Snow at Schiphol

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Introduction

The operational snow season at Amsterdam Airport Schiphol runs from mid November until the end of March. In this period all operational partners such as Airport Authorities, Air Traffic Control and airliners like KLM have to work together tightly in fighting possible delays due to snowfall at runways, taxiways and peers.

In the kick-of meeting at November 14th (2011) KNMI presented the meteorological aspects of snow at the airport, varying from climatology to seasonal forecasting. This article describes the main aspects of this presentation.

Snow at Schiphol, picture Peter de Vries (KNMI)

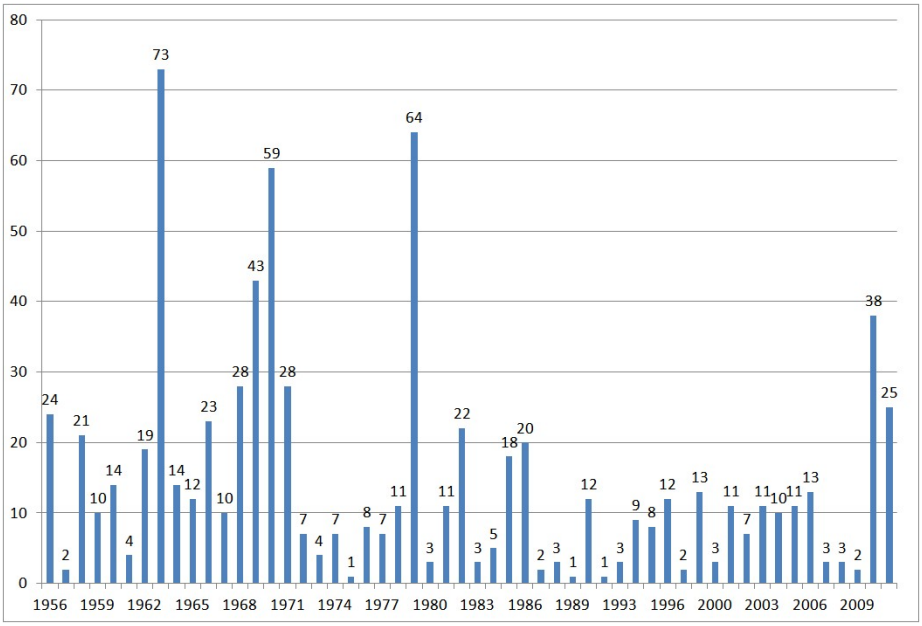
How often do we see a snow covered airport?

We observe a snow covered Schiphol on average 14 days per year (period 1956-2010). The variation between years is large: in the winter of 1998 (1997-1998) no snow cover was observed, in the winter of 1963 the airport was white at 73 days.

However, since at an operational airport snow clearing starts immediately, these numbers are only valid for unattended sites, like the grass area where the meteorological instruments of KNMI are located. Snow is falling on more days then there is snow cover, but regarding the subject of operational snow delays, we do not mention light snow showers without a remaining snow cover.

Intense snow showers at frost days imply a snow covered airport: as an example we remind to the snow showers of 6 January 2010, leading to a snow cover of 10 cm and a traffic jam around Schiphol and Amsterdam.

Long duration snow events are caused by frontal systems in freezing conditions: the snow front of 17 December 2010 led to traffic jams in the Netherlands with a total length of 750 kilometers.



Average number of days per year with snow cover near Schiphol (Hoofddorp) since 1956

Climate atlas

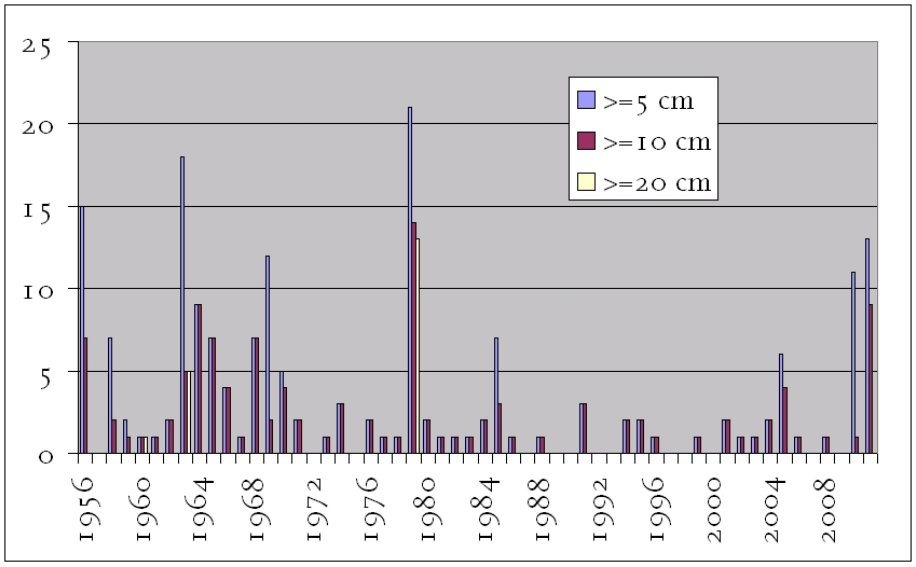
For the climate atlas 1981-2010 (Bosatlas van het Klimaat) KNMI calculated the snow climate from the data of the last 30 years. Results are also available at the website www.klimaatatlas.nl.

Since 1981 the average number of days with a snow covered country vary from less than 10 days in the milder southwest part of the Netherlands to more than 20 days in the colder northeastern part.

