

Mean Total Precipitation

Abstract

Over much of the continental interior of Canada, precipitation reaches its annual maximum in the summer months and falls as rain. October marks the transition from mainly rain to snowfall across northern Canada. The map shows the seasonal mean precipitation in the months of January, April, July and October.

January precipitation across Canada is mainly in the form of snow. Throughout much of the interior and the north, precipitation amounts are generally less than 20 mm and, in the high Arctic, as little as a few millimetres (water equivalent). The low precipitation is, in part, because of the cold temperature of the air, which limits its capacity for water vapour and therefore its ability to produce precipitation. The west coast receives heavy precipitation in the form of rain at low elevations and mainly snow at higher elevations. For coastal British Columbia, this is the rainy season. On Canada's east coast, where cold continental air masses clash with the warmer air masses from the Atlantic, there is a mixture of rain and snow, with rain dominating close to the Atlantic and snow becoming more prevalent to the northwest, in southern Quebec and Labrador. The snow belt east of Lake Superior and Lake Huron is clearly visible, especially around Georgian Bay.

April is a transitional month across much of southern Canada, when snow is still possible but rainfall begins to dominate the precipitation regime. Precipitation amounts across the southern interior of Canada are somewhat greater than those in January, as air temperatures warm in response to the increasing strength and duration of sunshine. Rainfall amounts onshore along British Columbia's west coast are still in the range of 200 to 300 millimetres, somewhat less than the values in January. Likewise, in the Atlantic Provinces, precipitation amounts are less than in January, but the distribution of monthly precipitation is not as variable annually as on the Prairies or the west coast. Across northern Canada, it is still very much winter, with almost all precipitation falling as snow.

Throughout much of the continental interior of Canada, precipitation reaches its annual maximum in the summer months and falls as rain. On the Prairies, the maximum monthly precipitation is usually in June or July, but this shifts to August at more northerly latitudes and in Ontario and Quebec. The more northerly position of the storm track is evident as a band of higher precipitation across the northern Prairie Provinces, Ontario and Quebec. Drier conditions exist to the south of this storm track across the southern Prairies and southern Ontario. Southern Alberta and the valleys of southern British Columbia are particularly dry, experiencing moisture deficits. Convective precipitation in the form of showers and heavy thundershowers



is very important in the summer months throughout much of the country, as opposed to general rains associated with low pressure systems. On both the west and east coasts, summer is the driest time of the year, particularly on Vancouver Island and the Sunshine Coast of southwestern British Columbia. In the Arctic Archipelago, rainfall tends to be dominant, but snowfall is still significant and can occur in any summer month.

October marks the transition from mainly rain to snowfall across northern Canada. Snowfall also occurs across much of the interior of southern Canada but in relatively small amounts that usually melt. October also marks the transition to the rainy season on the southern portion of British Columbia's west coast. For the Queen Charlotte Islands and Prince Rupert, the rainy season has already begun and, for some locations, precipitation approaches 400 millimetres. The southern portion of the Prairies is relatively dry, as convective precipitation has abated and the storm track generally remains farther north. Only the Arctic Archipelago is drier than the southern Prairies at this time of year. On the east coast, precipitation is on the increase from its summer minimum with the commencement of the winter stormy season.

Data Source and Methodology

The 1971 to 2000 precipitation climate normals were calculated by Environment Canada in a manner consistent with the methodology of the World Meteorological Organization. The normal is a simple arithmetic average of the monthly or annual precipitation for the specified period. These spatial models have been developed using the thin plate smoothing spline algorithms of ANUSPLIN, which is a mathematically sophisticated approach to generating climate maps at varying spatial and temporal scales. The Canadian Forest Service has been working in partnership with several staff in Environment Canada's Meteorological Service of Canada, the Australian National University (the creator of ANUSPLIN) and others to develop a variety of climate models that cover both Canada and North America.

Definitions of underlined terms

Snow water equivalent (SWE): The depth of water if a snow cover is completely melted, expressed in millimetres, on a corresponding horizontal surface area. (Colbeck, S., Akitaya, E., Armstrong, R., Gubler, H., Lafeuille, J., Lied, K., McClung, D. and Morris, E., 1990: The International Classification for Seasonal Snow on the Ground. International Commission on Snow and Ice (IAHS), World Data Center A for Glaciology, U. of Colorado, Boulder, CO, USA, 23 pp.)

Convective precipitation: Precipitation caused by convective motion in the atmosphere.

Climate normals: Climate normals are used to summarize or describe the average climatic conditions of a particular location.

Map Sources

Annual Mean Total Precipitation (mm)

The 1971 to 2000 precipitation climate normals were calculated by Environment Canada in a manner consistent with the methodology of the World Meteorological Organization. The normal is a simple arithmetic average of the monthly or annual precipitation for the specified period. These spatial models have been developed using the thin plate smoothing spline algorithms of ANUSPLIN, which is a mathematically sophisticated approach to generating climate maps at varying spatial and temporal scales. The Canadian Forest Service has been working in partnership with several staff in Environment Canada's Meteorological Service of Canada, the Australian National University (the creator of ANUSPLIN) and others to develop a variety of climate models that cover both Canada and North America.

