

# Ch 19.3 Regional Wind Systems

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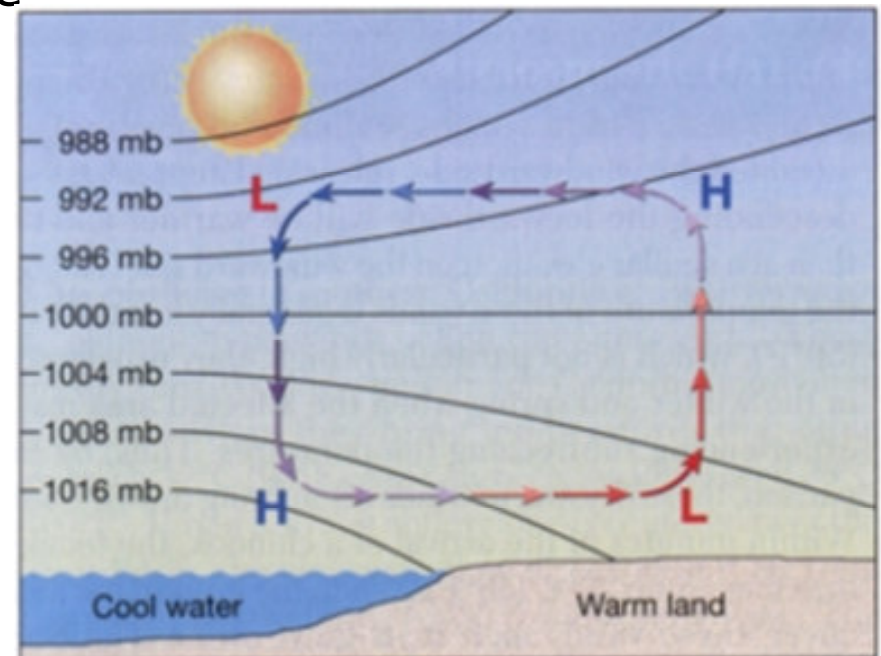
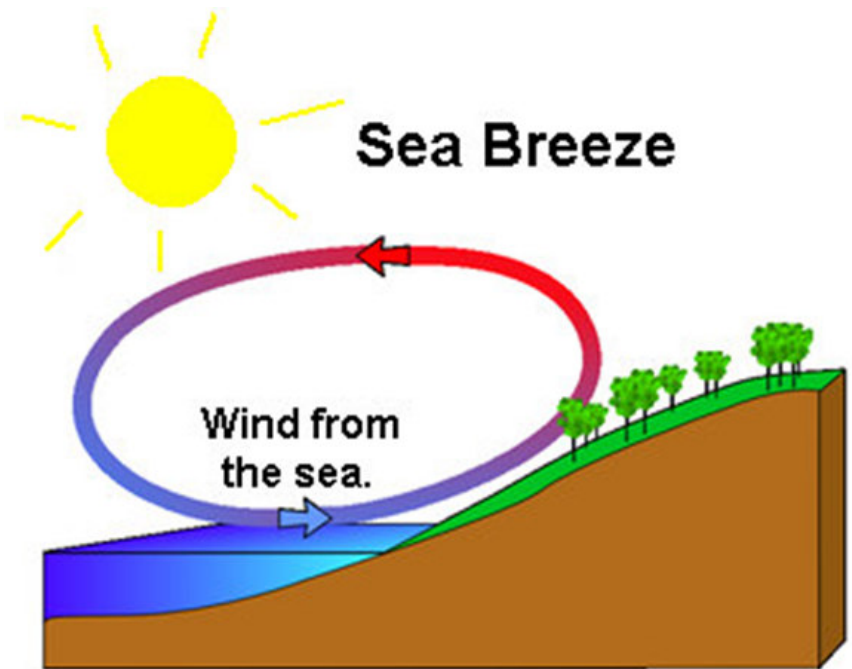
## Local Winds

- Small-scale or local winds are produced by locally generated pressure gradient. Local winds are caused either by topographic effects or by variations in surface composition – land and water.
- The presence of mountains and valleys also produces specialized types of local winds. This includes Chinook and Santa Ana winds.



