PhyzJob: WeatherSchool 101
"c" is for Climate

Felix

Specific heat capacity is not simply a concept listed in a physics book whose applications are limited to experiments with hot water and pieces of metal. Among other things, specific heat capacity plays a role in determining climate. It makes San Francisco a "better" place to live than Washington, District of Columbia.

1. How does the specific heat capacity of land compare with that of water?

Land low; water high

2. What is the direction of the prevailing winds across the United States? (Do weather systems move north to south, east to west, etc.?) If you are unsure, watch the animated satellite sequence during the weather forecast on the evening news.

W -> E

3. During winter, San Franciscans enjoy moderate temperatures while people in the nation's capital freeze their buns off in the ice and snow. Both cities are at approximately the same latitude, and both are near oceans, so how do you explain the disparity in local temperatures?

Moderate air over Pacific Ocean blows across SF; that air gets cold while passing across cold continent and is chilly by the time it hits DC

4. During the summer, San Franciscans again enjoy moderate temperatures while their counterparts in "the District" swelter in the summer heat. Again, why?

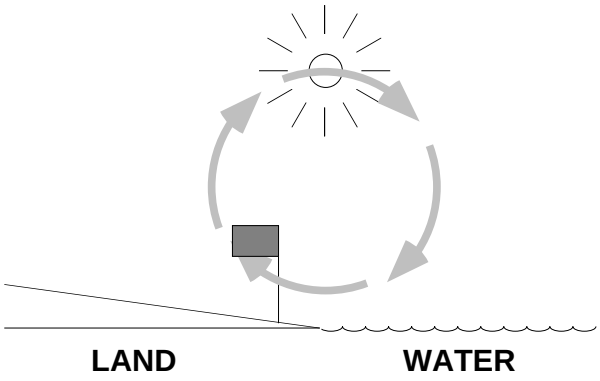
Moderate air over Pacific Ocean blows across SF; that air warms up while passing across hot continent and is hot by the time it hits DC

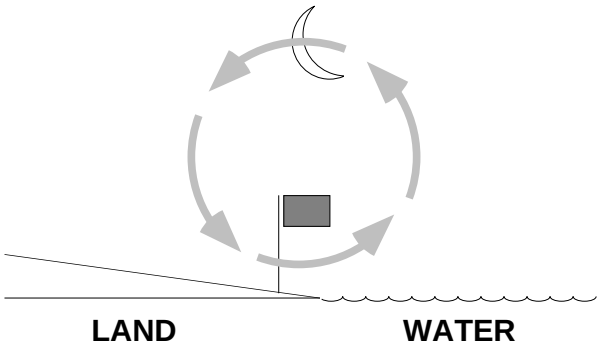
5. North Carolina has the same latitude as Bermuda, but not nearly the same tourist industry. Why do you suppose this is?

NC gets "continent air" (cold in winter, hot in summer); Bermuda gets "ocean air" (warm in winter, cool in summer).

PhyzJob: WeatherSchool 102
Convection at the Beach

Felix





Smaller-scale wind patterns can be explained in terms of specific heat capacity and convection. Consider wind at the beach.

1. What heats up faster during the day: land or water?
Land

2. What will be warmer during the day: the air over the land or the air over the water?
Air over land

3. What happens to warm air (that is less dense than the air around it)?

Rises

4. When that air rises, will air from somewhere else take its place?

Yes; air above water will come in to take its place

5. During the day, a convection circulation pattern exists due to differential heating of the land and water. Draw that pattern on the daytime diagram above. Which way does the wind blow on the beach during the day? If there were a flag on the pole, which way would it be blown?
Daytime seabreeze: water to land

6. What cools down more slowly during the night: land or water?
Water

7. What will be warmer during the night: the air over the land or the air over the water?
Air above water

8. During the night, a convection circulation pattern exists due to differential cooling of the land and water. Draw that pattern on the nighttime diagram above. Which way does the wind blow on the beach during the night? If there were a flag on the pole, which way would it be blown?

Nighttime seabreeze: land to water