

Chapter 8, Part 2

Precipitation Types

Rain

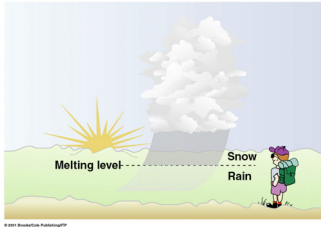
- Rain if falling drops greater than or equal to 0.5 mm in diameter
- Drizzle if drops are smaller.
- Sometimes rain evaporates before hitting the ground leaving streaks in the sky (virga).

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

Description	Rate in (in./hr)
Light	0.01 to 0.1
Moderate	0.11 to 0.3
Heavy	> 0.3

Snow



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

Fallstreaks

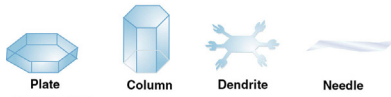


- Ice crystals and snowflakes falling from high cirrus clouds produce fallstreaks when they sublimate (pass to vapor).

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)



Temp. (°C)	Temp. (°F)	Crystal Habit
0 to -4	32 to 25	Thin plates
-4 to -6	25 to 21	Needles
-6 to -10	21 to 14	Columns
-10 to -12	14 to 10	Plates
-12 to -16	10 to 3	Dendrites, plates
-16 to -22	3 to -8	Plates
-22 to -40	-8 to -40	Hollow columns

Dendrite Snow Crystals



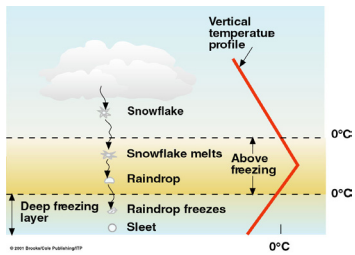
- Ice crystals grow most rapidly when the difference between the saturation vapor pressures of water and ice is largest.
- This occurs in the -12°C to -16°C range where dendrites are favored.

Snowfall Intensity

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

Intensity	Visibility
Light	Greater than 0.5 mile
Moderate	Between 0.25 and 0.5 miles
Heavy	Less than 0.25 miles

Sleet



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

Freezing Rain

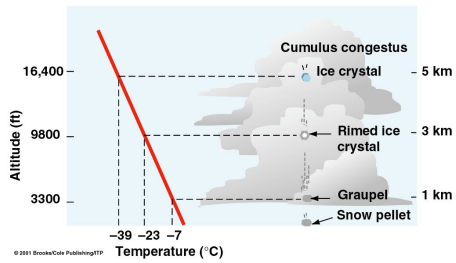


- If the cold surface layer is too thin, the droplets do not freeze, but become supercooled.
- They freeze when striking a cold object.
- Freezing drizzle if diameter $< 0.5\text{mm}$.

Consequences of Freezing Rain

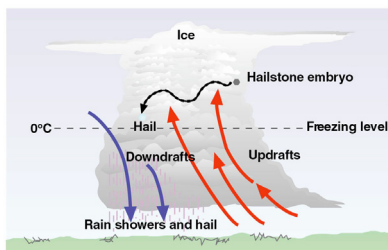


Snow Pellets



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

Hail

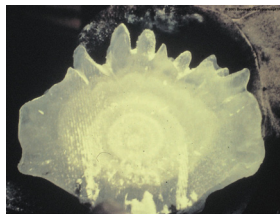


- Ice particles swept horizontally through a cloud collide with supercooled droplets which freeze producing larger and larger ice particles.

Pictures of Hail



Small Hail



Giant Hailstone (1.67 lb)

Measuring Precipitation

Standard Rain Gauge

Tipping Bucket Rain Gauge

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

Weather Radar

- Radar = radio detection and ranging
- Microwaves (wavelength ~ 1cm) 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	• Sleet
• Drizzle	• Freezing rain
• Virga	• Freezing drizzle
• Snow	• Snow pellets
• Fallstreaks	• Snow grains
• Flurries	• Hail
• Snow squalls	
• Blizzard	
