MONTÉRÉGIE REGION | PORTRAIT

Climate scenarios and potential impacts on agriculture

This document summarizes the information and discussions covered in meetings of the Agriclimate project's regional working group. This information is still in the process of being analyzed and validated. It is considered preliminary.

The project

The purpose of the Agriclimate project is to make farmers and other agricultural stakeholders aware of the consequences of the changes in climate set to take place between now and 2050 in order to better brace themselves for the coming changes and adapt to them sustainably. The project is being conducted over a three-year period (2017–2020) and will result in the adaptation of regional climate change adaptation plans for agriculture developed in concert with actors in Quebec's agricultural sector.

A participatory approach

The Agriclimate project includes participation from over 150 people through nine regional working groups (RWGs) formed in each of the regions involved in the project. These groups are composed of farmers and other agricultural stakeholders from the region. The RWGs are tasked with using climate scenarios to identify the threats and opportunities associated with a changing climate as well as the adaptation measures for their agricultural territory that will have to be developed.

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Quebec farmers will be invited to participate in two workshops organized in their regions in the fall of 2018 and 2019. The first workshop will feature information about the region's future climate, and participants will be called on to propose solutions for adaptation at the local level. The project will conclude with a forum on the region's adaptation to climate change.

In the course of the project, six webinars will be made publicly available. The recorded webinars will be accessible on the **agriclimat.ca** website.

RWG tasks

The RWG held its first meeting in November 2017. A portrait of the climate changes expected in the region by the year 2050 was presented, and threats and potential opportunities for the region's farming operations were identified. A second meeting took place in spring 2018 to pinpoint on-farm adaptation measures. The RWG will meet again in 2019 to set priorities for the adaptation measures and to develop a regional adaptation plan for businesses and the farming territory.

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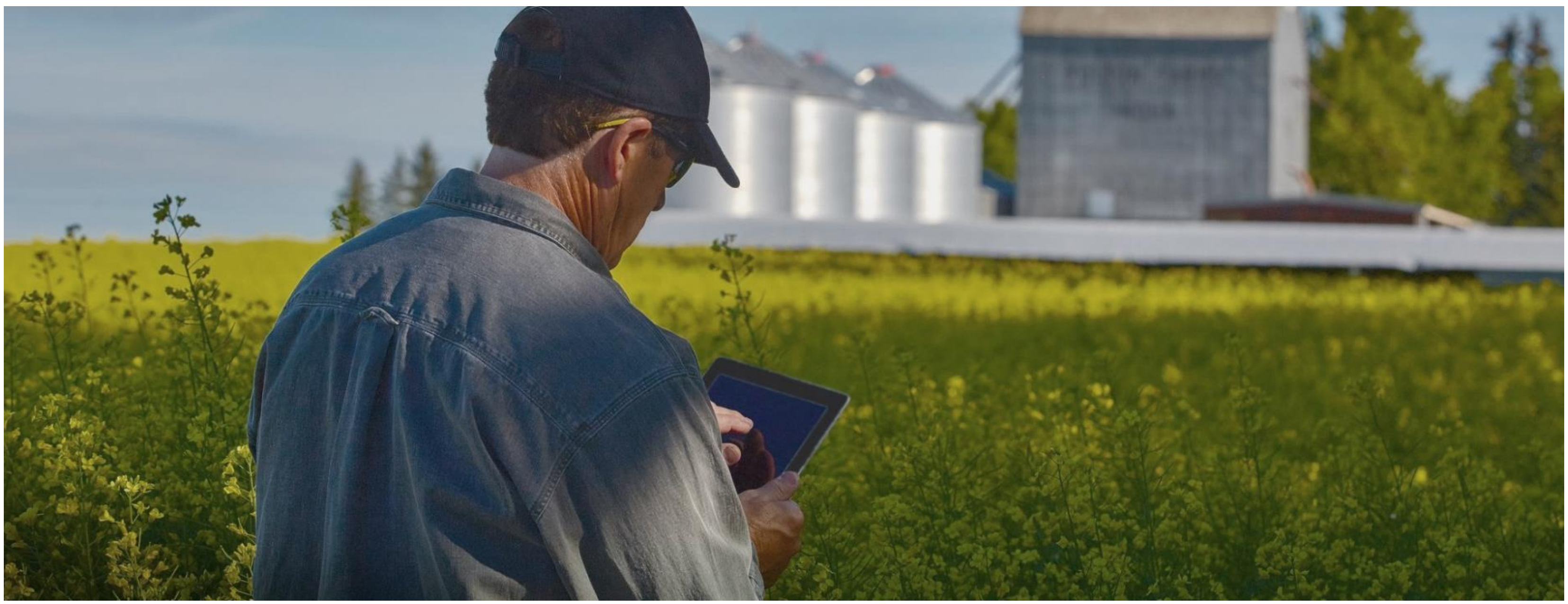
Where do the climate data come from?

