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HAIL STORMS IN CHINA

On Sunday, June 12, 2016, a heavy rainstorm accompanied with small hail, 5 to 6 mm (0.19 to 0.23 in) in diameter, hit Shanxi's Jianhua Township in Ansai County. The hail storm lasted for more than 40 minutes and caused great economic loss to local agriculture. The hail stones also hit other counties such as Zichang, Yanchang, and Baota. Another hail storm hit the city of Harbin, the capital of northeast China's Heilongjiang Province. Coin-sized hail stones pelted Harbin for some 10 minutes before a heavy rainstorm moved in.

On Monday June 13, 2016, a heavy hail storm struck the prefecture-level city of Changzhi in Shanxi Province, North China. The largest hail stones were more than 45 mm (1.7 inches) in diameter. More than 18, 000 cars that parked outdoors were damaged in the storm that lasted for over half an hour.

WHAT IS A HAIL STORM?

A hail storm (also spelled hailstorm) is defined as a thunderstorm that produces hail. Hail is a form of solid precipitation that is produced by thunderclouds. Hail stones are balls or clumps of ice that form in thunderheads due to the combination of sub-freezing temperatures and convection cell updrafting in the clouds.

How Hail Forms?

Thunderhead clouds create strong updraft winds that cycle the precipitation up towards the top of the cloud, freezing and turning into hail along the way. In the top of thunderheads, where the updraft winds are weaker, gravity takes over and the hail stones start to fall. As hail stones fall back through the cloud, they pick up additional moisture from the cloud and grow in size. Hail stones can repeat this rising / falling action (called convection) many times. Once heavy enough to overcome the updraft winds, they fall all the way to the ground.

Hail is defined as starting at a diameter of 0.2 inches or more. Hail can grow as big as golf balls, baseballs, and even soccer balls. Hail larger than 0.75 inches is considered large enough to cause serious damage in the United States. Researchers of National Oceanic and Atmospheric Administration, USA (NOAA) found that hailstones could fall at speeds up to 120 miles per hour (192 kilometers per hour).

Hail stone about the size of tennis ball fell during Sydney Hail storm April 14, 1999. Source: *Internet*

In USA, hail storms are common in state of Colorado, Iowa, Kansas, Missouri, Montana, Nebraska, Oklahoma, South Dakota, Texas, and Wyoming.

In Europe, hail storm occur in Bulgaria, France, Germany, Holland, Serbia, Switzerland, and UK.

In Australia, hail storms are common in New South Wales, mainly from September to March, with about 45 events per year. However, the costliest hail storm, which is also the costliest natural disaster in Australia, occurred on April 14, 1999 in Sydney, NSW.

Common Types of Hail Damage

Roof Damage: Roofs are the most commonly damaged part of a home or business when hail storms hit. Hail damage to roofing can be difficult to detect and the longer owner leaves hail damage un-repaired, the more damage can occur as water leaks through the roof and into walls.

Skylight Damage: Imagine a baseball falling from space onto glass. It is no surprise that skylights are especially susceptible to hail damage. Skylights are most often damaged on the glass or on the seal around the outside.

Window & Siding Damage: Hail does not always fall straight down. When hail falls at angles it can crack windows and siding on home or office building.

Automobile Damage: If a car, truck, or camper was exposed to direct hail strikes, it is quite possible that hailstones will damage glass, plastic and metal surfaces. It is common to have dents in the body of an automobile and/or cracks in the glass after a hail storm.

Property Damage: Hail also causes damage to trees, plants, and yards. Trees and tree branches can break and fall from the weight of hail and the winds that often accompany hail storms. When significant amounts of hail fall, then start melting on the ground, flooding and damage from standing water can occur. If you have substantial property damage from hail, you may want to contact a debris-removal service.