Year to year variation is large: in the winter of 2007 (2006-2007) there were no days with a snow cover, in the winter 2009-2010 the number of days with a white countryside in the northeastern part was 55.

The snow cover is registered at more than 300 stations at 09 local time (08 UTC) in the climatological report: type of snow cover and thickness.

Near Schiphol the station Hoofddorp reported at 09 local time in the recent 30 years in total almost 200 days with a snow cover, with at most days less than 2 cm, 48 days with at least 5 cm and 31 days with at least 10 cm. More than 20 cm was never reported in the period 1981-2010. Since 1956 Schiphol experienced 13 days with more than 20 cm of snow, but these were all before 1980.



Number of days with a snow deck of at least 5, 10 or 20 cm in the period 1956-2010 near Schiphol (Hoofddorp)

When does it snow?

Snow reaches the surface when the temperature distribution in the vertical is cold enough to prevent melting.

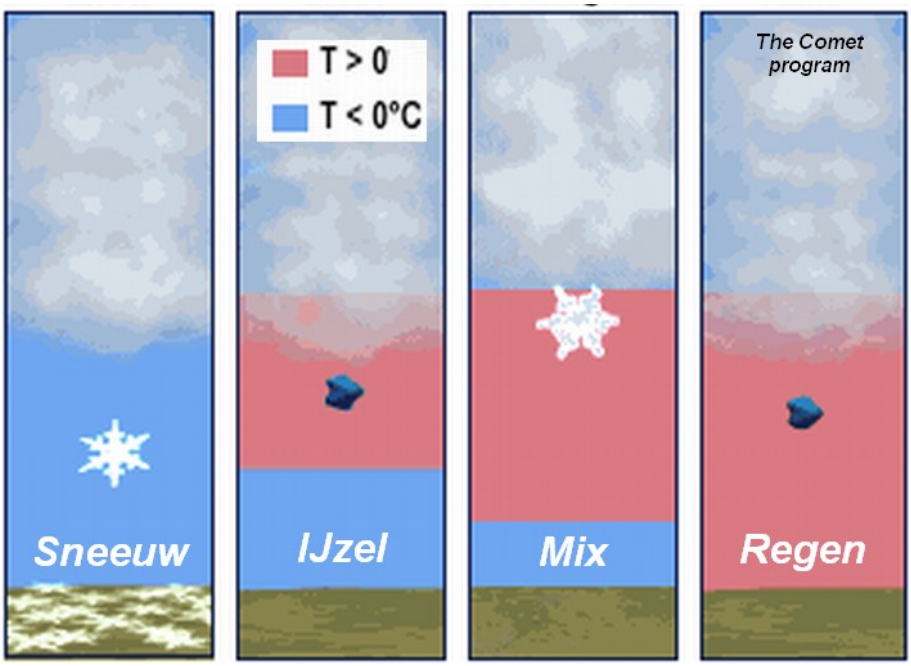
When a melting layer is present near the surface the precipitation will be rain or drizzle. With frost at the surface level and a melting layer above freezing rain or freezing drizzle is reported. With a thin melting layer a mix of precipitation types is observed.

Snow periods are common in the first two months of the year, but can also occur in other months. The earliest date at which snowfall was observed since 1956 was October 13th 1975, the last day around mid June. However, these extreme dates do not cause a snow cover.

The nearby warmer North Sea stimulates convective growth of small scale snow showers in wintertime in a westerly to northerly flow towards the Dutch coast. Larger scale snow events occur in general when warmer air pushes northward over cold air north of the large rivers Rhine and Meuse.

The leading edge of this frontal precipitation starts with large scale intensifying snow (Dutch: sneeuw), causing a snow covered white world. As the warm mass pushes northward the melting layer increases and lowers to the earth surface, changing the precipitation type to a mix of rain and snow (sleet, Dutch: natte sneeuw), or freezing rain (Dutch: ijzel) when surface temperatures are below zero degrees Celsius.

Eventually the warm layer leads to reports of rain (Dutch: regen) in the warm air.



Types of precipitation as a function of the vertical temperature distribution: from left to right (in Dutch) snow, freezing rain, mix of snow and (freezing) rain, and rain.

Coming winter?

In October some providers told the press and public the Netherlands would experience a horror winter, based on experimental seasonal forecasts. However, KNMI concluded that correlations between forecasts for the coming winter and the number of sunspots, the average pressure distribution on the Atlantic, or the Siberian snow cover in the preceding autumn were insignificant. The researcher remarked that seasonal forecasting for next winter is pure luck, or in Dutch: ´Het kan vriezen, het kan dooien ´.

In the KNMI´06 Climate Scenarios severe winter periods will become rare at the end of this century due to an increasing average temperature, but intense snow periods will still occur, as we already experienced last winters.

These events can be forecasted with increasing skill for periods less than two weeks ahead. An updates of the two week forecast is made twice a day (ECMWF-forecast). A short range high resolution forecast ensemble is in use several times a day when a snow event if approaching, and gives a detailed forecast for the next 48 hours. Besides, real-time forecasts for the coming hours are made by combining model output with satellite, radar and station observations.

In the operational process the forecaster discusses the prognoses up to five days ahead with all relevant aviation partners (AAS, LVNL and KLM) once a day or more to make sure that operational arrangements can start in time.

When nowcasting is needed during a snow event, a meteorological advisor is in operation at Schiphol (MAS at LVNL). In ´normal weather´ situations forecast and warnings are produced at KNMI in the central weather room in De Bilt.

Climatology, forecast and warnings are available at the website www.knmi.nl