Earth

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75 Years

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Snow covered roads in Boston Jan 5, 2018 | *Source: Wordpress*

BLIZZARDS / WINTER STORM

Blizzards are dangerous winter storms that are a combination of blowing snow and wind resulting in very low visibilities. While heavy snowfalls and severe cold often accompany blizzards, they are not required. Sometimes strong winds pick up snow that has already fallen, creating a ground blizzard.

Officially, the National Weather Service, USA (NWS) defines a blizzard as a storm which contains large amounts of snow or blowing snow, with winds in excess of 35 miles per hour (56 kilometers per hour) and visibilities of less than 1/4 mile (400 meters) for an extended period of time (at least 3 hours). When these conditions are expected, the NWS will issue a "Blizzard Warning". When these conditions are not expected to occur simultaneously, but one or two of these conditions are expected, a "Winter Storm Warning" or "Heavy Snow Warning" may be issued.

Blizzard conditions often develop on the northwest side of an intense storm system. The difference between the lower pressure in the storm and the higher pressure to the west creates a tight pressure gradient, or difference in pressure between two locations, which in turn results in very strong winds. These strong winds pick up available snow from the ground, or blow any snow which is falling, creating very low visibilities and the potential for significant drifting of snow.

Winter Storm / Blizzards occur in USA, Canada, Europe, Russia, northern China, Japan, and Iran.

How do Blizzards Form?

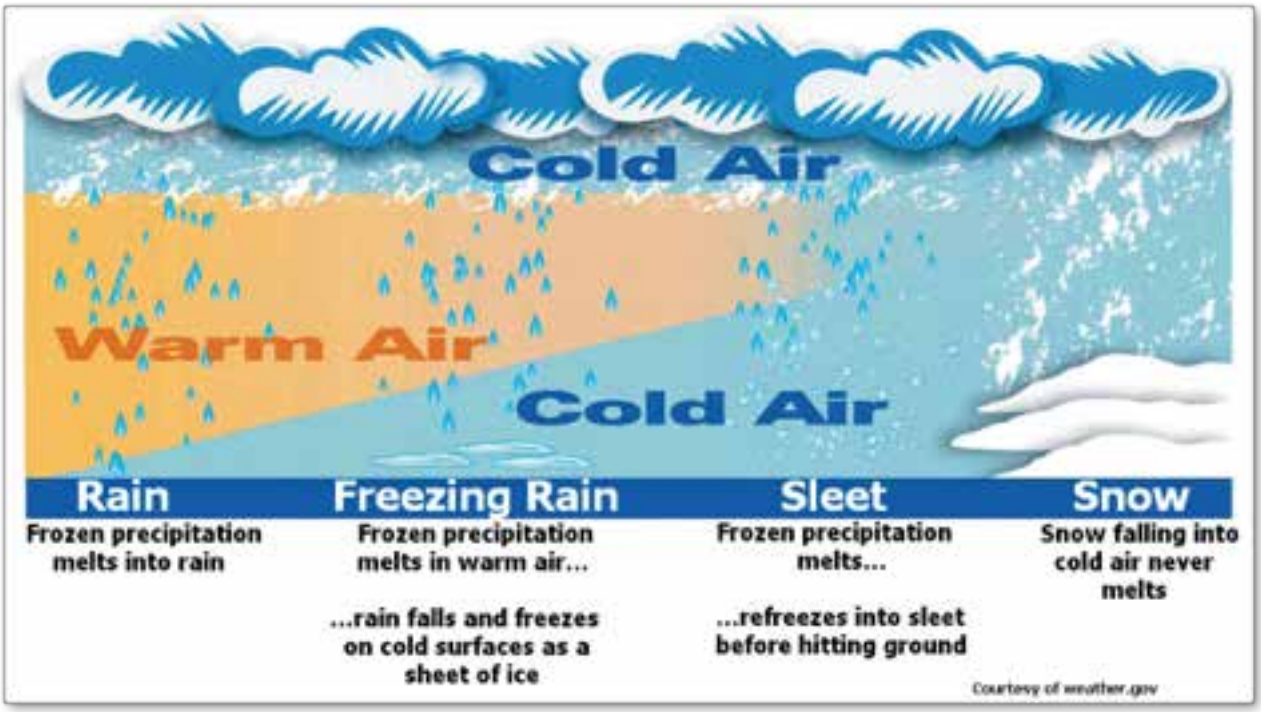
The below three should happen to make a blizzard.

1. Cold air (below freezing) is needed to make snow
For snow to fall to the ground, the temperature must be cold both up in the clouds where snowflakes form, and down at ground level. If the air near ground level is too warm, the snow will melt on its way down, changing to rain or freezing rain.

2. Moisture is needed to form clouds and precipitation
Moisture in the air is called water vapor. Air blowing across a body of water, such as a large lake or the ocean, is an excellent source of water vapor. As wind moves air over the water, some water evaporates from the surface, putting vapor into the air. This is how “lake effect snowstorms” and “Nor’easters” – blizzards occurring in New York and other North Eastern parts of USA, pick up so much moisture. However, cold air is not able to hold much water vapor. In fact, very cold air does not make very much snow.

3. Warm, rising air is needed to form clouds and cause precipitation
For a blizzard to form, warm air must rise over cold air. There are two ways that this may happen. Winds pull cold air toward the equator from the poles and bring warm air toward the poles from the equator. When warm air and cold air are brought together, a front is formed and precipitation occurs. Warm air can also rise to form clouds and blizzard snows as it flows up a mountainside.

