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Atmospheric Hazards in Prairie and Northern Region

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www.hazards.ca

- Weather hazards significantly impact Canadian society and infrastructure.
- Initially developed for Ontario to assist municipalities in identifying and assessing their atmospheric hazards for emergency planning.
- Expanded nationally.
- PNR started developing content in 2007.
- The information is presented in graphical and map formats. Supplementary datasets for selected locations are also available.





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Welcome to the Canadian Atmospheric Hazards Network

A portal to five regional Hazards sites across Canada:

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Every year, Canadians are impacted by severe weather events such as snowstorms, severe thunderstorms, wind storms, heat waves and tornadoes. Damage to or loss of homes, properties and businesses as well as disruption and damage to electrical, communication and transportation systems can result from these storms. Heat waves and cold spells can be hazardous to human health.



The

numbers and costs of extreme weather events, particularly the more infrequent weather-related disasters, are on the rise globally and in Canada. The social and economic toll from the weather disasters can be staggering. During the 1st week of January, 1998, a crippling Ice Storm impacted about 25% of Canada's population in Ontario, Quebec, New Brunswick and Nova Scotia as well as 7 states in the Northeastern U.S. In 2010, it remains Canada's costliest weather disaster with total insured damages estimated at over \$5 billion and 28 human fatalities in Canada. Ontario's most expensive weather disaster



occurred on August 19, 2005 when extreme rainfall resulted in destructive flash flooding in Toronto and 2 tornadoes struck northwest of the City. Damages exceeded \$500 million in insured losses, also marking this as the second most expensive insurance storm event in Canada's history.

Major weather disasters have occurred from coast to coast in Canada and are etched in Canadians' memories due to their devastating impacts. The Pine Lake tornado that struck central Alberta in July 2000 tragically took the lives of 12 people when it struck a campground and trailer park. On August 20, 2009, 18 tornadoes crossed southern Ontario, a record number of tornadoes observed on one day in Canada. The tornadoes left one boy dead and a trail of destruction that included extensive damage to 600 homes in the City of Vaughn, just north of Toronto, with 38 of these homes declared unsafe and demolished.





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Welcome to the Prairie and Northern Region Atmospheric Hazards Website

Provincial and territorial emergency legislation in Prairie and Northern Region (**Alberta, Saskatchewan, Manitoba, Northwest Territories** and **Nunavut**) identifies the need to produce emergency management plans. In order to create effective plans, decision makers must be aware of the types of atmospheric hazards their jurisdictions are at risk for, and understand the climatology of these events.

Prairie and Northern Region (PNR) encompasses more than 50 percent of Canada's landmass. The landscape is diverse and spans many eco-climatic regimes including the Grasslands zone in the south, the Boreal, the Sub-Arctic, and Arctic regime in the North.

A variety of weather extremes impact this region throughout the year. Severe thunderstorms occur during the summer with a high frequency over the prairies. Weather phenomena associated with these storms include large hail, heavy rainfalls, lightning, flooding, tornadoes and other damaging winds. All of these phenomena exact heavy annual tolls in crop, infrastructure and other property damage, and all too often in human lives. The Pine Lake Tornado of July 14, 2000 in Central Alberta resulted in 140 injuries, 12 fatalities and \$13 million in damages. The impacts and economic losses due to drought on the Prairies in the agricultural, environmental and hydroelectric sectors are significant.

The Northern region is often subjected to storms in the fall and winter seasons giving rise to strong winds that can be channelled by local topographic features, to heavy precipitation that can be in various types, and to hazardous blowing snow and low visibilities. Winter ice roads are critical links to the south for communities and mine and exploration sites. Shorter winter road seasons due to climate change will impact the transportation of construction equipment, and goods such as food and fuel.

The Atmospheric Hazards portal for Prairie and Northern Region (PNR) was developed by Environment Canada's Adaptation and Impacts Research Section and the PNR Sciences Section. The site was developed to assist municipal, provincial and territorial governments in identifying and assessing their atmospheric hazards for emergency planning. To begin exploring the data, choose one of the hazards on the left menu or choose a specific site by clicking [here](#).

Data used in the analyses were extracted from Environment Canada's National Climate Data Archive. Only climate and weather observing stations with at least 20 years of record for the specific hazard were used.

http://www.climate.weatheroffice.ec.gc.ca/climate_normals/index_e.html





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Tornadoes

By definition, a tornado is a vortex extending downward from a cloud base, which is associated with deep, moist convection from the Earth's surface. A vortex may be intense enough to cause damage at one or more points along its path.

The majority of tornadoes are short-lived and produce little damage: bent and uprooted trees, damaged windows, and damage to weak structures such as barns and sheds. Some tornadoes, however, can be so violent that they cause buildings to collapse, debris to be scattered, and, unfortunately, loss of life.

Tornadoes vary widely in intensity levels and are classified using the Fujita Scale:

- **F0 - Light:** winds of 64 to 116 km/hr.
- **F1 - Moderate:** winds of 117 to 180 km/hr.
- **F2 - Considerable:** winds of 181 to 252 km/hr.
- **F3 - Severe:** winds of 253 to 330 km/hr.
- **F4 - Devastating:** winds of 331 to 417 km/hr.
- **F5 - Incredible:** winds of 418 to 509 km/hr.
- **F6 - Inconceivable:** winds in excess of 510 km/hr.

A **Tornado Watch** is issued by Environment Canada when severe thunderstorms have developed and there is the possibility of one or more tornadoes developing within the areas and times specified in the watch.

A **Tornado Warning** is issued by Environment Canada when one or more tornadoes are occurring in the area specified or detected on Doppler radar. The expected motion, development, and duration will be given in the warning.

Maps

Tornado analyses were completed on data provided primarily from volunteer severe weather observer reports. It's important to note that the results may not accurately describe all actual events over the entire region since weather reports are primarily obtained from the most densely populated areas of the region. The occurrence of a tornado is verified through several types of evidence, including damage surveys, videos, photographs, and eyewitness accounts.

