

Science 1206

Weather Dynamics

Precipitation and
Humidity, and Regional
Weather



Humidity

- Humidity:
 - a measure of the amount of water vapor in the air
 - Warm air can hold more moisture than cold air
- Relative Humidity:
 - The measure of the amount of water vapor compared to the **Maximum** amount possible

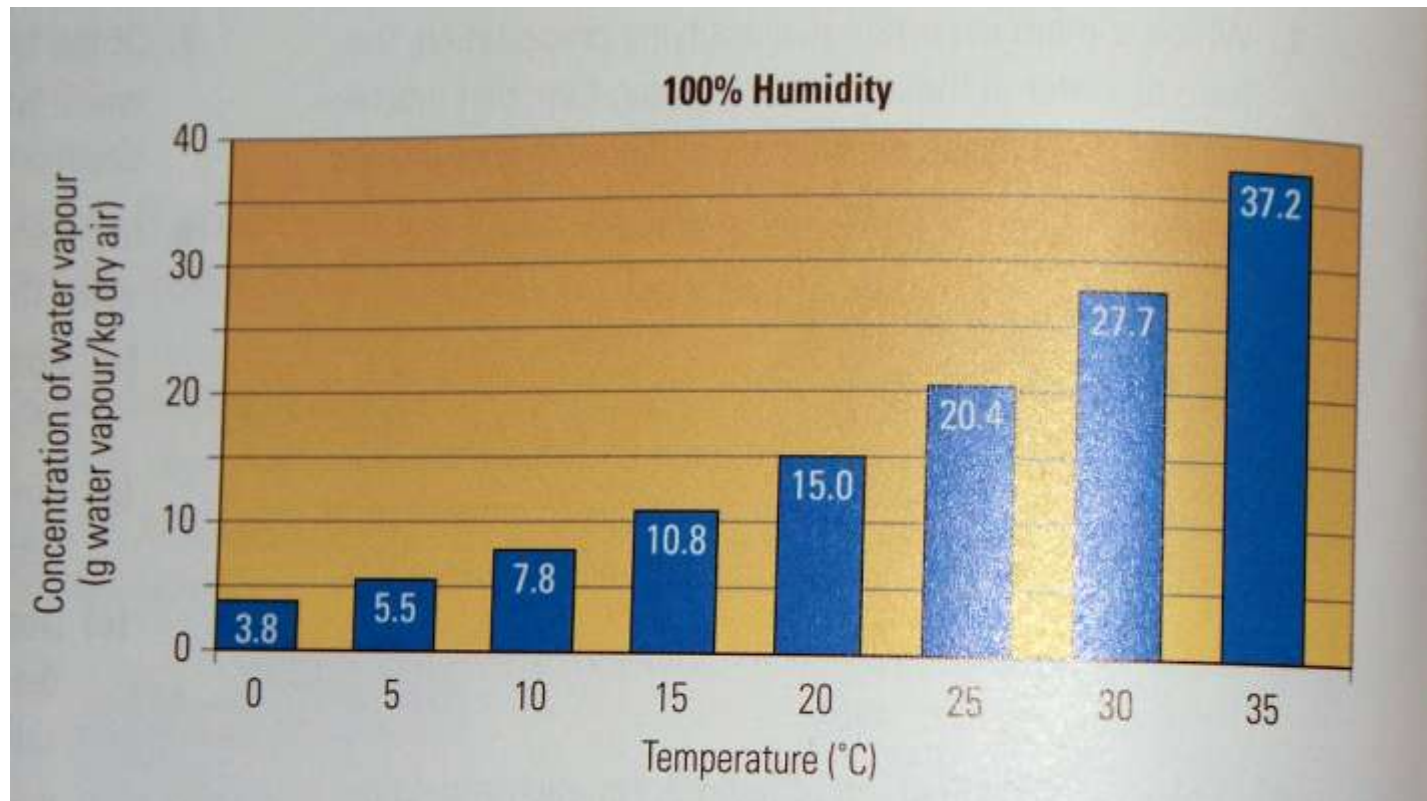


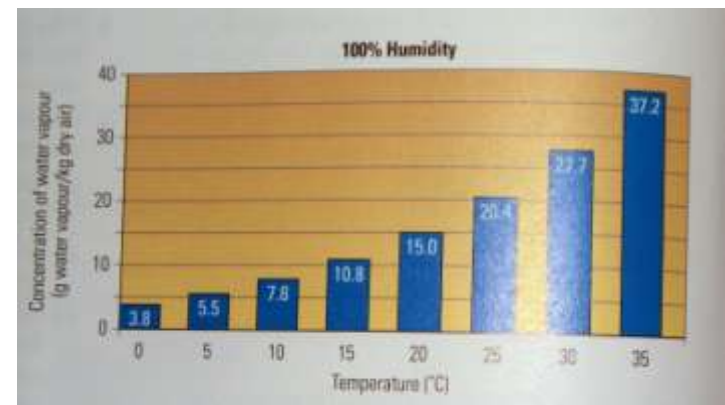
Continued...

- Saturated Air
 - Relative humidity is 100%
 - Over 100% results in condensation
- Dew Point
 - Temp at which dew forms
 - As air gets colder, it holds less moisture
 - Releases excess as dew

Humidity Calculations

- Figure 1, pg. 558 – Maximum Amounts





$$\text{Relative Humidity} = \frac{\text{concentration}}{\text{maximum concentration}} \times 100\%$$

Ex 1:

What is the relative humidity if 1.9 g/kg of water in air is present at 0°C?

Ex 2:

What is the conc of H₂O in the air at 20°C if the relative humidity is 50%?

Measuring Relative Humidity (pg. 560)

- A *Psychrometer* measures relative humidity
 - Two thermometers
 - One dry, one kept wet