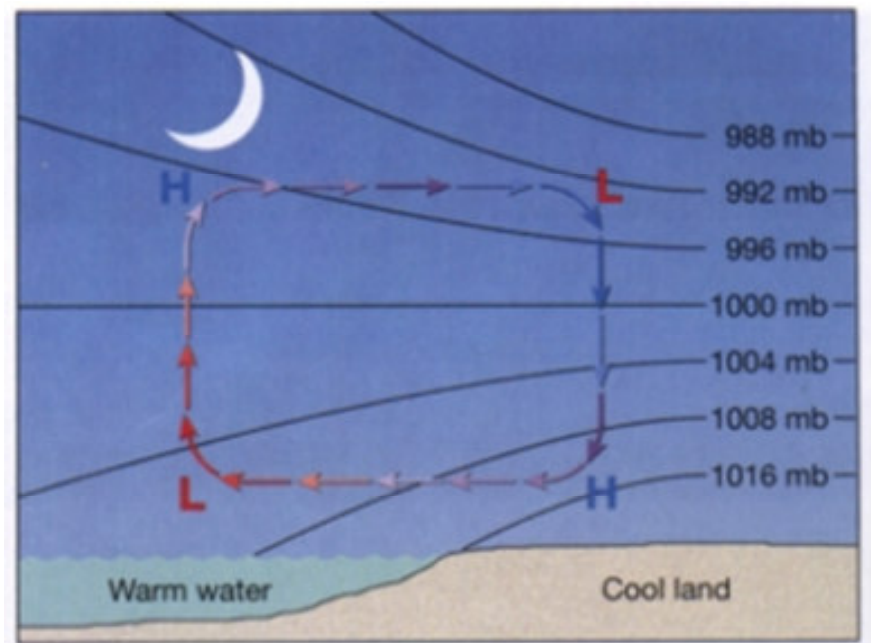
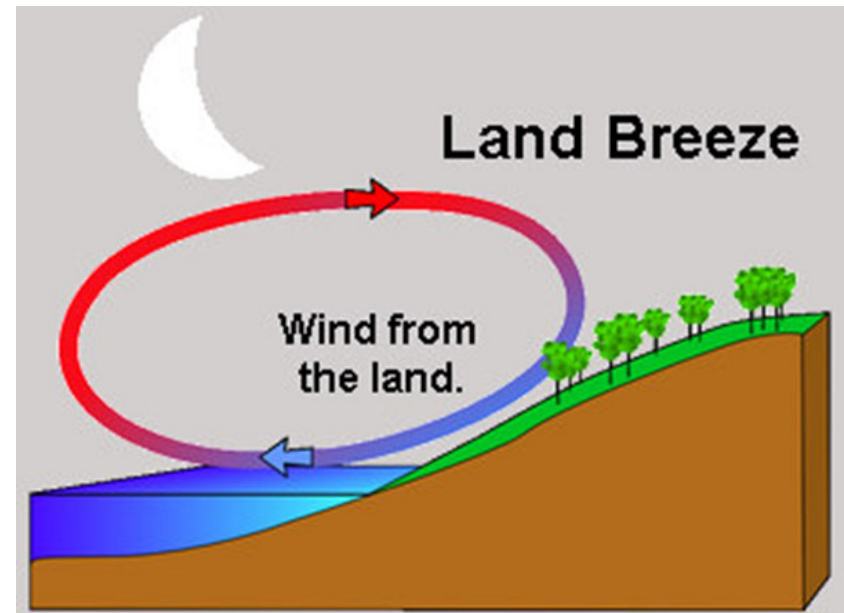
# Sea Breeze Circulation

- In coastal areas, the land surface is heated more intensely during the daylight hours than adjacent body of water.
- As a result, the air above the land heats up, expands, and rises, creating an area of low pressure.
- A **sea breeze** then develops because of the colder air over the water moves toward the land creating a cool wind blowing in from the sea.
- Small-scale sea breezes can also develop along the shores of the Great Lakes which cools summer temperatures near the lake.