Tornadoes during the period of 1970 - 2009 were plotted by occurrence within each of the individual Environment Canada public forecast regions for the following maps:

Total tornado occurrences per public forecast region (PNG). (Prairie) (North)

Total tornado occurrences per public forecast region (PDF). (Prairie) (North)

Periods of confirmed and probable tornado occurrence (PNG).

(Prairie) (1970's) (1980's) (1990's) (2000's)

(North) (1970's) (1980's) (1990's) (2000's)

Periods of confirmed and probable tornado occurrence (PDF).

(Prairie) (1970's) (1980's) (1990's) (2000's)

(North) (1970's) (1980's) (1990's) (2000's)

The following maps depict total tornado occurrences between 1970 and 2009 in the Prairie and Northern Region, based on Fujita scale ratings:

All confirmed and probable tornadoes (PNG).

(Prairie) (1970's) (1980's) (1990's) (2000's) (1970 - 2009)

(North) (1970's) (1980's) (1990's) (2000's) (1970 - 2009)

All confirmed and probable tornadoes (PDF).

(Prairie) (1970's) (1980's) (1990's) (2000's) (1970 - 2009)

(North) (1970's) (1980's) (1990's) (2000's) (1970 - 2009)

Confirmed and probable weak tornadoes (PNG). (Prairie) (North)

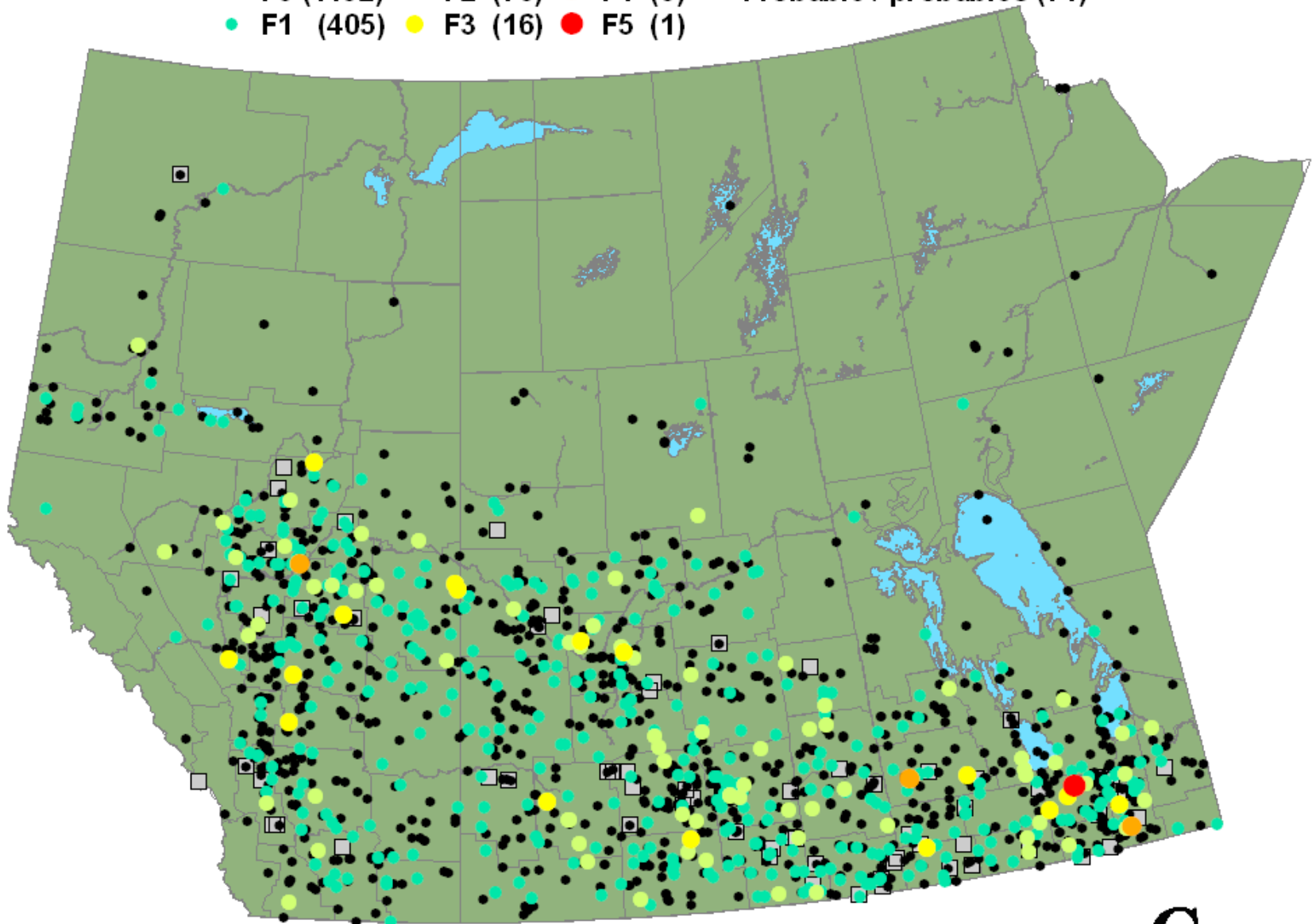
Confirmed and probable weak tornadoes (PDF). (Prairie) (North)

Confirmed and probable significant tornadoes (PNG). (Prairie) (North)

