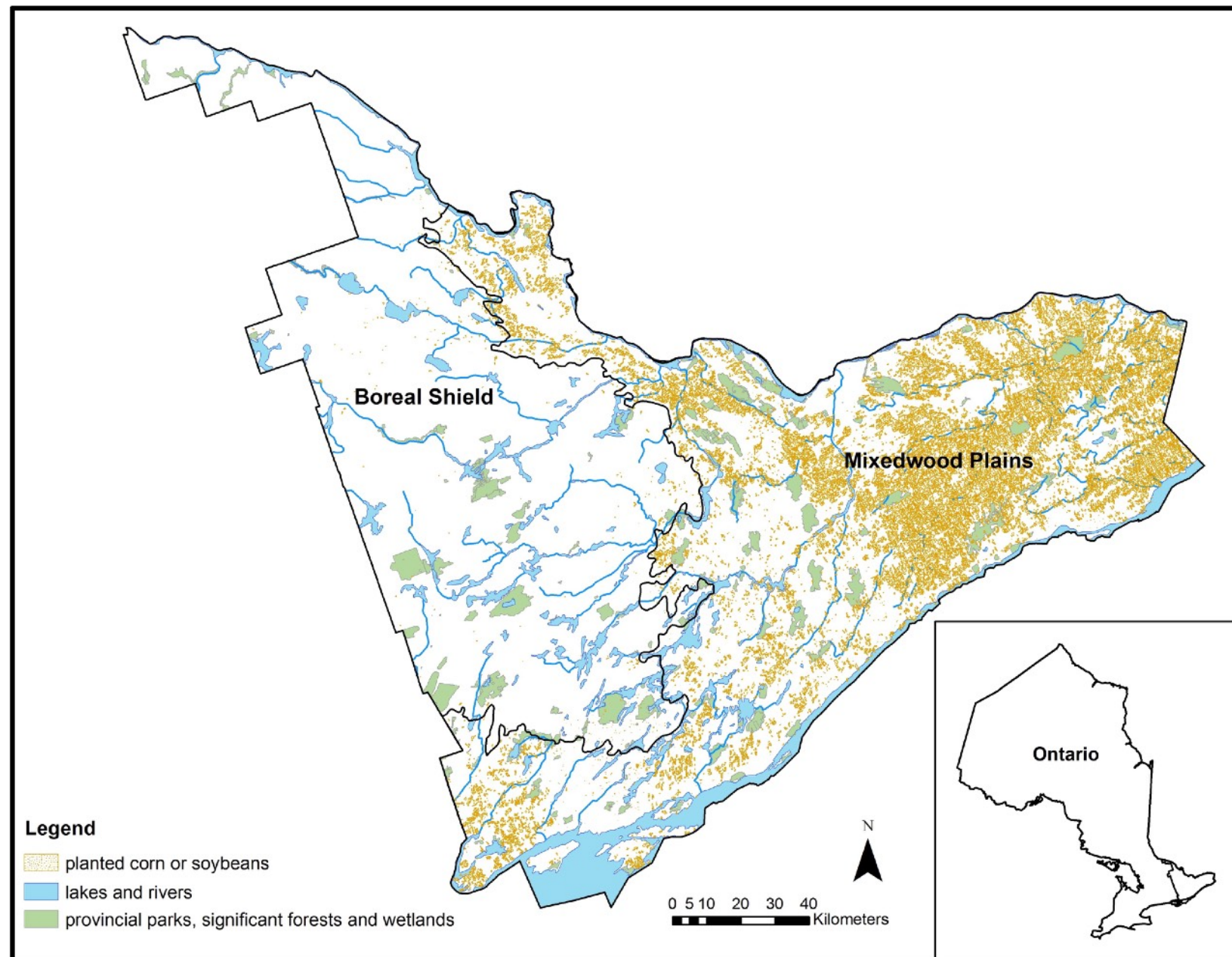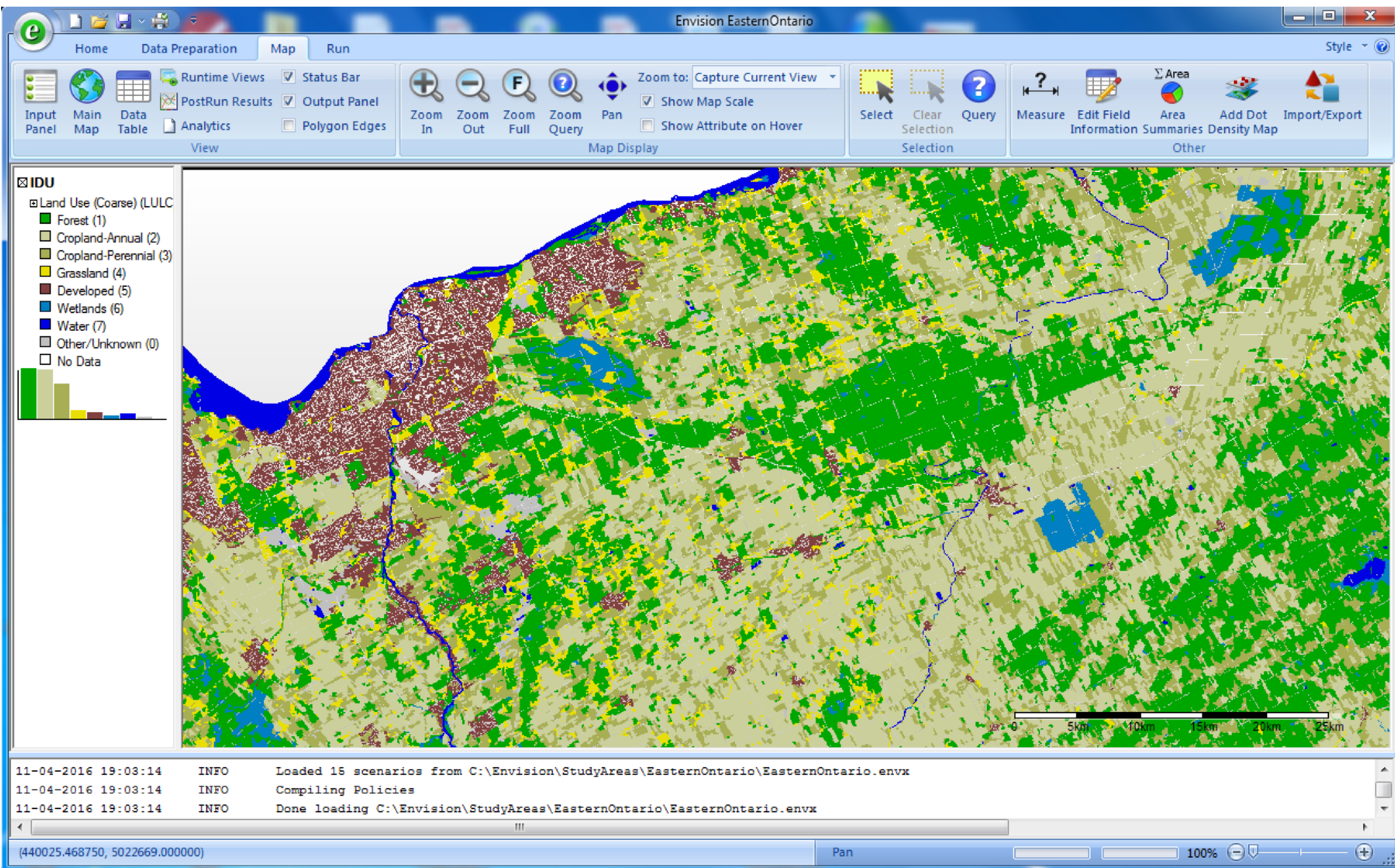
Indices derived from "just" weather data

- E. Ontario not expected to be a hotspot of weather extremes
  - but types of extremes of particular relevance in "regular" agricultural operations are not necessarily what people first think of as "extreme"

- "standard" indices are available to analyse and compare weather / extremes
  - useful to describe general trends

- some, however, mask processes that are important to agriculture

Why extremes? This is NOT the whole story!

A. Zaytseva's M.Sc. Thesis (Carleton University).

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"Scenario-based risk assessment decision support modelling tools for regional climate change and climate extremes, impacts and adaptation in agricultural watersheds" is a project funded by the Ontario Ministry of Agriculture, Food, and Rural Affairs' New Directions Research Program. One of our main objectives is to provide a clearing-house for information and resources that are useful for evaluating climate change in Ontario, starting with our pilot program in eastern Ontario.

Why are we here?

- Expand on invitation, motivation
- Introductions