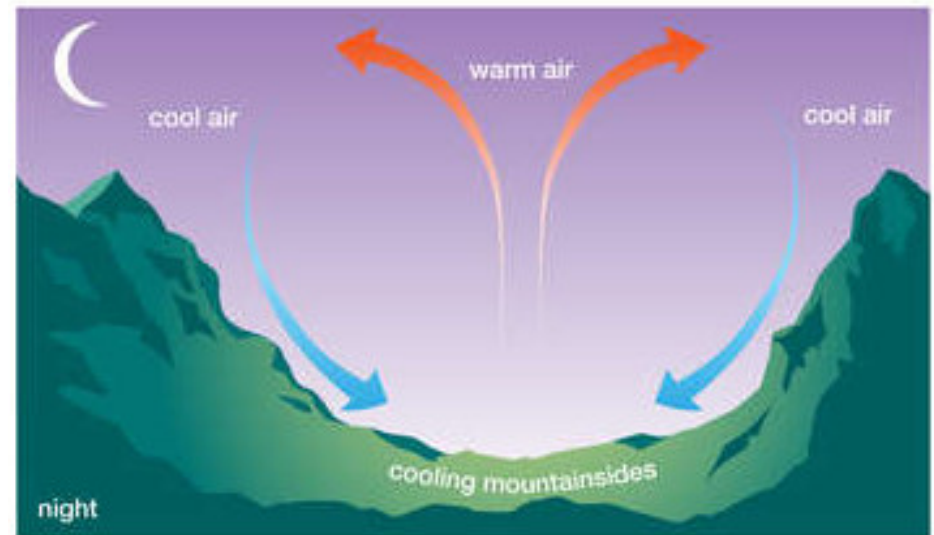
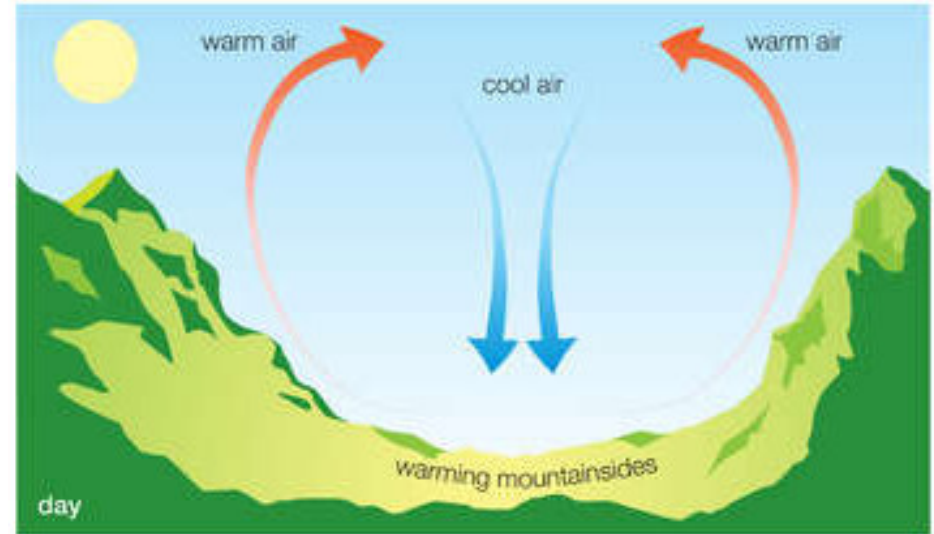
## Land Breeze Circulation

- At night, the reverse may take place. The land cools more rapidly than the sea, and a **land breeze** develops.
- The cooler air at higher pressure over land moves to the sea, where the air is warmer and at lower pressure.
- These relatively cool winds can be a moderating influence on afternoon temperatures in coastal areas.



# Valley and Mountain Breezes

- During the daylight hours, the air along slopes of the mountains is heated and becomes less dense. This causes the warm air to generate a **valley breeze** and flow up the valleys.
- After sunset, the process can reverse. The rapid cooling air becomes denser and start to flow downslope into the valleys and cause a **mountain breeze**. This happens in the Grand Canyon. The sound of the rushing wind can be louder than the Colorado River below.



# Regional Wind Systems

## Wind Direction

- The **prevailing wind** is the wind that blows more often from one direction than from any other.
- **Monsoons** are the seasonal reversal of wind direction associated with large continents, especially Asia. In winter, the wind blows from land to sea. During the summer in Arizona, the wind blows north from Mexico into Arizona due to an area of high pressure over Arizona & New Mexico.



## Wind Speed

- An **anemometer** is an instrument that resembles a cup and is commonly used to measure wind speed.

## Wind Direction

- A **weather vane** is an instrument for showing the direction of the wind.
- In the U.S., the **westerlies** consistently move weather from west to east across the continent.