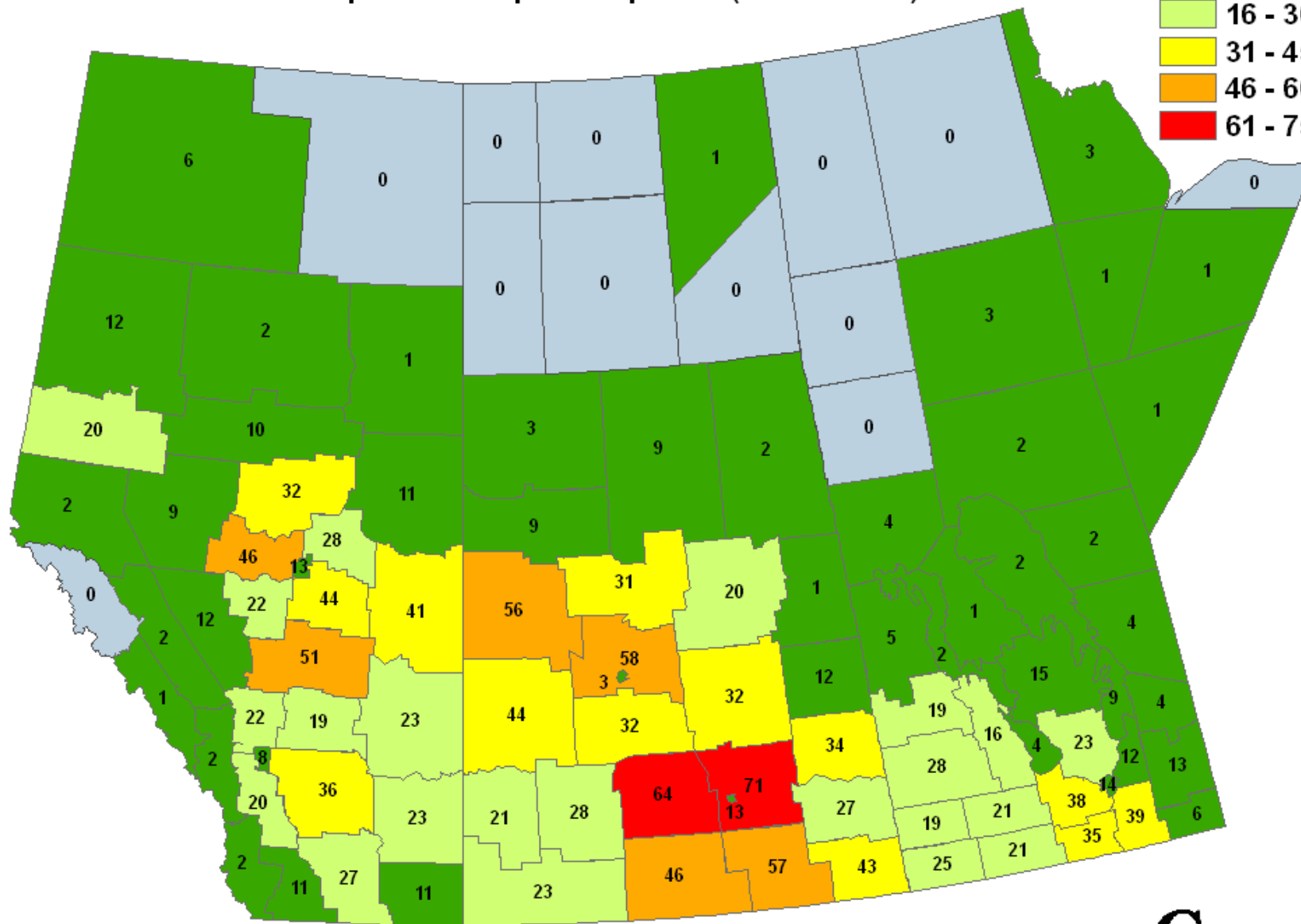
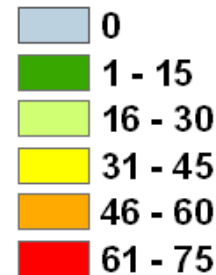
Confirmed and probable significant tornadoes (PDF). (Prairie) (North)

All confirmed and probable tornadoes by Fujita Scale
Tornades confirmées et probables par l'échelle de Fujita (1970 - 2009)

- F0 (1132)
- F1 (405)
- F2 (73)
- F3 (16)
- F4 (3)
- F5 (1)
- Probable / probables (71)



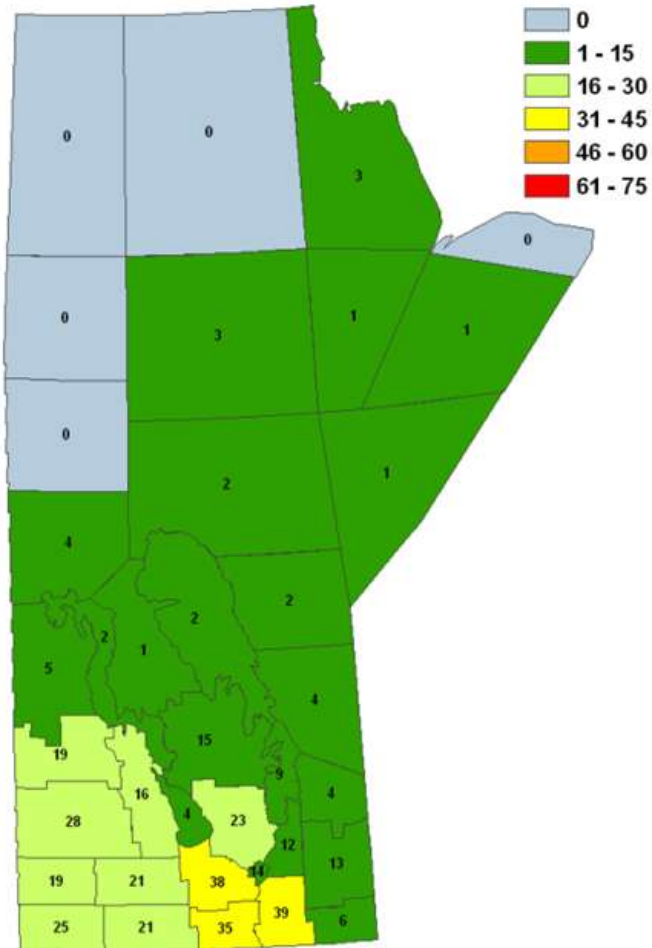
Total tornado occurrences per public forecast region
 Nombre total de tornades, regroupées par région de prévisions pour le public (1970 - 2009)



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**Total tornado occurrences per public forecast region
Nombre total de tornades, regroupées par région de prévisions pour le public (1970 - 2009)**