Glass damaged during hail storm on March 16, 2016 in Texas
Source: *Dallasnews.com*

Insured Losses Above US$ 500 Million Due to Hail Storms

Date	Location	Insured Loss (US$) in year of occurrence
27 July 2013	Germany, France	3.8 Billion
10 April 2001	St. Louis, Missouri, USA	2 Billion plus
28 April 2012	St. Louis, Missouri, USA	1.6 Billion
10 April 2001	Illinois, Kansas, Missouri	1.5 Billion
12 April 2016	San Antonio, Texas, USA	1.36 Billion (initial estimate)
5 May 1995	Fort Worth, Texas, USA	1.1 Billion
14 April 1999	Sydney, Australia	1.08Billion
30 Nov 2014	Brisbane, Australia	852 Million
20 June 2013	Germany	827 Million
20 July 2009	Denver Metro, Colorado, USA	767.6 Million
23 March 2016	Dallas-Fort Worth, Texas, USA	700 Million
23 July 2009	Central and northern cantons, Switzerland	679.26 Million
11 July 1990	Denver Metro, Colorado, USA	625 Million
16 March 2016	Dallas-Fort Worth, Texas, USA	600 Million

Source: *Munich Re, Swiss Re, ICA, ICT, RMIIA*

Sandstorm affecting the Middle East on September 8, 2015.
Source: *NASA*

Significant increase in frequency and intensity of sand and dust storms in the Middle East over the past 15 years

Researchers at the World Meteorological Organization (WMO) found that there has been a significant increase in the frequency and the intensity of sand and dust storms in the region in the past 15 years or so. Among the Middle East nations, Iran and Kuwait are the worst hit.

A sand and/or dust storm is a meteorological phenomenon common in arid and semi-arid region. Dust storms arise when a gust front or other strong wind blows loose sand and dirt from a dry surface. Particles are transported by saltation and suspension, a process that moves soil from one place and deposit it in another.

Dust and sand storms are a persistent problem in the Middle East, but they are most prevalent during spring and summer months due to strong winds that characterize the weather during winter-spring seasonal transition. These storms are strongest in late mornings and afternoon and subside after sunset.

One of the main sources of sand and dust storms is Iraq, where the flow of rivers has decreased because of a race in dam constructions in upstream countries. That has led to the disappearance of marshes and drying up of lakes in both Iraq and Iran. The other reasons include years of inappropriate farming practices, reduced vegetation due to mismanagement of water resources and climatic changes, desertification and droughts. The United Nations Environment Programme (UNEP) has predicted that Iraq could witness 300 dust events in a year within 10 years, up from around 120 per year now.

Iran suffers more than 500 dust storms annually, mainly in the spring and summer months as temperatures mount, and rainfall wanes. In recent decades, the southwestern provinces have experienced anywhere from 60 to 130 distinct dust "events" every year. Dust clouds veiled Tehran for 117 days of the Iranian year, which ran from March 2012-March 2013

Table below shows recent sand and dust storms occurred in the Middle East and Iran.

Date	Region/Country	Impact
May 2016	Iran	16 villages were buried in sand. Economic loss of around US$9 million of agriculture and livestock
March 2016	Jeddah and other places, Saudi Arabia	Visibility reduced
September 2015	Israel, Lebanon, Syria and Palestine, Iraq, Jordan, Egypt and Saudi Arabia	Some casualties, many hospitalized due to respiratory problems, flights delayed, normal business activities disrupted
April 2015	Saudi Arabia	Flights cancelled, schools closed.
Feb 2015	Israel, Palestine, Lebanon and Egypt, and Iran	Flights cancelled in Cairo, Egypt and Iran
June 2, 2014	Tehran, Iran	5 casualties, some cars destroyed

Dusky sky above the port of Sidon, south Lebanon. Source: *Daily Star*

Dust storm in Jeddah with wind speed 50-60 kilometers per hour on March 27, 2016 Source: *Arabnews.com*

Impact of Sand and Dust Storm

A sand and dust storm can affect the climatic and other environmental processes of the planet, but they also have a major impact on human health, particularly the respiratory system. A dust storm consists of a massive amount of particulates in the air, and when people breathe it, these can get down their lungs and cause respiratory illness and heart disease and so on.

These storms, especially serious-strong sand and/or dust storms are hazardous weather events with extreme calamity. When they occur, they can move forward like an overwhelming tide and the strong winds take along drifting sands that cover farmlands, damage young crop plants and result in a loss of production. They accelerate the process of land desertification and cause serious environment pollution with huge destruction to ecology and the living environment.

These storms also affect machinery, electronics, and buildings. Blowing sand and dust make glass frosted, wire wrap wears away, and electric circuits ground out. Moist dust can combine with lubricants and clog/jam equipments and machines.

Source: *WMO, UNISDR, BBC, Sissakian et al, "Sand and dust storm events over Iraq"*

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