 - Spun in the air, temp drops
 - The difference between the two is used to find relative humidity





Dry Bulb	Wet Bulb	Relative Humidity
22	17	
18	14	
32	30	
32	22	

Dry Bulb (°C)	Number of degrees difference between the wet- and dry-bulb readings (°C)									
	1	2	3	4	5	6	7	8	9	10
10	88%	77	66	56	45	35	26	16	7	--
11	89	78	67	57	47	38	28	19	11	2
12	89	79	68	59	49	40	31	22	14	5
13	89	79	69	60	51	42	33	25	16	9
14	90	80	70	61	52	43	35	27	19	11
15	90	80	71	62	54	45	37	29	22	14
16	90	81	72	63	55	47	39	31	24	17
17	91	82	73	64	56	48	41	33	26	19
18	91	82	73	65	57	50	42	35	28	21
19	91	82	74	66	58	51	44	37	30	24
20	91	83	75	67	59	52	45	38	32	26
21	91	83	75	68	60	53	47	40	34	27
22	92	84	76	69	61	54	48	41	35	29
23	92	84	77	69	62	56	49	43	37	31
24	92	84	77	70	63	57	50	44	38	32
25	92	85	77	71	64	57	51	45	40	34
26	92	85	78	71	65	58	52	46	41	35
27	93	85	78	72	65	59	53	47	42	37
28	93	86	79	72	66	60	54	49	43	38
29	93	86	79	73	67	61	55	50	44	39
30	93	86	80	73	67	61	56	50	45	40
31	93	86	80	74	68	62	57	51	46	41
32	93	87	80	74	68	63	57	52	47	42
33	93	87	81	75	69	63	58	53	48	43
34	93	87	81	75	69	64	59	54	49	44