Figure 1 below showcases the process of formation of blizzards



What makes a blizzard dangerous?
Blizzards can create life-threatening conditions. Traveling by automobile can become difficult or even impossible due to "whiteout" conditions and drifting snow. Whiteout conditions occur most often with major storms that produce a drier, more powdery snow. In this situation, it doesn't even need to be snowing to produce whiteout conditions, as the snow which is already on the ground is blown around, reducing the visibility to near zero at times.

The strong winds and cold temperatures accompanying blizzards can combine to create another danger. The wind chill factor is the amount of cooling one "feels" due to the combination of wind and temperature. During blizzards, with the combination of cold temperatures and strong winds, very low wind chill values can occur. It is not uncommon in the Midwest to have wind chills below -60F during blizzard conditions. Exposure to such low wind chill values can result in frostbite or hypothermia.

Blizzards also can cause a variety of other problems. Power outages can occur due to strong winds and heavy snow. Pipes can freeze and regular fuel sources may be cut off.

Insurance Cover Due to Winter Storm /Blizzard
According to the Insurance Information Institute (III) of USA, most insurance policies in USA are designed to cover winter storm-related losses. Some insurance policies which winter-storm/ Blizzards are:

- **Standard home owners policies** provide coverage for damage caused by wind, snow, severe cold and freezing rain. Melting snow that seeps into a home is covered by flood insurance, which is provided by FEMA's National Flood Insurance Program, and a few private insurers. Additional living expenses (ALE) would pay for reasonable expenses incurred by living elsewhere while a home is being repaired.

- **Standard auto insurance policies** cover auto accidents caused by slippery road conditions. Damage to a car caused by winter conditions, such as falling ice or a collision with an object, is covered by the optional comprehensive and collision portions of an auto policy.

- **Business Insurance policies** provide coverage for property damage and losses to inventory. Business income insurance (also known as business interruption) is typically included in a Business Owners Policy (BOP) or a Commercial policy and provides for revenue lost due to closure, fixed expenses, such as rent and utility costs as well as expenses of operating from a temporary location.

Table below shows top 15 insured losses due to winter- storms / Blizzards in USA between 1980 - 2016

Top 15 Costliest U.S. Winter Storms By Insured Losses, 1980-2016 (1)					
				Losses when occurred ($ millions)	
Rank	**Date**	**Event**	**Location**	**Overall**	**Insured (2)**
1	Feb. 16-25, 2015	Winter storm, winter damage	Various states	$2,800	$2,100
2	Mar. 11-14, 1993	Blizzard	Various states	5,000	2,000
3	Jan. 5-8, 2014	Winter damage, cold wave	Various states	2,500	1,700
4	Apr. 13-17, 2007	Winter storm, tornadoes, floods	Various states	2,000	1,600
5	Mar. 13-15, 2010	Winter storm, floods	Various states	1,700	1,200
6	Apr. 7-11, 2013	Winter storm	Various states	1,500	1,200
7	Dec. 10-13, 1992	Winter storm	Various states	3,000	1,000
8	Jan. 31-Feb. 3, 2011	Winter storm, snowstorms, winter damage	Various states	1,300	980
9	Dec. 17-30, 1983	Winter damage, cold wave	Various states	1,000	880
10	Jan. 17-20, 1994	Winter damage, cold wave	Various states	1,000	800
11	Feb. 10-12, 1994	Winter damage	Various states	3,000	800
12	Jan. 1-4, 1999	Winter storm	Various states	1,000	780
13	Jan. 4-9, 2008	Winter storm	Various states	1,000	750
14	Jan. 31-Feb. 6, 1996	Winter damage	Various states	1,500	740
15	Feb. 24-25, 2013	Blizzard, winter damage	Various states	1,000	690

(1) Costliest U.S. blizzards and winter storms/damages based on insured losses when occurred. (2) Based on property losses including, if applicable, agricultural, offshore, marine, aviation and National Flood Insurance Program losses in the United States and may differ from data shown elsewhere. NA=Data not available. Source: The Property Claim Services® (PCS®) unit of ISO®, a Verisk Analytics® company.

Most recently, a powerful blizzard caused severe disruption along the East Coast of the United States and Canada from Jan 3-6, 2018. It dumped snow and ice in places that rarely receive wintry precipitation, even in the winter, such as state of Florida and Georgia, and produced snowfall accumulations of over 2 feet (61 cm) in the Mid-Atlantic States, New England, and Atlantic Canada.

The storm originated on January 3 as an area of low pressure off the coast of the Southeast. Moving swiftly to the northeast, the storm explosively deepened while moving parallel to the Eastern Seaboard, causing significant snowfall accumulations. The storm received various unofficial names, such as Winter Storm Grayson, Blizzard of 2018 and Storm Brody. The storm was also dubbed a "historic bomb cyclone".

The high winds caused coastal flooding from Massachusetts to Maine, overwhelming fishing piers, streets and restaurants. Schools, businesses and ferry services in parts of the Canadian coast were also shut down. Thousands of flights were cancelled in Eastern USA because of the storm. Pictures below show impact of storm.

Winter Storm at Times Square, NYC on Jan 4, 2018 | *Source: Accuweather*

Men work to free a stranded car during winter storm in Atlantic City, New Jersey
Source: Accuweather

Similarly, a winter storm hit China's Anhui Province on January 3, 2018. This is the worst storm occurring since 2008. It affected more than a million people in the province and caused direct economic losses of 1.26 billion Yuan (US$ 190 million) and 790 million Yuan (US$ 122 million)in Agriculture. Besides Anhui, Henan, Hubei, Hunan, Jiangsu, and Shaanxi provinces also suffered from winter storm.

Source: Accuweather, Insurance Information Institute (III), NOAA, National Weather Service, New York Times, the Guardian, and Xinhua

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