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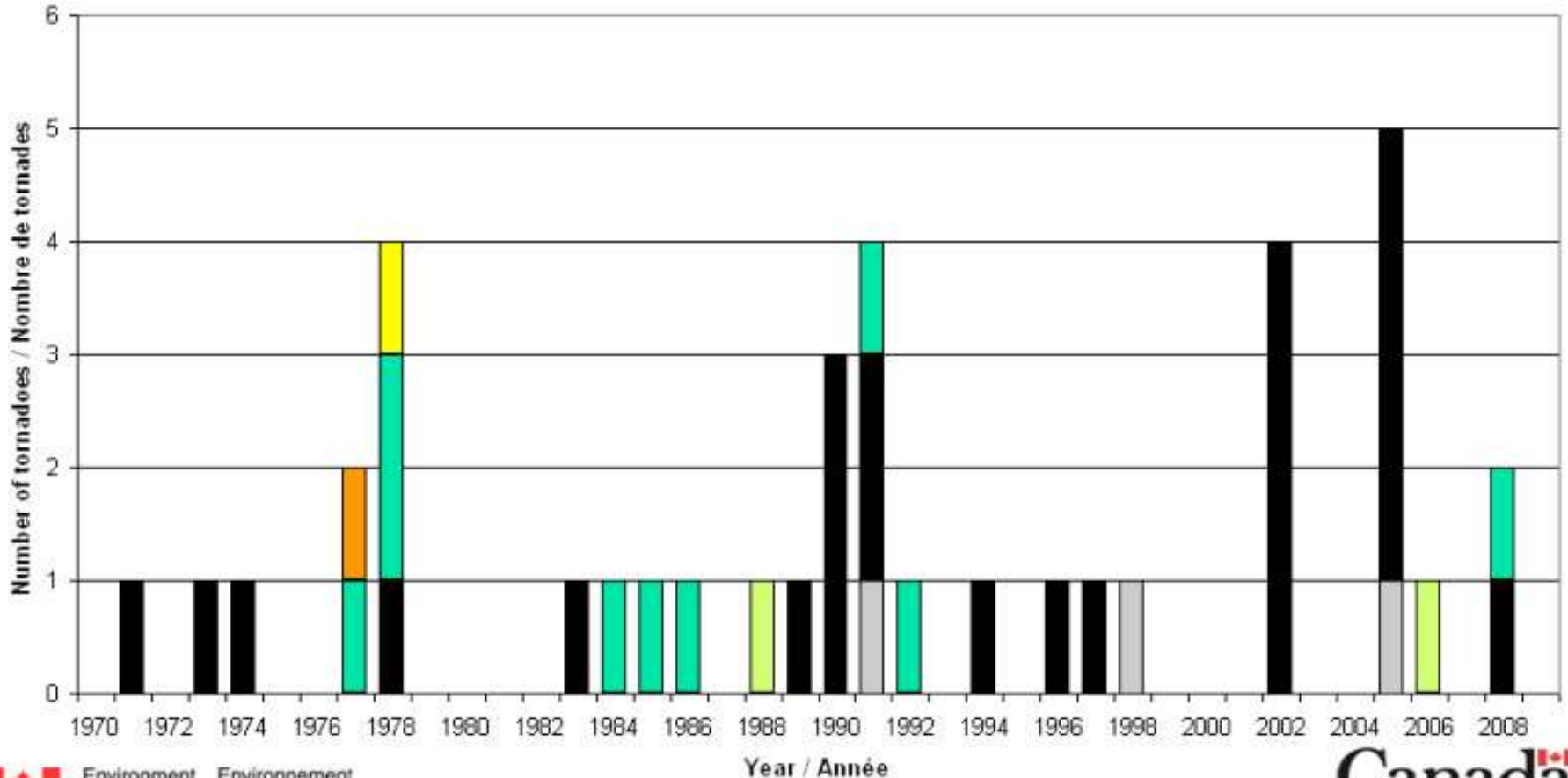
Charts

Manitoba tornadoes. (Year) (Month) (Month (significant))

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All Confirmed and Probable Tornadoes By Fujita Scale /
 Tornades confirmées et probables par l'échelle de Fujita
 Steinbach-St. Adolphe-Dominion City-Vita-Richer
 (1970 - 2009)

Probable / probables
 F0
 F1
 F2
 F3
 F4
 F5



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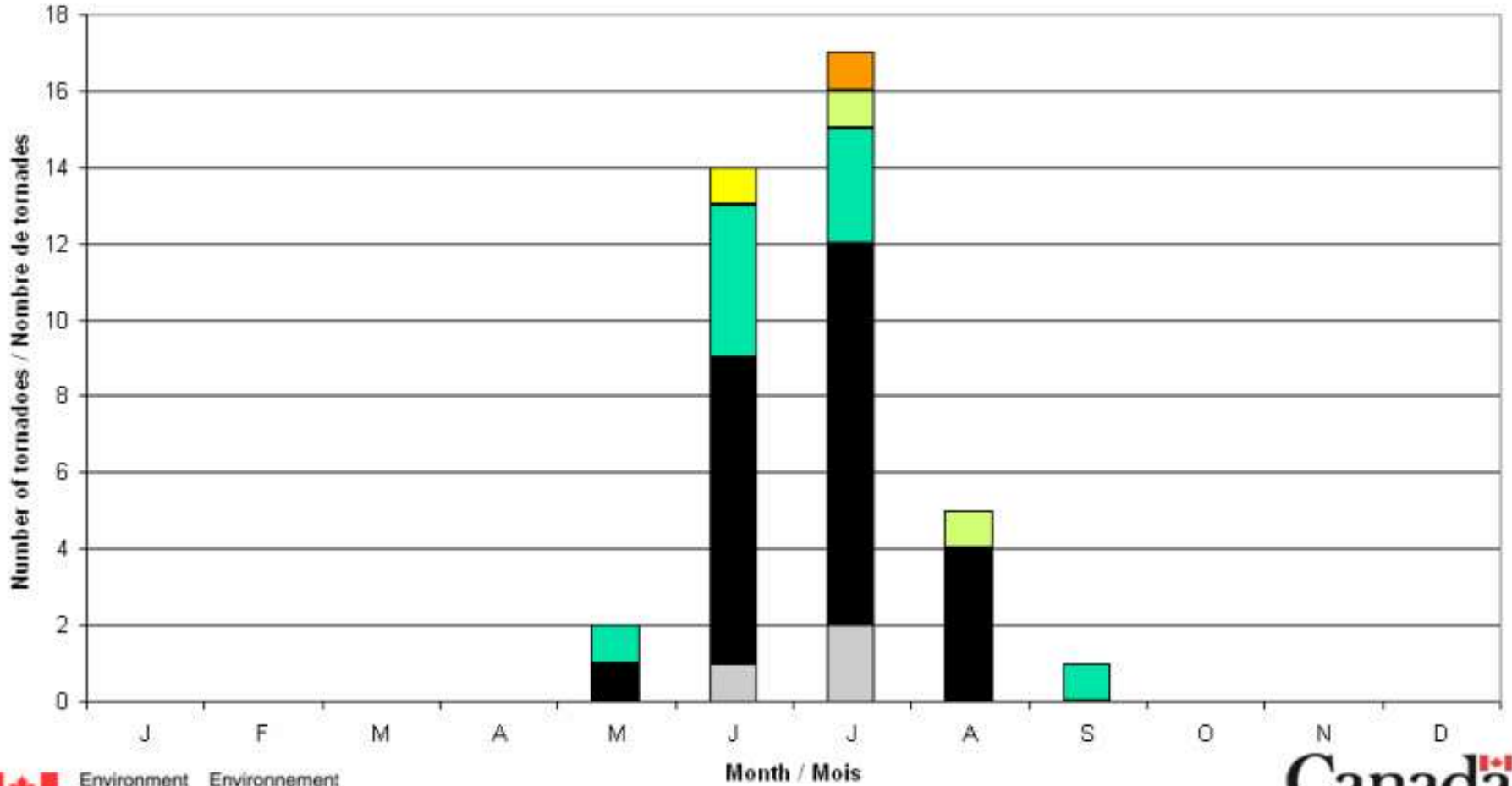