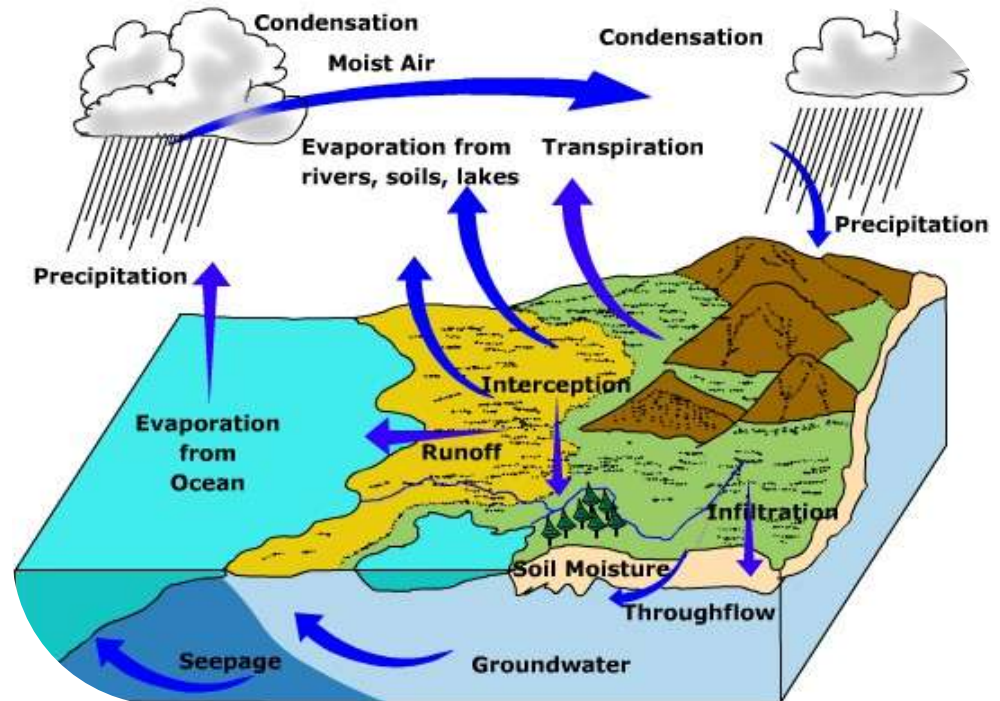
Effects of Humidity

- Higher humidity
 - causes perspiration to evaporate slowly.
 - Sweating doesn't cool us as well
- Low humidity
 - Air is dryer
 - Skin may be uncomfortable
- Humidex:
 - Reports how hot the humidity makes us feel

Precipitation (14.5 - pg. 556)

- Precipitation: Water that reaches the ground in either liquid or solid form

Recall: The Water Cycle:

