

MET 101

Forms of Precipitation

Chapter 7

Rain - A falling liquid drop that must have a diameter greater than 0.5 millimeters

Rain Showers - Convection can lead to the development of cumuliform clouds and precipitation in a few minutes

- Droplets tend to be large
- Lasts for a brief period of time

Drizzle - Liquid precipitation whose diameter is less than 0.5 millimeters

- Typically occurs in stratus clouds
- Air is saturated all the way to the surface
- Or forms from rain that falls into unsaturated air which causes the drop to become smaller

Virga - Drizzle/rain which falls from a cloud which never reaches the ground

- Air under the cloud is unsaturated
- Drop evaporates before reaching the surface

Snow - Much of the world precipitation starts as snow

- Snowflakes generally can fall 300 m in above freezing air before completely melting

Fallstreaks - Falling ice crystals from high cirrus clouds

- Behave as virga
- Air is unsaturated beneath the cloud
- Ice crystals sublimate (change from ice into vapor) before reaching the surface

Giant snowflakes - Large soggy snowflakes

- Fall through moist, above freezing air
- A layer of water develops on the edge of the flakes
- This acts like a glue when the snowflakes collide, producing one large flake

Flurries - Snow falling from cumulus clouds

- Light in intensity
- Lasts for a brief time period...which produces little if any accumulation

Sleet - Snowflakes which melt and then re-freeze in a deep freezing area near the surface

- Usually clear/transparent pellets smaller than 5 millimeters
- Bounce off the ground producing a tapping sound as they strike a car or window

Freezing Rain - Snowflakes which melt into a rain drop which then re-freezes on contact with a frozen surface

- Gives everything a coating of glistening ice, which looks nice (see images in text) but:
 - Causes dangerous driving and flying conditions
 - Damages trees
 - Brings down power lines
 - Jan 1998 a ice storm in Northern New England and Canada caused:
 - Over \$1 billion dollars in damage
 - Millions of people to be without electricity and then as a result without heat
 - December 9-11, 2007 a ice storm from the Great Lakes to the southern Plains
 - 640,000 homes and businesses lost power in Oklahoma as 1.5 inches of clear ice accumulated across the state
 - 27 people died in the Midwest mostly in traffic accidents

Freezing Drizzle - Freezing rain drops that are small which re-freeze on contact with a frozen surface

- Less than 0.5 millimeters in diameter

Snow Grains - Small opaque grains of ice

- Diameters generally less than 1 millimeter
- Equivalent to drizzle
- They don't bounce or shatter when striking a surface

Snow Pellets - Small opaque grains of ice

- Diameters generally less than 5 millimeters
- Sometimes confused with snow grains
- They do bounce and sometimes shatter when striking a surface

Snow Squall - Brief heavy fall of snow that can greatly reduce visibility

- Similar to a rain shower
- Usually fall from cumuliform clouds
- Skies could clear and the sun could appear again in a matter of minutes

Graupel - Form when ice crystals take on additional mass by riming

- This new ice pellet usually has very small air bubbles giving it a spongy texture and a milky white appearance
- Can be as large as 5 millimeters and can provide the nuclei upon which hailstones form

Hail - Can grow in size to become very large

- Is very destructive to cars, houses and agriculture
- Figure 7.21 shows the annual average number of hailstorms over the United States
- Largest authenticated hail stone **circumference** fell in Aurora, NE on June 22, 2003 - 18.75 in
- Largest authenticated hail stone **diameter** fell in Vivian, SD on July 23, 2010 - 8.0 in
- **Heaviest** authenticated hail stone fell in Vivian, SD on July 23, 2010 - 1 pd 15 oz
- Particle grows by accumulating supercooled water as it passes up and down through regions of varying water content
- Updrafts bring the particle high above the freezing layer which allows the water to freeze
- If hailstone gets heavy enough it will fall and accumulate more supercooled water
- This process continues until the hailstone become heavy enough to fall against the strong vertical updraft
- Size of stone is dependent upon the amount of cold air aloft and the intensity of the updraft

Other Weather Events

Hailstreak (Not a type of precipitation) - An area on the surface (several kilometers wide by 10 kilometers long) in which a cumulonimbus cloud drops hail

- If the cloud remains stationary or continues to develop over the same location it could dump enough hail to cover the ground
- June 1959 a hailstorm over Selden, KS lasted 85 minutes and covered the entire town with 18 inches of hail
- June 1984 a hailstorm lasting over an hour dumped knee-deep hail on the suburbs of Denver, CO

Blizzard (Not a type of precipitation) - Fine powdery particles of snow combined with strong winds

- Sustained wind speeds or frequent gusts above 35 mph
- Considerable falling or blowing snow causing low visibilities below 1/4 of a mile
- These conditions can cause near whiteout conditions and quickly disorient a person lost outside in a rural area

Lake Effect Snow - Strong enhancement of snowfall that occurs downwind of the Great Lakes and other large bodies of water during the late fall and early winter

- Warmer bodies of water warm and evaporate moisture into the air above them
- Cold dry air from Canada blows this warm moist air towards the shoreline
- Friction on the shoreline slows down the wind causing convergence and thus uplift
- This causes snow to fall on a strip of land on-shore that can extend many miles inland