April Mean Total Precipitation (mm)

The mean total precipitation for the spring season is represented by the month of April, middle of the spring season. The 1971 to 2000 precipitation climate normals were calculated by Environment Canada in a manner consistent with the methodology of the World Meteorological Organization. The normal is a simple arithmetic average of the monthly or annual precipitation for the specified period. These spatial models have been developed using the thin plate smoothing spline algorithms of ANUSPLIN, which is a mathematically sophisticated approach to generating climate maps at varying spatial and temporal scales. The Canadian Forest Service has been working in partnership with several staff in Environment Canada's Meteorological Service of Canada, the Australian National University (the creator of ANUSPLIN) and others to develop a variety of climate models that cover both Canada and North America.

January Mean Total Precipitation (mm)

The mean total precipitation for the winter season is represented by the month of January, middle of the winter season. The 1971 to 2000 precipitation climate normals were calculated by Environment Canada in a manner consistent with the methodology of the World Meteorological Organization. The normal is a simple arithmetic average of the monthly or annual precipitation for the specified period. These spatial models have been developed using the thin plate smoothing spline algorithms of ANUSPLIN, which is a mathematically sophisticated approach to generating climate maps at varying spatial and temporal scales. The Canadian Forest Service has been working in partnership with several staff in Environment Canada's Meteorological Service of Canada, the Australian National University (the creator of ANUSPLIN) and others to develop a variety of climate models that cover both Canada and North America.

July Mean Total Precipitation (mm)

The mean total precipitation for the summer season is represented by the month of July, middle of the summer season. The 1971 to 2000 precipitation climate normals were calculated by Environment Canada in a manner consistent with the methodology of the World Meteorological Organization. The normal is a simple arithmetic average of the

monthly or annual precipitation for the specified period. These spatial models have been developed using the thin plate smoothing spline algorithms of ANUSPLIN, which is a mathematically sophisticated approach to generating climate maps at varying spatial and temporal scales. The Canadian Forest Service has been working in partnership with several staff in Environment Canada's Meteorological Service of Canada, the Australian National University (the creator of ANUSPLIN) and others to develop a variety of climate models that cover both Canada and North America.

October Mean Total Precipitation (mm)

The mean total precipitation for the fall season is represented by the month of October, middle of the fall season. The 1971 to 2000 precipitation climate normals were calculated by Environment Canada in a manner consistent with the methodology of the World Meteorological Organization. The normal is a simple arithmetic average of the monthly or annual precipitation for the specified period. These spatial models have been developed using the thin plate smoothing spline algorithms of ANUSPLIN, which is a mathematically sophisticated approach to generating climate maps at varying spatial and temporal scales. The Canadian Forest Service has been working in partnership with several staff in Environment Canada's Meteorological Service of Canada, the Australian National University (the creator of ANUSPLIN) and others to develop a variety of climate models that cover both Canada and North America.

References

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Environment Canada. Meteorological Service of Canada. Climate Trends and Variations Bulletin. http://www.msc-smc.ec.gc.ca/ccrm/bulletin/disclaim_e.cfm

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McKenney DW, Papadopol P, Campbell K, Lawrence K, Hutchinson MF. 2006. *Spatial Models of Canadian and North American-Wide 1971/2000 Minimum and Maximum Temperature, Total Precipitation and Derived Bioclimatic Variables*. Sault Ste. Marie (Ontario): Canadian Forest Service Front Line Technical Note no. 106.

Phillips, David. 1990. *The Climates of Canada*. Ottawa: Ministry of Supply and Services, Ottawa. 176pp.

The Australian National University (ANU). Centre for Resource and Environmental Studies. <http://fennerschool.anu.edu.au/publications/software/anuclim.php>

Related Web sites (1999 – 2009)

Federal Government

Environment Canada. Canadian Climate Normal's or Averages 1971-2000
http://www.climate.weatheroffice.ec.gc.ca/climate_normals/index_e.html

Environment Canada. Canadian Weather at a Glance
http://www.weatheroffice.gc.ca/jet_stream/index_e.html

Environment Canada. Climate Data
http://www.climate.weatheroffice.ec.gc.ca/climateData/canada_e.html

Environment Canada. Meteorological Service of Canada (MSC)
http://www.msc-smc.ec.gc.ca/contents_e.html

Environment Canada. Meteorological Service of Canada. Weather information for Canada
http://www.weatheroffice.gc.ca/canada_e.html

Environment Canada. National climate data and information archive
http://www.climate.weatheroffice.ec.gc.ca/Welcome_e.html

Natural Resources Canada. Canadian Forest Service. Regional, National and International Climate Modeling
<http://cfs.nrcan.gc.ca/subsite/glfc-climate>

Other

Australian National University. Centre for Resource and Environmental Studies. ANUSPLIN
<http://fennerschool.anu.edu.au/publications/software/anusplin.php>
ANUSPLIN is a mathematically sophisticated approach to generating climate maps at varying spatial and temporal scales.

The Weather Network
<http://www.theweathernetwork.com/>