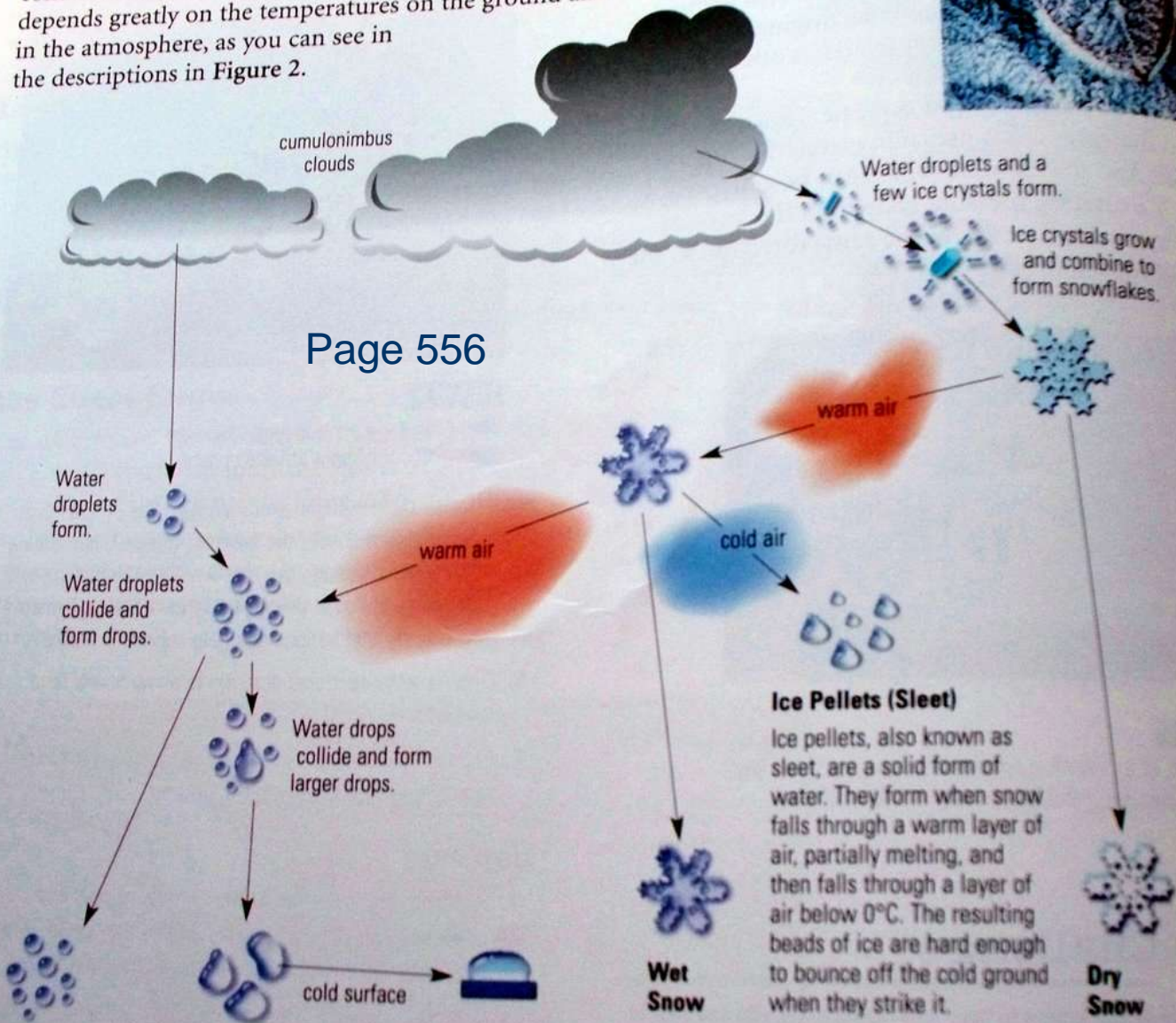


- When air reaches its *saturation point* and the water vapor in the air condenses to form liquid droplets.
- Droplets join together and become heavy enough to fall to the surface

Type of precipitation depends on conditions in the atmosphere and on the ground

Liquid	Solid

condensation, freezing, or sublimation. The type of precipitation depends greatly on the temperatures on the ground and in the atmosphere, as you can see in the descriptions in Figure 2.



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Drizzle
Drizzle is fine water droplets between about 40 μm and 0.5 mm in

Rain
Rain consists of falling water droplets between about 0.5 mm

Freezing Rain
When raindrops are close to

Snow
Snow is formed when water vapour crystallizes on tiny particles of dust and other solid substances, such as

Ice Pellets (Sleet)
Ice pellets, also known as sleet, are a solid form of water. They form when snow falls through a warm layer of air, partially melting, and then falls through a layer of air below 0°C. The resulting beads of ice are hard enough to bounce off the cold ground when they strike it.

Dry Snow

- See Fig 2, pg. 556

- Hail:

- created in cumulonimbus clouds
- Frozen raindrops are circulated up and down
- Layers of ice are formed

- Dew:

