

## Average Maximum Snow Depth

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### Abstract

This map shows the average maximum snow depth in centimetres computed over 18 winter seasons (1979 to 1997). Over southern Canada this usually occurs in January or February, while the time of maximum accumulation occurs much later in mountain areas and in the Arctic. The main features of the map are the pronounced maximum in snow accumulation over the western Cordillera, where snow depths can exceed several metres, with a secondary maximum over Quebec and Labrador. These maxima are related to their proximity to oceans, which act as sources of moisture and winter storms, and to the orographic effect of the mountains in the case of western Canada. The two maxima are linked by a band of higher snow accumulation that follows the boreal forest zone; this is a preferred track for winter storms. To the north of this zone is the relatively shallow snow cover of the Arctic (low snowfall with extensive wind packing). To the south, the depth of snow is limited by the shorter accumulation season and the substantial sublimation of snow over the Canadian Prairies.

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### Data Sources and Methodology

This map was computed from the 18-year (1979 to 1997) daily snow-depth analysis of Brown et al. (2003). The analysis combined all available surface observations of snow depth with snow-depth estimates from a simplified physical snowpack model in areas of sparse data (mountains and high latitudes). This dataset is considered to be one of the best available representations of snow cover over North American middle latitudes. The quality of the dataset is less certain, however, in mountainous areas and over high latitudes, where there are few snow-depth observations.

The map was generated by computing maximum annual snow depths at each point in the 0.25 degree latitude-longitude grid over 18 snow seasons (season of 1979 to season of 1996). The average maximum depth was then computed and the results adjusted with 3 degrees by 3 degrees grid averaging to yield contours for display. The grid resolution was insufficient to resolve detailed topography of areas such as Vancouver Island. In this area, contours were generated manually by taking into account available surface observations, satellite observations of the snow line, and local topography. Manual editing of contours was also carried out over the Canadian Arctic Archipelago to resolve some discrepancies related to the inability of the gridded dataset to resolve some of the smaller land masses.

## Definition of underlined terms

**Orographic:** Enhanced precipitation on the windward side of mountain ranges caused by the vertical lifting (and cooling) of moist air.

**Sublimation:** The process of the change in the physical state of water from solid (ice) to gaseous phase (water vapour) and vice versa.

**Wind packing:** The transport and fracturing of snow crystals by wind action to create a dense, cohesive snow surface layer. Requires relatively high wind speeds and exposed terrain.

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## Map Sources

### Average Maximum Snow Depth

The average maximum snow depth (centimetre) was generated by computing maximum annual snow depths at each point for the 0.25 degree latitude/longitude grid over a period of 18 snow seasons (1979/80 to 1996/97). Environment Canada, Meteorological Service of Canada.

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## **Related Web sites (1999 – 2009)**

### **Federal Government**

Environment Canada. Operational Analysis Charts  
[http://www.weatheroffice.gc.ca/analysis/index\\_e.html](http://www.weatheroffice.gc.ca/analysis/index_e.html)

### **Provincial/Territorial Government**

Government of British Columbia. Current snowpack conditions in B.C.  
[http://www.gov.bc.ca/rfc/river\\_forecast/snowp.htm](http://www.gov.bc.ca/rfc/river_forecast/snowp.htm)

Government of Alberta. Current snowpack conditions in Alberta  
<http://www3.gov.ab.ca/env/water/basins/basinform.cfm>

### **Other**

University of Waterloo. State of the Canadian Cryosphere  
<http://www.socc.ca/cms/en/home.aspx>