One of the partners of the Agriclimate project is Ouranos, a Montreal-based consortium on regional climatology and climate change adaptation. The members of Ouranos used their expertise to prepare climate scenarios for each region and provide guidance on how to interpret them. A suite of climate simulations was analyzed to account for the uncertainty associated with future climate projections, particularly when it comes to future worldwide greenhouse gas (GHG) emissions as well as differences between the various climate models available. On the basis of this analysis, a summary climate scenario for the year 2050 was produced and presented to the RWG. This summary represents the median trend of the various climate projections. In addition to the median scenario presented for each indicator an associated uncertainty range was determined, being a product of differences in the climate models used to predict the future climate as well as the different hypotheses on levels of future greenhouse gas emissions.



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Natural weather variability

Each year has its share of weather-related surprises. The year 2017 will be remembered for its abundant rainfall, drought in certain regions, and a very warm fall season. The summer of 2018 was characterized by a near-total absence of precipitation and by scorching temperatures, with dramatic effects in multiple regions. Are these manifestations of climate change at work? Analyses must always be conducted over long periods, so it is impossible to answer this question exactly. Weather conditions have always been variable, with alternation between relatively warm and cool years, chiefly influenced by large cyclical phenomena. The weather we have observed in recent years is most likely a normal manifestation of this natural variability. If the climate continues along its current trajectory, the future will see worldwide temperatures increase regularly, with major variability in both temperature and precipitation. Quebec will not be spared from this general trend, and surprise weather conditions posing challenges for agriculture are certain to continue.

Major trends in Quebec's climate

Quebec's climate will continue to alter gradually, following historical trends that have already been observed in recent decades. However, the rhythm and intensity of climate change will increase as a function of changes in global GHG emissions.

By 2050, the following major trends are expected:

- Higher temperatures
- Longer growing season for plants
- More frequent extreme heat (days and nights) and longer heat waves
- Increased total annual precipitation
- Thinner snow cover for a shorter period of time
- More liquid precipitation in winter
- More frequent and more intense extreme rain events
- More precipitation in the form of localized and intense thunderstorm cells