- Water vapour condenses near the ground as the air cools
- Cold Days : Frost

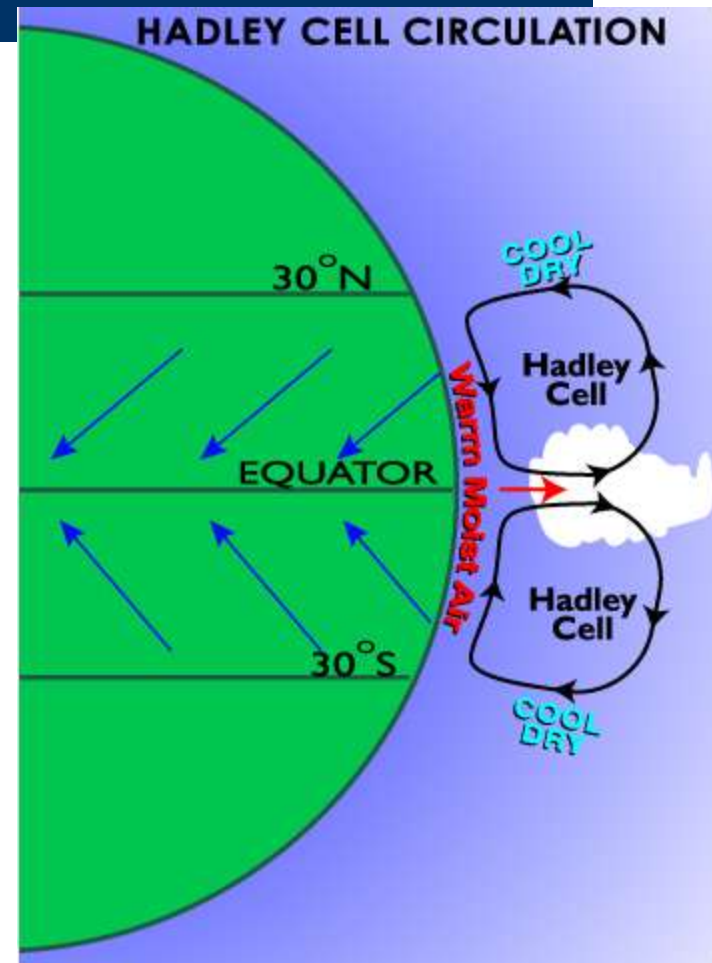
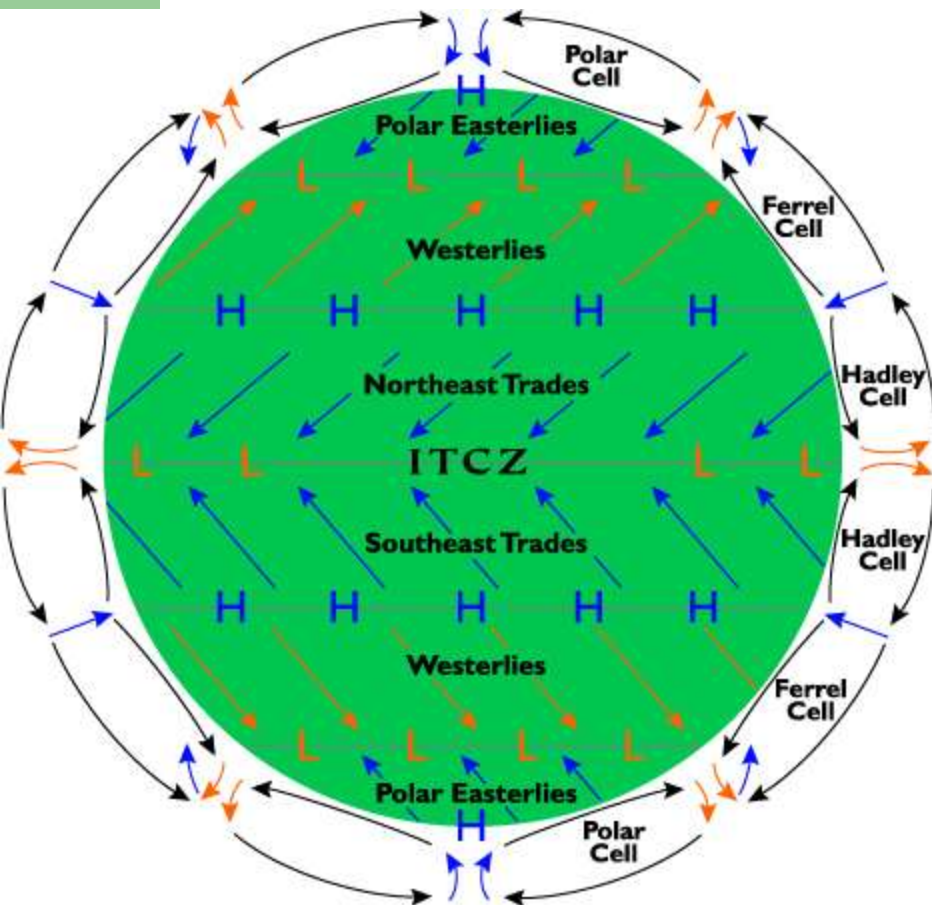


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Weather Dynamics

Regional Weather

Quick reivew: Prevailing winds



Regional Weather Systems

(Sec 14.4 pg 553)