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All Confirmed and Probable Tornadoes By Fujita Scale /
 Tornades confirmées et probables par l'échelle de Fujita
 Steinbach-St. Adolphe-Dominion City-Vita-Richer
 (1970 - 2009)

Probable / probables
 F0
 F1
 F2
 F3
 F4
 F5





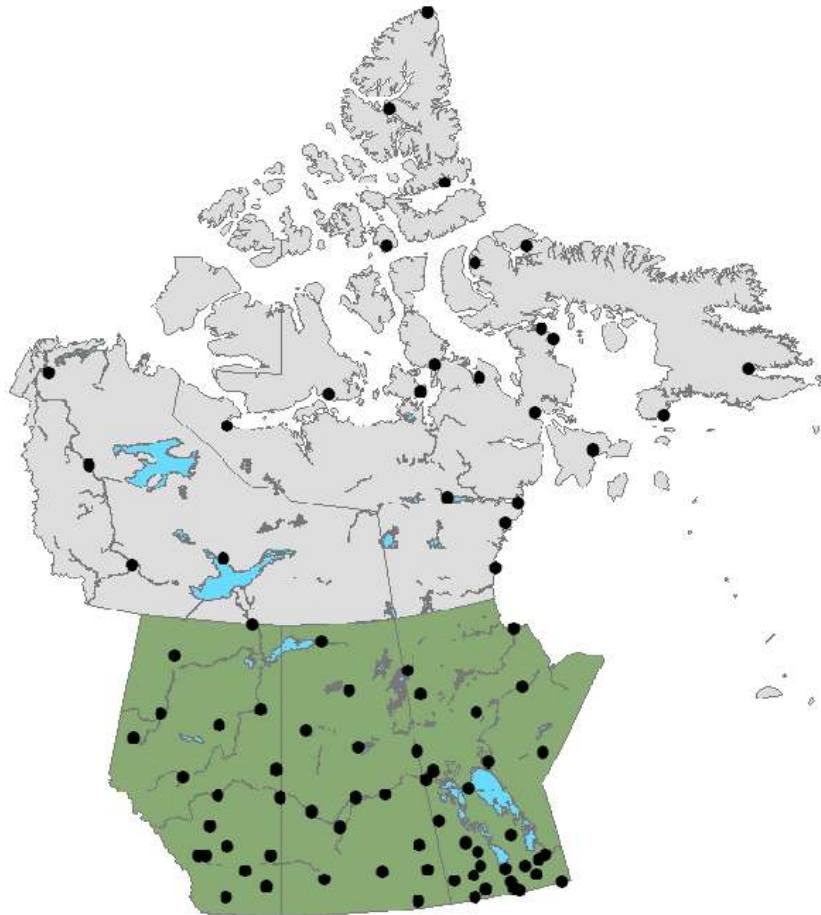
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Click on a site below to view that individual station's data.





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Dauphin, MB

Lat/Long: 51 ° 6' N 100 ° 3' W

Snowfall (1971 - 2002) [Charts](#) [Text](#) [Missing Data](#)

Rainfall (1971 - 2002) [Charts](#) [Text](#) [Missing Data](#)

Rain on Snow (1971 - 1995) [Text](#)

Hail (1971 - 1993) [Charts](#) [Text](#) [Missing Data](#)

Extreme Cold (1971 - 2005) [Charts](#) [Text](#) [Missing Data](#)

Wind Chill (1971 - 2005) [Charts](#) [Missing Data](#)

Freezing Precipitation (1971 - 1994) [Charts](#) [Text](#) [Missing Data](#)

Extreme Heat (1971 - 2005) [Charts](#) [Text](#) [Missing Data](#)

