Rain

- **Rain** if falling drops greater than or equal to 0.5 mm in diameter
- **Drizzle** is drops are smaller.
- Sometimes rain evaporates before hitting the ground leaving streaks in the sky (virga).

Rainfall Intensity

- Updrafts and downdrafts in the air currents can explain why rain is so spotty and how we get intense rain showers.
- Rainfall intensity is categorized as

<table>
<thead>
<tr>
<th>Description</th>
<th>Rate in (in./hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>0.01 to 0.1</td>
</tr>
<tr>
<td>Moderate</td>
<td>0.11 to 0.3</td>
</tr>
<tr>
<td>Heavy</td>
<td>&gt; 0.3</td>
</tr>
</tbody>
</table>
Snow

- Although much of the precipitation begins as snow, it usually melts before hitting the ground – especially in Florida!

Fallstreaks

- Ice crystals and snowflakes falling from high cirrus clouds produce fallstreaks when they sublime (pass to vapor).

Snowflakes

- Snowflakes falling through moist air that is slightly above freezing melt, forming a thin film of water on the edge of the flakes.
- This film acts like glue sticking together snowflakes on contact.
- When snowflakes fall through dry and very cold air, they do not stick together leading to powdery and “dry” snow.
Ice Crystal Forms (Habits)

<table>
<thead>
<tr>
<th>Temp. (°C)</th>
<th>Temp. (°F)</th>
<th>Crystal Habit</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to –4</td>
<td>32 to 25</td>
<td>Thin plates</td>
</tr>
<tr>
<td>-4 to –6</td>
<td>25 to 21</td>
<td>Needles</td>
</tr>
<tr>
<td>-6 to –10</td>
<td>21 to 14</td>
<td>Columns</td>
</tr>
<tr>
<td>-10 to –12</td>
<td>14 to 10</td>
<td>Plates</td>
</tr>
<tr>
<td>-12 to –16</td>
<td>10 to 3</td>
<td>Dendrites, plates</td>
</tr>
<tr>
<td>-16 to –22</td>
<td>3 to –8</td>
<td>Plates</td>
</tr>
<tr>
<td>-22 to –40</td>
<td>-8 to –40</td>
<td>Hollow columns</td>
</tr>
</tbody>
</table>

Dendrite Snow Crystals

- Ice crystals grow most rapidly when the difference between the saturation vapor pressures of water and ice is largest.
- This occurs in the -12°C to -16°C range where dendrites are favored.

Snowfall Intensity

- Flurries – light snow showers
- Snow squall – more intense snow shower
- Blizzard – fine, dry snow blown into air

<table>
<thead>
<tr>
<th>Intensity</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>Greater than 0.5 mile</td>
</tr>
<tr>
<td>Moderate</td>
<td>Between 0.25 and 0.5 miles</td>
</tr>
<tr>
<td>Heavy</td>
<td>Less than 0.25 miles</td>
</tr>
</tbody>
</table>
Sleet

- A snowflake which (partially) melts and then freezes into a tiny ice pellet is called sleet.
- They have small diameters < 0.5mm.

Freezing Rain

- If the cold surface layer is too thin, the droplets do not freeze, but become supercooled.
- They freeze when striking a cold object.
- Freezing drizzle if diameter < 0.5mm.

Consequences of Freezing Rain
Snow Pellets

- Ice crystals colliding with supercooled droplets freeze them producing a snow pellet (diameters < 5mm). Snow grain: diameter < 1mm.

Hail

- Ice particles swept horizontally through a cloud collide with supercooled droplets which freeze producing larger and larger ice particles.

Pictures of Hail

Small Hail

Giant Hailstone (1.67 lb)
Measuring Precipitation

- Snow is melted to find a water equivalent. 10 cm of fresh snow yields 1 cm of water.

Weather Radar

- Radar = radio detection and ranging
- Microwaves (wavelength ~ 1 cm) are sent out, reflected by cloud droplet or raindrops, and detected.
- The time elapsed allows one to determine the distance away.
- Doppler radar also can measure the speed the rain is moving horizontally.

Summary of Precipitation Types

- Rain
- Drizzle
- Virga
- Snow
- Fallstreaks
- Flurries
- Snow squalls
- Blizzard
- Sleet
- Freezing rain
- Freezing drizzle
- Snow pellets
- Snow grains
- Hail