

Meteorological aspects of snow

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Abstract

Snow is a natural form of atmospheric precipitation. Particular factors for the formation of snow include: atmospheric conditions (temperatures, moisture levels, instability), surface conditions, local effects, geographic location and altitude of the mountains. Snow forms as a result of the coalescence of certain types of ice crystals combined with suitable surface conditions that do not lead to the melting of the snow once it has fallen. When enough snow falls to provide sufficient ground cover, then it will remain covering the ground until it either melts or is broken up by rain. However, as snow has a very high albedo (reflectivity of solar radiation), rain has more of an effect on breaking the snow cover until the ground is uncovered.

The Australian alpine region, because of its geographic location, overall atmospheric conditions, and low elevation is only a marginal alpine region. Thus these conditions limit the snow season from around May to October and mean that small variations in the broadscale flow from one year to the next can have large effects on the type of snow season being experienced.

Several techniques and diagnostics have been developed to try to help us in the forecasting of snow.

Firstly, there have been four identified snow producing weather patterns in Australia and while they are not mutually exclusive (i.e. they can follow from one pattern to another or merge from one pattern to another), knowledge of these types of weather systems can thus provide those interested with a basis for a better understanding of weather charts and forecasts. It is also likely that as with the broadscale flow, different weather patterns may predominate depending on the season. A study of both the broadscale flow and these weather patterns over time could also provide clues as to whether there is any climatic change occurring.

Secondly, snowfall in alpine regions can be very dependent on local meteorological effects and such knowledge can only be obtained by experience.

Thirdly a set of atmospheric parameters that are generated via computer models are assessed and used as indicators for possible snow development. By far the major problem posed in the forecasting of snow is in determining whether the precipitation will be in the form of snow or rain and at what level the snow line will commence.

As the Australian alpine region is a marginal region, a study of the region over time could provide clues as to whether there are any signs of climatic change occurring. Results of a study of snow events and snow cover in the Snowy Mountains and atmospheric temperatures at 1500m and 3000m at Wagga Wagga since 1970 indicate that some atmospheric warming has occurred over this period together with reduced snow events occurring, particularly in May. However, there does not appear to be any change as yet in the length of duration of the snow cover.

Notes to readers

This is an abstract of a paper presented at: The Global Threats to the Australian Snow Country Conference held at the Australian Institute of Alpine Studies, Jindabyne, Australia. 17-19 February 1998.

To read all abstracts presented at the Global Threats to the Australian Snow Country Conference, go to:
<http://www.aias.org.au/newsletters/newslet1.html#snow>

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