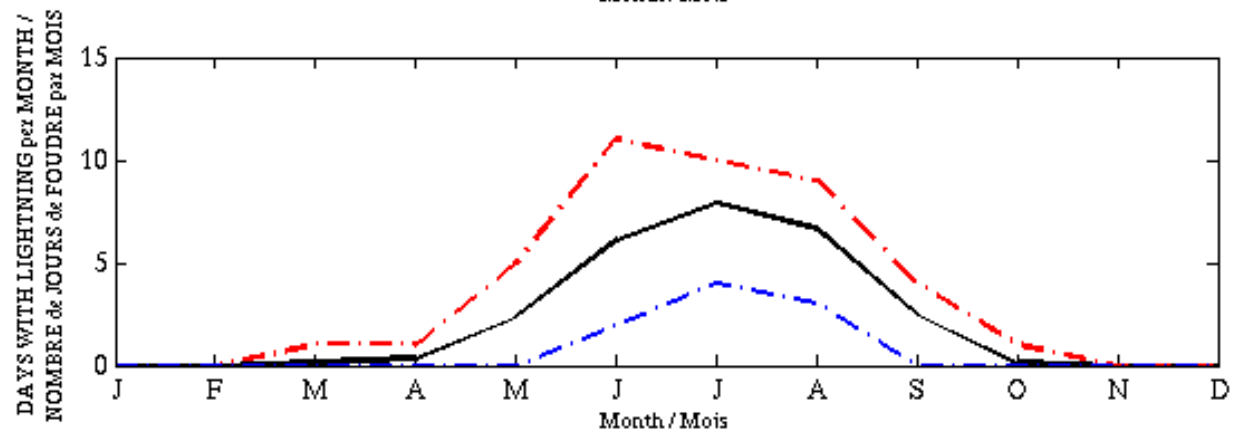
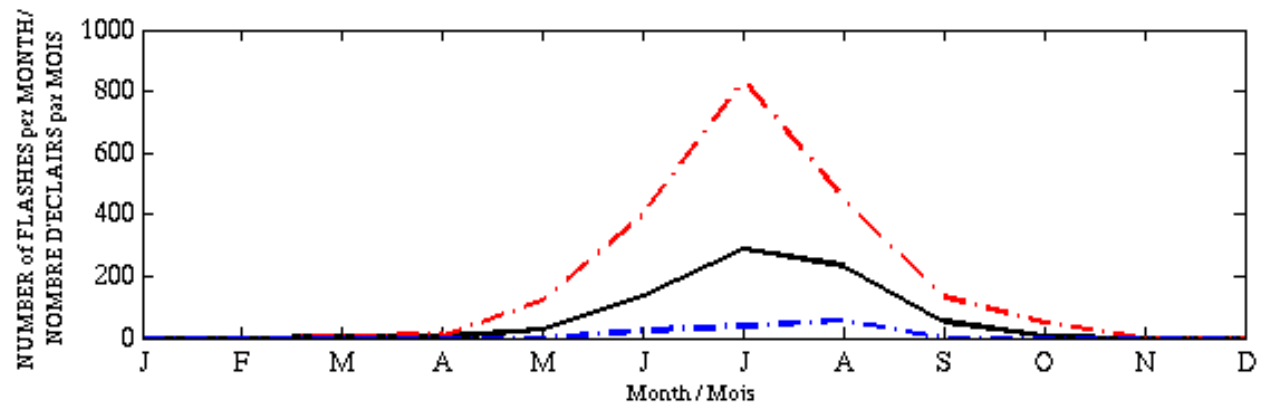
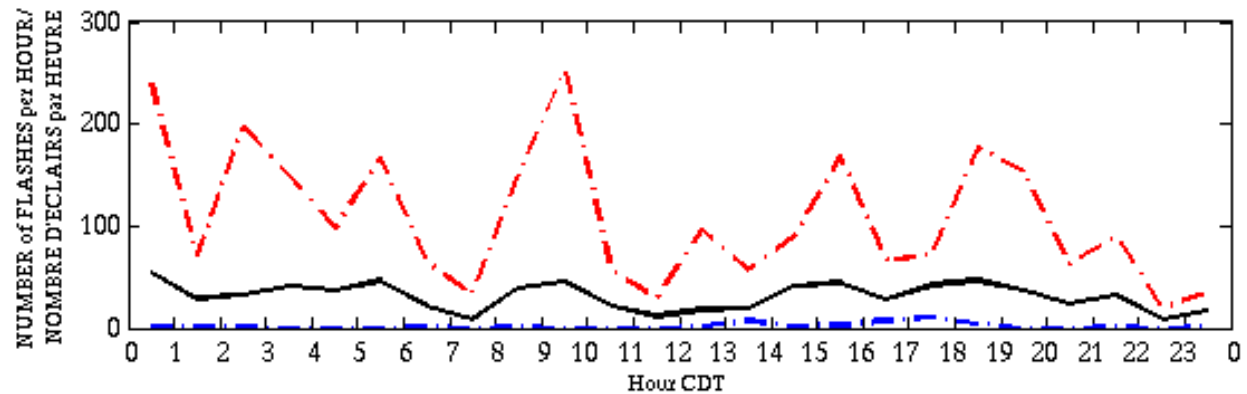
Humidex (1971 - 2005) [Charts](#) [Missing Data](#)

Lightning (1998 - 2006) [Charts](#)