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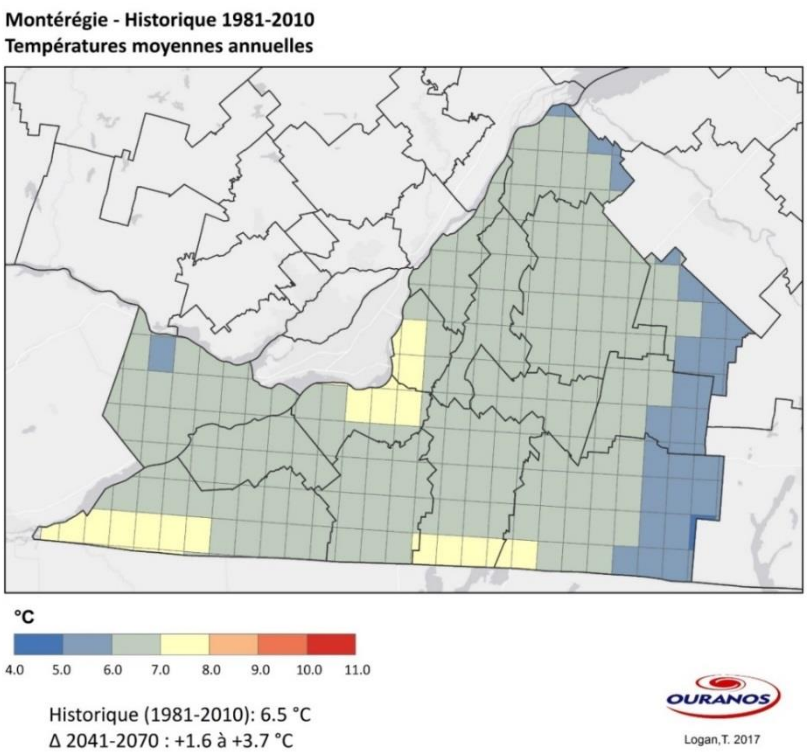
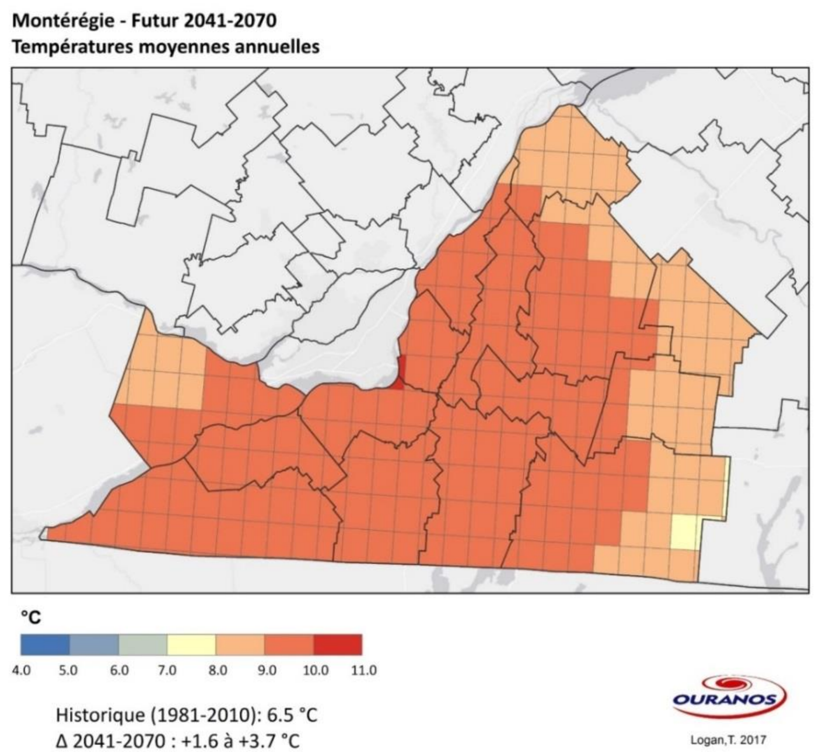
General trends for Montérégie

As part of the project, Ouranos produced climate scenarios for the administrative region of Montérégie. By 2050, the following median trends can be expected: an average annual temperature increase of 2.8°C and an annual total precipitation increase of 73 mm, bringing the average total annual precipitation to 1113 mm.

The two maps below show the annual average temperature. The map on the left shows the average value for the 1981–2010 period, while the one on the right shows the projections expected by 2050 (simulation period: 2041–2070). The range of 1.6 to 3.7°C, as indicated in the latter map, represents the uncertainty associated with future climate projections. The maps illustrate the temperature gradients that exist between the north and the south of the region, which should continue to exist in 2050 but with generally higher average temperatures.





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Average trends by season

Below are a few agro-climatic indicators for the Montérégie region calculated for the climate scenario that is plausible by 2050 (average projected values for 2041–2070). These values are compared to the historical average (1981–2010) where applicable. Bear in mind that there is some uncertainty associated with future climate projections and that these values represent median trends for the region as a whole.

WINTER	SPRING
▪ 41 fewer days of snow cover (historical: 124 days) ▪ Higher flow rates in streams ▪ More frequent winter thaws ▪ Less frequent cold snaps	▪ Earlier spring flooding ▪ Last frost date occurring 12 days earlier ▪ Growing season starting[1] 11 days earlier ▪ Growing season lasting 23 days longer (historical: 216 days) ▪ Cumulative heat increasing by 820 CHUs (historical: 3,221 CHUs) ▪ Slightly higher precipitation

SUMMER	FALL
▪ 24 more days with temperatures above 30°C (historical: 9 days above 30°C) ▪ More severe low-water periods in summer ▪ Similar precipitation levels ▪ More high-intensity rainfall events ▪ More acute moisture deficiencies as a result of increased evapotranspiration	▪ Growing season ending 14 days later, around November 27 ▪ First frost occurring 14 days later, around October 26 ▪ Similar precipitation levels

1 After winter, the growing season begins on the fifth day of a period of five consecutive days where the weighted moving average of the average daily temperatures is above 5.5°C. It ends on the fifth day of a period of five consecutive days where the weighted moving average of average daily temperatures is above 5.5°C for the last time following the summer season.

