

# Ch 19-3 ACTIVITIES

NAME \_\_\_\_\_ HR \_\_\_\_\_

## LAND AND SEA BREEZES

Water and land heat up at different rates. During the day the sun beams down on the land and water equally, but the land warms up quicker. For this reason air over the water is cooler (more dense) than air over the land. It therefore sinks lower and squirts under the warmer air forcing it up. This causes the wind to come from the water during the day. Draw a picture of this below, using a red colored pencil to show warm air movement and a blue colored pencil to show cold air movement.

### **DAYTIME**



During the night the land and water cool back down at unequal speeds. The land cools down quicker than the water. For this reason air over the LAND is now COLDER (more dense) than air over the water. It therefore sinks lower and squirts under the warmer air above the water, forcing it up. This causes the wind to come from the land and blow out to the sea during the night. Draw a picture of this below, using a red colored pencil to show warm air movement and a blue colored pencil to show cold air movement.

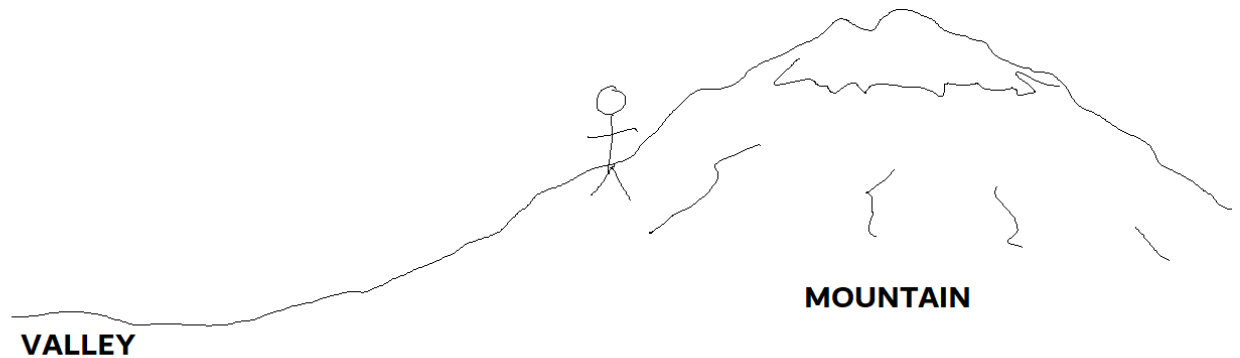
### **NIGHT TIME**



## VALLEY AND MOUNTAIN BREEZES

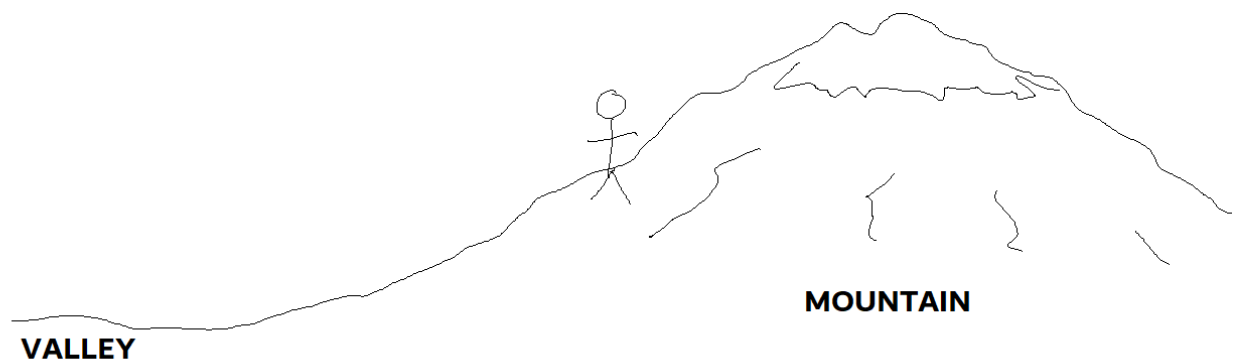
During the day air is warmed by the sun and rises up the mountain, creating a wind that blows up from the valley. Draw a picture of this below, using red for warm air.

### **DAYTIME**



During the night air cools down and sinks down the side of the mountain, creating a wind that blows down from the peaks to the valley below. Draw a picture of this below, using blue for cold air.

