Historically, the collection of rainfall data was done from precipitation stations throughout the territory. Although these provide a direct measurement of precipitation, the low density of the rain gauges and the short time period which any given measurement applies to significantly limit our ability to represent and analyze the spatial and temporal structure of rainfall events, particularly with respect to the most intense events. However, a characterization of extreme rainfall events at fine spatial and temporal scales is often necessary to assess the impacts of atmospheric phenomena on regional natural ecosystems, or for the design of hydraulic structures. To our knowledge, few studies have examined these scaling laws from large sets of observations. Verifying to which degree these relationships between the different scales apply to various datasets could possibly generate information about precipitation at spatial and temporal resolutions not covered by existing data.

**OBJECTIVES**

- Verify the existence of scaling laws from multiple datasets at different spatial and temporal resolutions;
- Study the evolution of scaling laws for future climate;
- Determine the impact of natural climate variability and climate cycles on estimators of intense rainfall.

**METHODOLOGY**

- Verification of the existence of scaling laws and multi-scales on different datasets for the North American territory and determination of distributions usable to estimate rainfall intensities.
- Construction of intensity-duration-frequency (IDF) curves from the distributions retained.
- Comparison of estimates from series based on numerical models (reanalyses and historical regional climate simulations) with estimates based on observed series.
- Comparison of the scaling laws of the future period (2070–2100) with those obtained for the historical period (1960–1990) from regional climate projections.
- Application of the detection of a trend or of cycles in order to determine the impact of natural climate variability and climate cycles on intense rainfall estimators.

**EXPECTED RESULTS**

The project will develop knowledge on the scaling laws of extreme rainfall events from the analysis of a set of data (observations) and regional climate simulations, and assess how these scaling laws will be modified in future climate.