

To make up the annual deficit, heat must be transported into the region and this usually takes place in the upper levels of the Arctic atmosphere. In contrast to this little-publicized transfer of warm air into the Arctic, the compensating sporadic outbreaks of surplus cold air from the Polar regions are well known, especially to persons living in the temperate zone. The southward penetration of the cold air masses into the continent varies, of course, with the season. The advance is not along a broad, continent-wide front, but instead wave-like bulges form along the leading edge, which cause the cold air to surge southward in one area while it retreats northward in another. Deep low pressure areas frequently develop from the waves, spreading clouds and precipitation ahead of them as they move across the country.

For almost eight months of the year, cold air from the Arctic covers all of Northern Canada and large areas of Central Canada. Low pressure areas which form along its southern perimeter travel across the continent under the influence of the mid-latitude belt of prevailing "westerlies" and generally remain well outside the Arctic boundaries. Strong temperature contrasts between land and water in the Baffin Bay area make this a region of frequent cyclonic activity. Although low pressure areas periodically penetrate the Arctic, the usual circulation during the November-to-May period is anticyclonic. Normally a high pressure area persists over the Mackenzie River basin and the western islands of the Canadian Arctic Archipelago during January, then advances eastward to cover the Arctic islands and the "barrens" west of Hudson Bay in April. To the east of this high pressure area, the well-known Icelandic Low and its North American offshoot, the Baffin Bay Trough, maintain a general northwest-to-southeast circulation pattern. Variations in the strength of these northwesterly winds have a most significant effect on the climate of the eastern Arctic during this period.

Although May is a month of continuous daylight in most areas of the Arctic, climatically the atmospheric circulation patterns are still those of the Arctic night. June usually marks the start of a completely changed weather regime, which continues until cold, wintry conditions return to the region in September. The main features of the average circulation during the June-to-August period are the weak low pressure area over the Arctic Ocean, reflecting the alternating influences of low and high pressure areas, and the more prominent low at the south end of Baffin Island, a recognized area of high cyclonic frequency. Even in this period the majority of depressions cross Canada south of the Arctic limits but their influences are frequently felt in the Arctic region, particularly in the Davis Strait-Baffin Bay area. Some low pressure areas move through the Arctic as well, either along the mainland coast of Canada or from the Arctic seas.

While the atmospheric circulation pattern is mainly responsible for the year-to-year variations that occur in Arctic climate, the land and water distribution and relief of the land serve to create characteristic differences in climate from one location to another. The Arctic seas, including the countless channels that surround all islands north of the Canadian mainland, and Hudson Bay make up more than half of the Arctic area and have a dominant influence on the climate of the adjoining lands. The influence is especially marked during the July-to-November period when there is considerable open water in the Arctic waterways but it is scarcely noticeable during the remainder of the year when, except for some well-known local areas of open water, the surfaces are completely ice- and snow-covered. During the "open water" season, maritime influences are, of course, much greater along all coastlines and over the smaller islands than in the interiors of such large land areas as Baffin, Ellesmere or Victoria Islands, or on the Arctic mainland.

Only the most easterly of the islands of the Canadian Arctic Archipelago are predominantly mountainous. The high, ice-capped mountain ranges, which rise along the eastern coastlines of Baffin, Devon and Ellesmere Islands, present a barrier to the entry of mild, moist air from the North Atlantic. The rugged relief of these islands causes locally increased precipitation, mostly along the eastern coastlines. For example, the