



PROGRAM: SUPPORT FOR INFO-CRUE

PROJECT START DATE AND LENGTH
SEPTEMBER 2020 • 24 months

INFORMATION

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FUNDING

Environnement
et Lutte contre
les changements
climatiques



CONTEXT

Changes in land use alter the exchange of energy and water between the atmosphere and the earth's surface. For example, the conversion of forest into agricultural land changes the reflectivity and roughness of the surface, as well as its capacity to retain and release water through evapotranspiration. These biophysical effects have a significant influence on climate at regional and global scales. However, regional climate models respond very differently to such land use changes.

OBJECTIVES

- Assess the sensitivity of the Canadian Regional Climate Model, Version 5 (CRCM5) and the Canadian Land Surface Scheme (CLASS) to a severe land use change, namely complete afforestation or deforestation of non-desert regions;
- Quantify the biophysical effects of these land use changes in North America and Europe by comparing the responses of various regional climate models and land surface models;
- Share the data generated in order to assess the impact of land use on flooding.

METHODOLOGY

- Produce ERA-Interim driven CRCM5 simulations over two domains, North America and Europe, with two vegetation covers: fully forested (Forest) and deforested (Grass), following the Land-Use and Climate Across Scales (LUCAS) protocol;
- Compare the climatology of the Forest and Grass simulations to assess the sensitivity of CRCM5 and CLASS to this severe land use change;
- Compare the results of the CRCM5/CLASS simulations over the European domain with the ensemble of simulations produced by LUCAS;
- Initiate a concerted comparison of various regional climate models and land surface models as was done for LUCAS, but for the North American domain;
- Compare the set of simulations produced over the North American domain with the LUCAS ensemble for Europe to assess the transferability of the results.

EXPECTED RESULTS

This project will evaluate the ability of the Canadian Regional Climate Model (CRCM5) and the Canadian Land Surface Scheme (CLASS) to represent the climate impacts of land use changes. It is the first step towards assessing the historical and future impact of land use in Phase II of the project. The simulations produced will also be used to assess the impact of land use on flooding using hydrological models.

BENEFITS FOR ADAPTATION

Many climate change adaptation and mitigation measures involve changes in land use, including urban planning, agricultural practices, the planting of trees or crops for bioenergy or carbon capture, and the restoration of natural ecosystems. This project will assess the regional climate impacts of such actions, such as changes in precipitation regimes and extreme temperatures. The project's hydrological component will assess the impacts of land use changes on water regimes, including flooding.