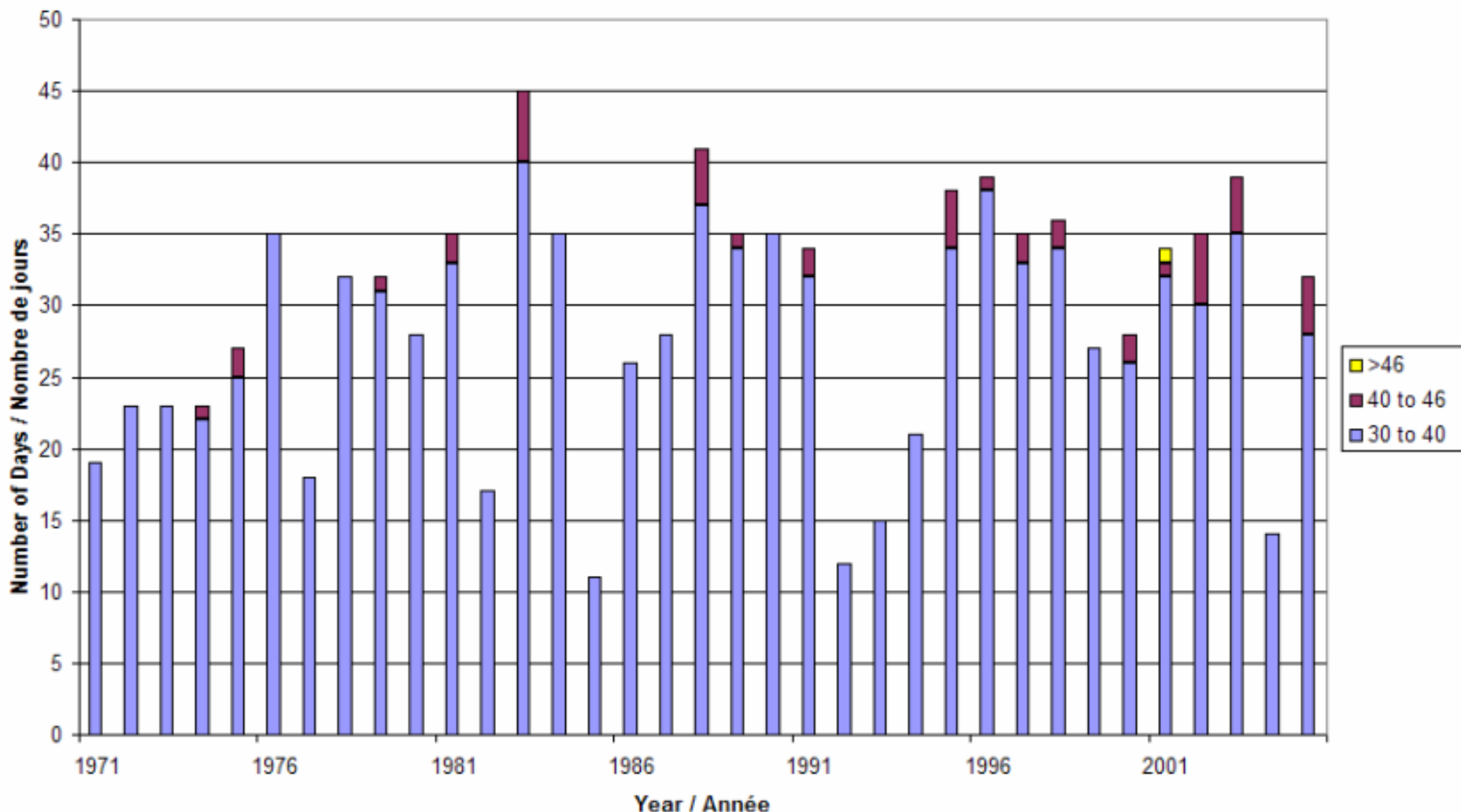
Wind (1971 - 1993) [Text](#)

Fog (1953 - 2002) [Charts](#) [Text](#)

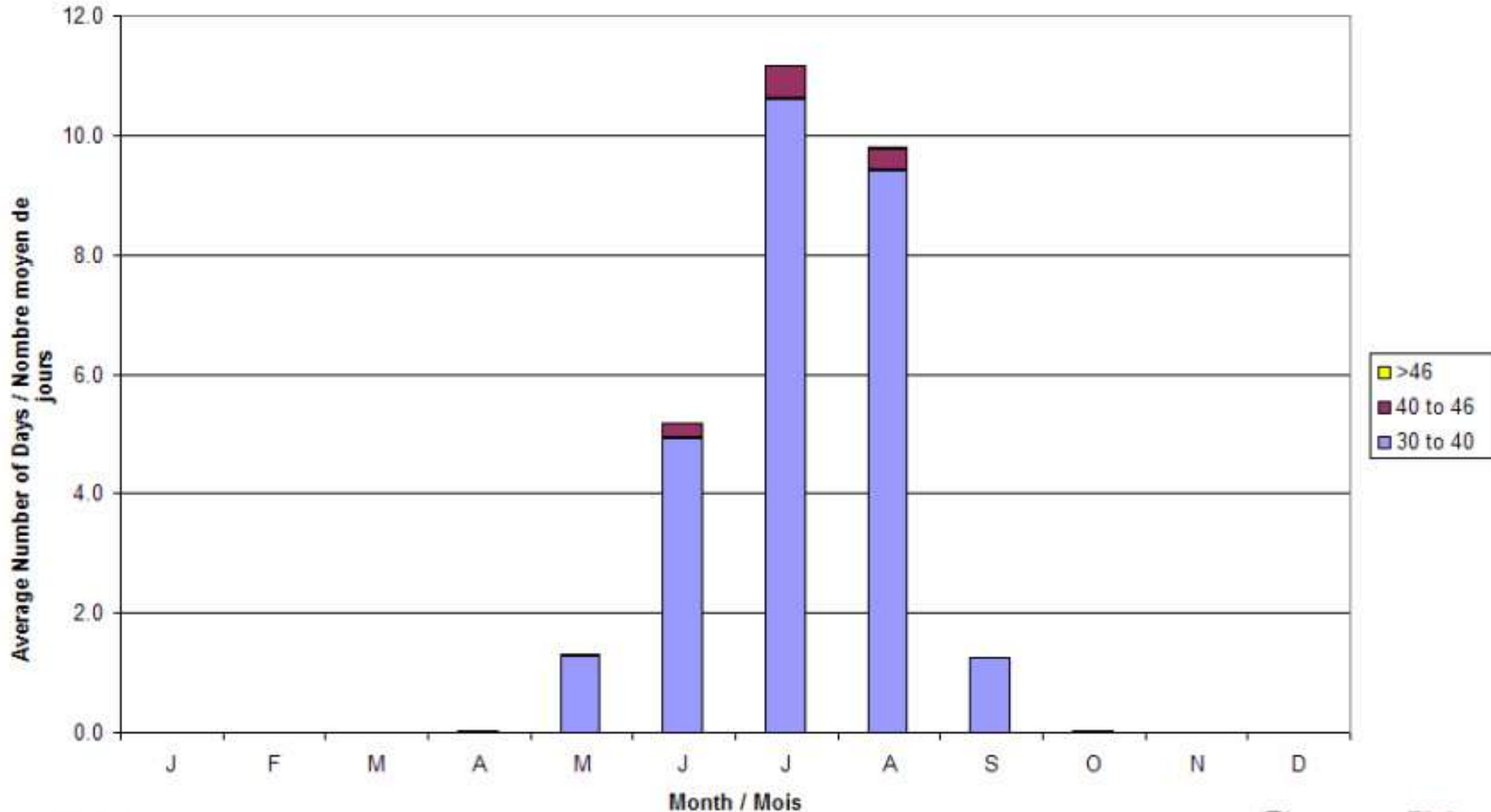
Dauphin A: 1998-2006 Annual Maximum, Mean, and Minimum in 20 km Radius Around /
 Maximum, moyenne, et minimum annuel dans un rayon de 20 km de



