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## My NASA Data - Mini Lesson

### El Niño Model



### Mini Lesson

During an El Niño event, the trade winds which normally blow westward from South America toward Australia and New Guinea weaken. This results in more warm water staying off the coast of South America because it is not pushed westward. In turn, this reduces the amount of cold water that can rise and replace the warm water, a process called upwelling. With less upwelling, not as many nutrients are available for fish populations off the coast of South America. The presence of more warm water off the South American coast also leads to more rain in the area. There are also other effects around the world.

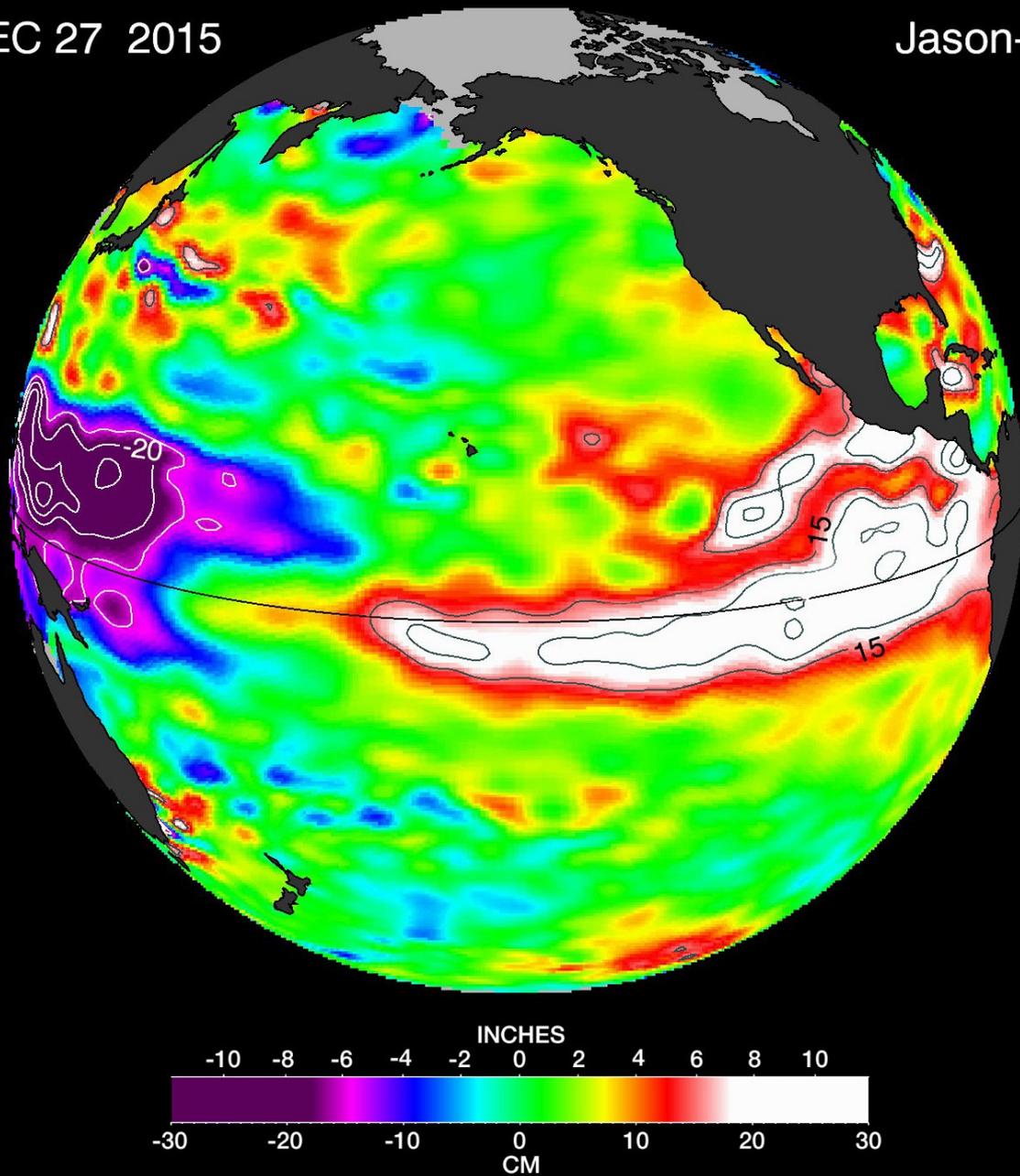
Where the ocean is warmer, the sea level will be marginally higher. The Jason-1, launched in 2001, and Jason-2, launched in 2008, satellites measure height from the Earth's surface to the satellite. This includes measuring from the ocean surfaces. Differences in sea surface height can be measured with these satellites.