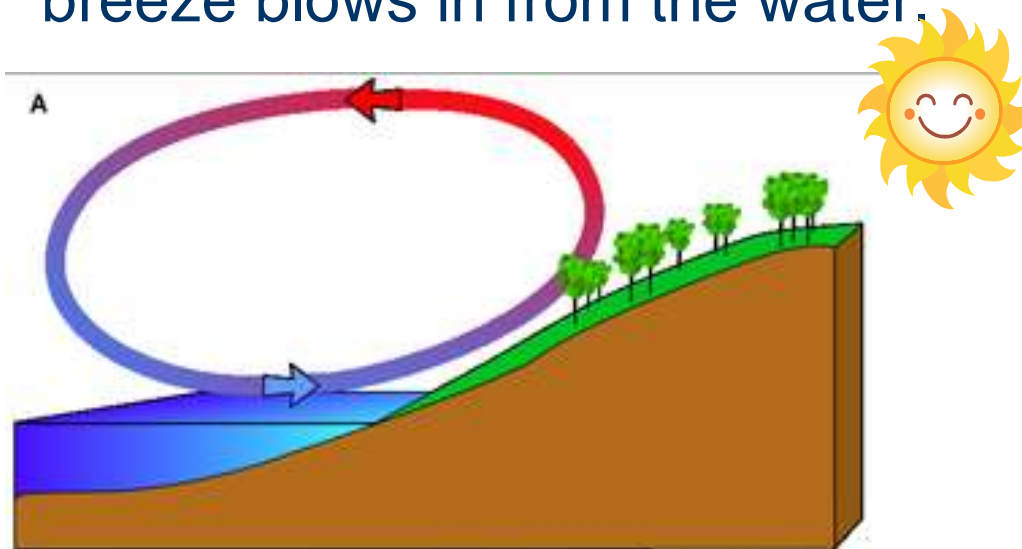
Weather can be affected by local landforms in a specific area

- Thermal:
 - A local *convection* current set up during the day
 - The sun heats the ground, causing the air to rise



Sea Breeze

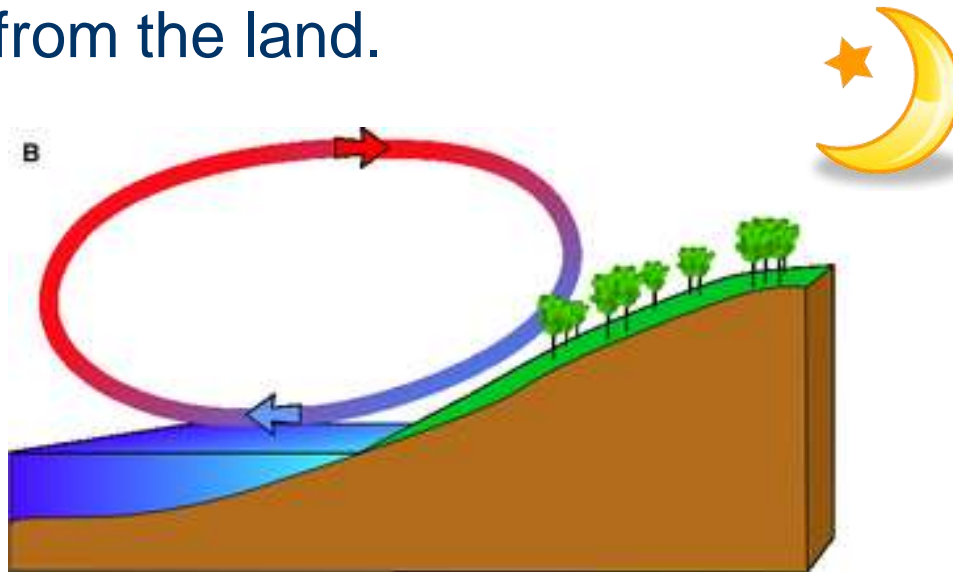
- From water to land
- A thermal formed near water
- The sun heats the land. The air rise, and a cool breeze blows in from the water.



Where are the
highs and
lows?

Land Breeze (link)

- from land to water
 - After sunset, the land cools quickly.
 - Air above the warmer water rises, replaced by air from the land.



Where are the
highs and
lows?

Lake-Effect Snow

- When air moves over water it picks up moisture. In winter, water is warmer than the land (more moisture)
- When the air reaches the cold land, the moisture becomes snow



Chinook Winds

- A gentle warm, dry wind on the leeward side of the Rocky mountains