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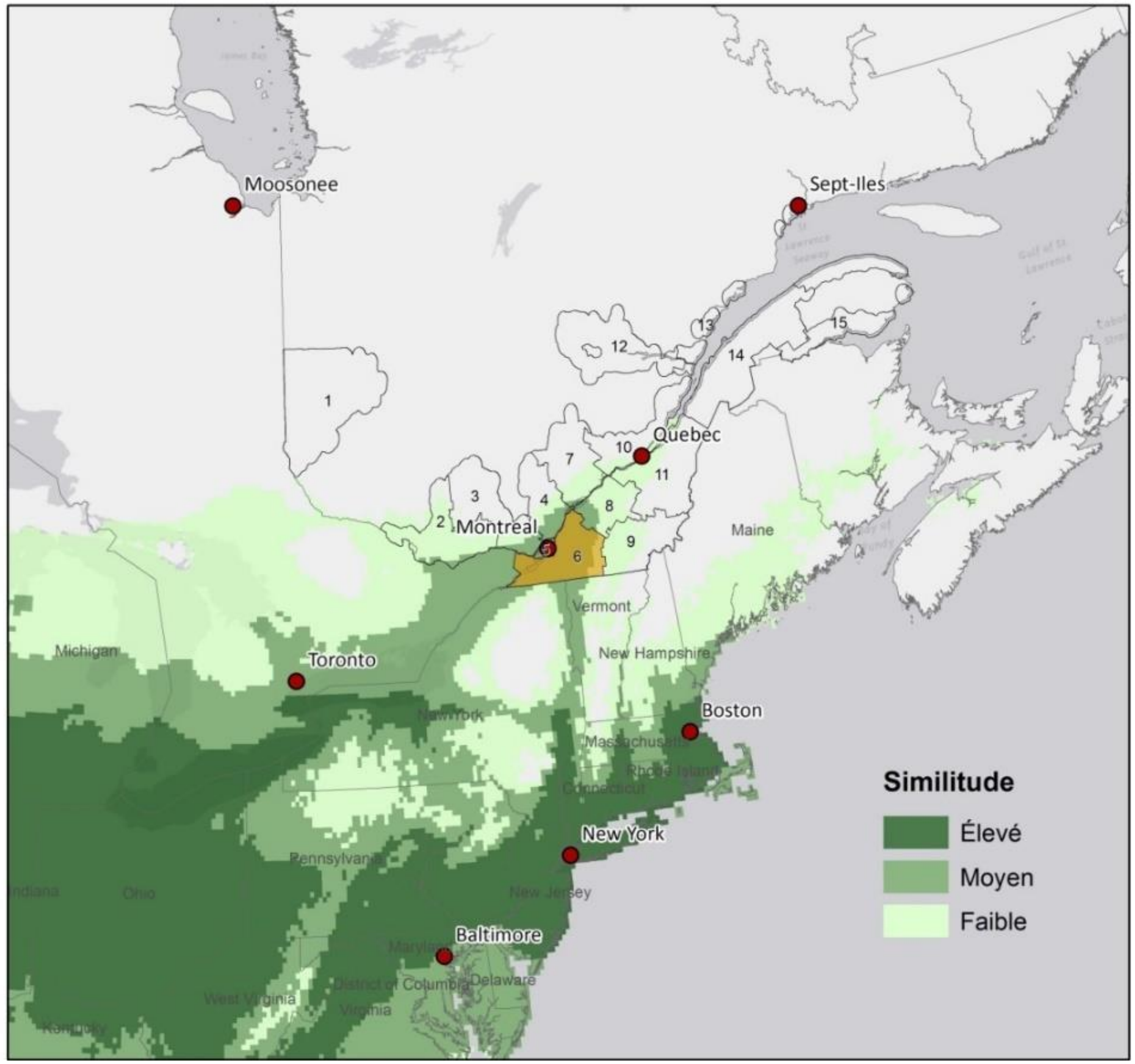
Comparing the future climate of your region to a known region

The following map shows the spatial analogues of your region, i.e., the regions that had a climate for the 1981–2010 period that is similar to what Montérégie is expected to experience in 2050. Note that similarity is assessed in terms of temperature and precipitation for the months of April to October.