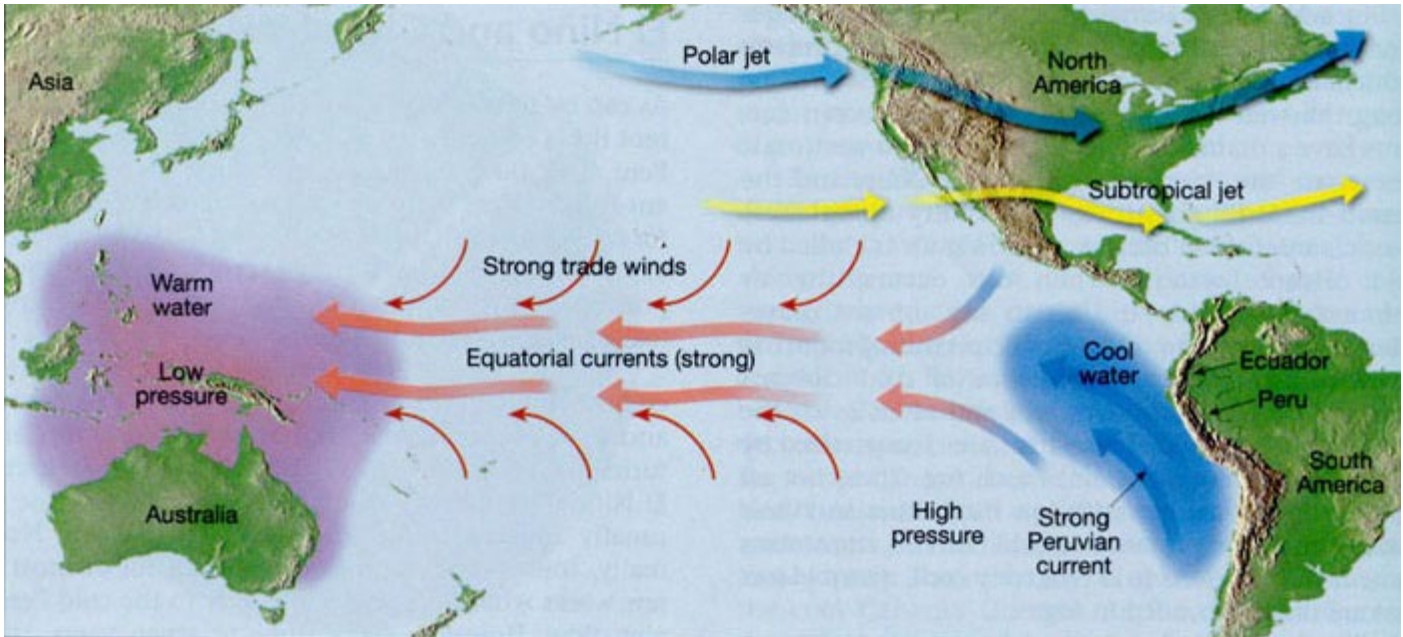
### **NIGHT TIME**



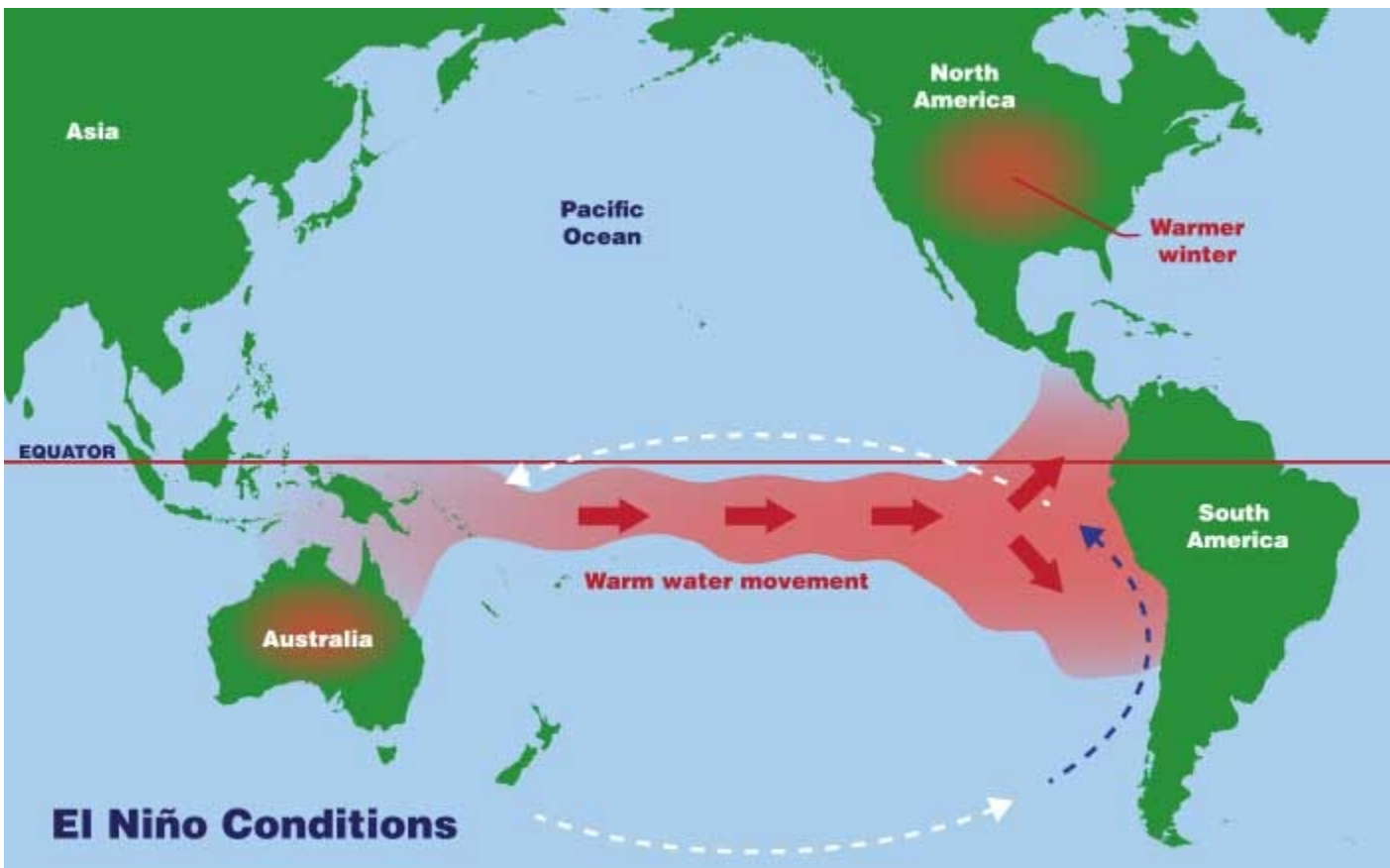
## EL NINO & LA NINA

El Niño is a climate pattern that describes the unusual warming of surface waters in the eastern tropical Pacific Ocean. Fishermen off the coast of Peru were the first to notice the appearance of unusually warm water (It ruined the fishing in the area). The phenomenon is called El Niño (meaning "the Christ Child" in Spanish) because the phenomenon often arrives around Christmas. El Niño later came to describe irregular and intense climate changes, rather than just the warming of coastal surface waters. During Christmas in 1982, the temperature got up to 66 degrees here in Ithaca, breaking all records. It was an El Niño year.

Look at the ocean current in the picture. It shows the trade winds near the equator blowing strongly to the west. This is the typical pattern. As the ocean water moves westward, it leaves a gap behind on the west edge of South America. This causes cold water from the deep ocean to well up. Notice the label "cool water" in this zone. Notice also that above Australia there is a zone labelled "warm water" indicating that all the warm water from the normal current ends up in this area.



Now look at the picture below. It shows the trade winds reversing, bringing warm water to the west coast of South America instead. This happens every 2 to 7 years, but we never really know when it will occur. Notice that it *does* affect us here in Michigan.



So what affects can El Nino have besides a warm Christmas day in Michigan? Places that usually have warm waters, rising air, and regular rainfall end up having cold, sinking air and therefore much less rain. These locations in Asia can suffer with drought conditions. Areas near South America that usually have cold sinking air and blue skies end up with warm rising air and lots of rain. Often it is too much rain, and it creates flooding.

1. What does the term El Nino mean in Spanish?
2. When do the effects of El Nino show up? (At what time of the year?)
3. What direction do the trade winds usually blow?
4. What direction do the trade winds blow during an El Nino year?
5. Where does warm water build up during normal years?
6. Where does warm water build up during El Nino years?
7. Why does cold water well up along the coast of South America during normal years?
8. What are the bad weather changes that happen in the land/ islands south of Asia due to El Nino?
9. What are the bad weather changes that happen in South America due to El Nino?