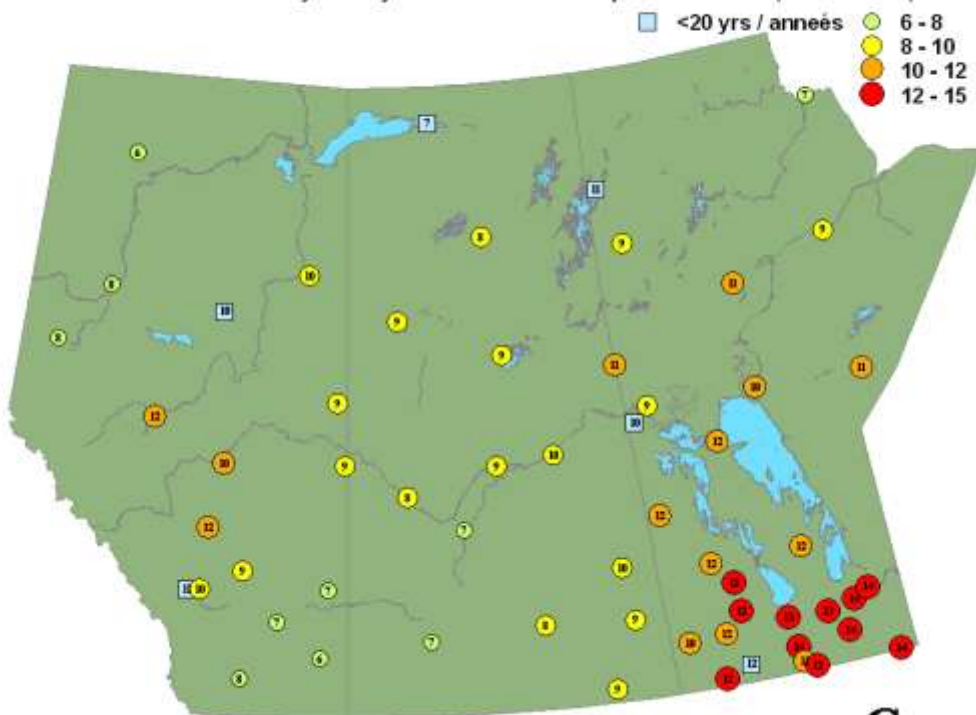
**Number of days per year with humidex ≥ 30 for Dauphin, MB /
 Nombre annuel de jours avec l'indice humidex ≥ 30 pour Dauphin, MB
 1971- 2005**



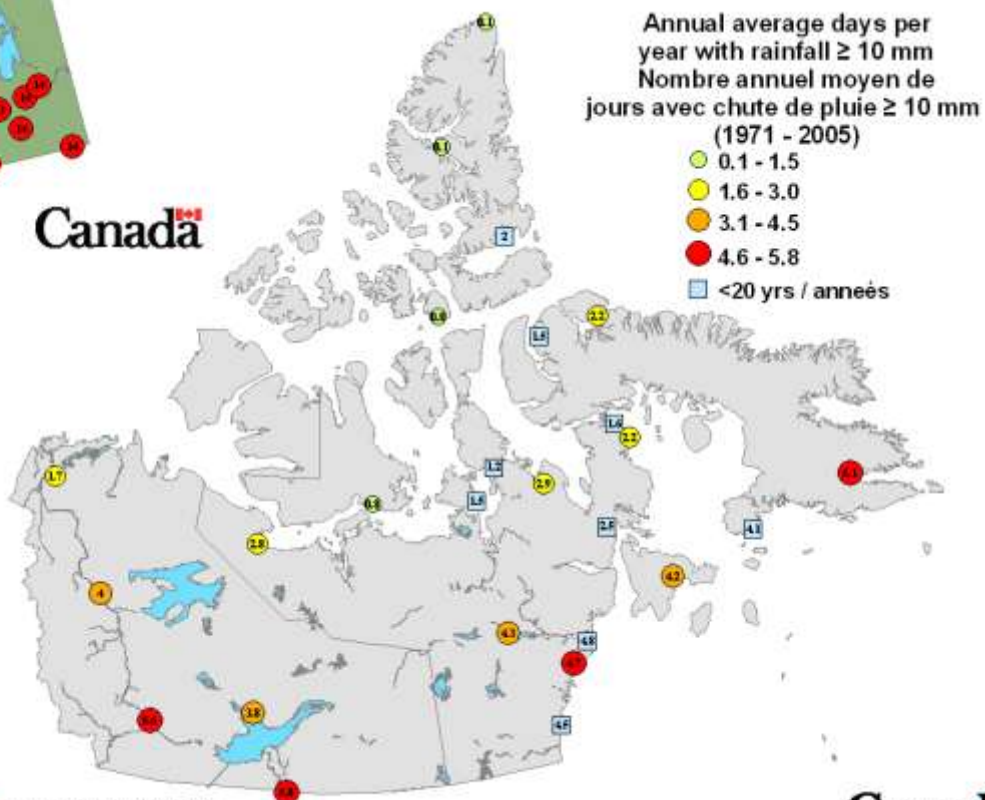
Average number of days per month with humidex ≥ 30 for Dauphin, MB /
 Moyen mensuel du nombre de jours avec l'indice humidex ≥ 30 pour Dauphin, MB
 1971- 2005



Annual average days per year with rainfall ≥ 10 mm /
 Nombre annuel moyen de jours avec chute de pluie ≥ 10 mm (1971 - 2005)



Annual average days per year with rainfall ≥ 10 mm
 Nombre annuel moyen de jours avec chute de pluie ≥ 10 mm
 (1971 - 2005)



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