The dark green colour indicates a high level of similarity. The orange zone is your administrative region. Therefore, its future climate could be similar to that of Ohio, Pennsylvania, and Indiana. By gaining familiarity with the reference analogue regions, we can use this information to consider the potential limitations and opportunities for agriculture.

Analogues spatiaux 2041-2070 (avril à octobre)



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Potential threats and opportunities for the region

RWG members listed the potential impacts of the climate changes in terms of threats and opportunities. They are summarized here:

- Risk to survival of forage plants and fall cereals as a result of winter thaws
- Longer growing season
- Earlier start to maple sap run
- Increased pressure from diseases and insect pests in crops
- Impact on choices of crop varieties as a result of higher summer temperatures
- Risk of soil erosion in episodes of intense rain
- Greater summer moisture deficiencies
- Greater challenges related to water management in the field
- Risk of more frequent thermal stress for animals

Adaptation measures

To address the threats, the RWG identified adaptation measures to be discussed with farmers in the region during the fall meetings. Certain measures will apply on individual farms, while others will apply across the region as a whole. Here are a few examples of measures that can be implemented at the farm level:

- Increase scouting of insects, diseases, and weeds in the field, and of pests in forests
- Keep soil covered at all times and adopt soil conservation methods
- Increase organic matter in soil and diversify rotations
- Establish and maintain effective riparian strips
- Participate in group watershed initiatives
- Improve biodiversity in areas surrounding fields, protect streams, and build infrastructure to store water for irrigation
- Increase irrigation efficiency, raise the mowing height, and plant windbreak hedging to conserve snow
- Adjust animal feed during heat waves
- Improve ventilation and install cooling systems in livestock buildings
- Improve the health of forest stands through sustainable management practices
- Improve maple harvesting techniques

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Agriclimate ambassadors

Agriclimate is a project initiated by Quebec farmers. The project, headed by the Conseil pour le développement de l'agriculture du Québec (CDAQ), is made possible thanks to funding provided by the Green Fund as part of Action-Climat Québec, a program from the Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques (MDDELCC). The program is an outcome of the 2013–2020 Climate Change Action Plan. The project receives support from the following partners: Ouranos, the Union des producteurs agricoles (UPA), the regional UPA federations, Groupe Uniconseils, the Regroupement des Organismes de Bassins Versants du Québec (ROBVQ), the Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec (MAPAQ), the Institut de recherche et de développement en agroenvironnement (IRDA), the David Suzuki Foundation, and Nature Québec. If you have any questions, please contact Sarah Delisle, Project Coordinator, and/or visit **agriclimat.ca** website.

Resource people in your region

A pair of facilitators—one resource from the regional UPA federation and one agrologist from an agri-environmental advisory club—will be overseeing the project as it unfolds in your region, coordinating the RWG, and organizing meetings with farmers. The resources for your region are:

- Caroline Charron, B.Sc., UPA Montérégie Federation. Phone: 450-774-9154, ext. 5215
  Email: **ccharron@upa.qc.ca**

- Patricia Leduc, agr., Agri Conseils Maska. Phone: 450-252-4636, ext. 261
  Email: **p.leduc@agriconseilsmaska.com**

If you have any further questions about Agriclimate, please contact the project coordinator:

SARAH DELISLE, agr.
CONSEIL POUR LE DÉVELOPPEMENT DE L'AGRICULTURE DU QUÉBEC
UPA Headquarters | 555 Boul. Roland-Therrien, Suite 100
Longueuil, Quebec, J4H 3Y9
Phone: 450-679-0540, ext. 8754 | **sarahdelisle@cdaq.qc.ca**

Annexe | Références

- Ouranos (2015). *Vers l'adaptation. Synthèse des connaissances sur les changements climatiques au Québec*. Partie 1 : Évolution climatique au Québec. Édition 2015. Montréal, Québec : Ouranos, 114 p.
- Ouranos (2015). *Vers l'adaptation. Synthèse des connaissances sur les changements climatiques au Québec*. Partie 2 : Vulnérabilités, impacts et adaptation aux changements climatiques. Édition 2015. Montréal, Québec : Ouranos, 234 p.
- Charron I. (2016). *Guide sur les scénarios climatiques : utilisation de l'information climatique pour guider la recherche et la prise de décision en matière d'adaptation*, Édition 2016. Ouranos, 94 p.
- Ouranos (2018). *Annexe A – Méthodologie du portrait des changements climatiques pour les régions agricoles du Québec*. Montréal, Québec : Ouranos, 18 p.