In this activity, students will create a model of the sea surface height.

Use the color image provided for an guide for the model. The color legend shows the difference from normal sea height in centimeters. Students will use millimeters for their models rather than centimeters.

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Jason-2



(Image Credit: NASA/JPL)

Use the image and scale to answer the following questions.

1. How many centimeters below normal sea height does the purple range represent? (6 - 30 cm below sea level)
2. What does the green range represent? (0 - 5 cm above sea level)
3. How many centimeters above normal sea height does the yellow range represent? (5 - 8 cm)

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- above sea level)
4. How many centimeters above normal sea height does the red range represent? (10 - 15 cm above sea level)
  5. How many centimeters above normal sea height does white represent? (18 - 30 cm)
  6. What is the difference between the green and purple ranges? (approximately 20 cm)
  7. What is the difference between the yellow and green ranges? (approximately 7 cm)
  8. What is the difference between the red and yellow ranges? (approximately 6 cm)
  9. What is the difference between the red range and the white? (approximately 5 cm)
  10. How many millimeters are in one centimeter? (10)
  11. If you change the unit from centimeters without converting, how many times smaller will the numbers be? (10)

The following activity has been modified from the activity found at [NASA Space Place: What is El Niño anyway?](#)

***ALWAYS BE SAFE - THIS ACTIVITY INVOLVES BOILING WATER - ADULT SUPERVISION REQUIRED***

What you need:

- Four small packages of gelatin dessert mix (like JELL-O® brand) in these colors:
  - Purple (like grape or blackberry)
  - Green (lime)
  - Yellow (lemon)
  - Red (like cherry, raspberry, or strawberry)
- 1 quart lemon or pineapple sherbet
- Whipped cream
- Glass casserole dish or glass bowl that can hold 8 cups of liquid (Preferably flat)
- Measuring cup
- Four mixing bowls (or fewer, if you wash them out between colors)
- Rotary beater or whisk

What to do:

1. Do these steps for each of the four colors of gelatin:
  - Dump the gelatin mix into a bowl. Add 1 cup of boiling water and stir until the gelatin is completely dissolved.
  - Important! Let the gelatin mixture COOL to room temperature.
  - When the gelatin mixture is cool, add 3/4 cup of the sherbet, and mix in with the beater or whisk.
2. Use the differences between the color ranges to determine the thickness for each layer in the model. You will use millimeters rather than centimeters.
  - Purple (bottom) - difference between green and purple (16 millimeters or 1.6 centimeters)
  - Green - difference between yellow and green (4 millimeters or 0.4 centimeters)
  - Yellow - difference between red and yellow (6 millimeters or 0.6 centimeters)
  - Red (top) - difference between red and white (4 millimeters or 0.4 centimeters)

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3. One color at a time, carefully pour the "pudding" mixtures into the glass dish. Pour the colors in this order and try to make them the thicknesses calculated. If you want a particular color to be on the top in part of your model, don't put more colors on top of it.
    - Purple (bottom) (20 millimeters or 2.0 centimeters)
    - Green (7 millimeters or 0.7 centimeters)
    - Yellow (6 millimeters or 0.6 centimeters)
    - Red (top) (5 millimeters or 0.5 centimeters)
  4. Put the "pudding" into the refrigerator until it is completely set.
  5. Now for the artistic part.
    - Use the whipped cream to make the white "El Niño." This represents the highest part of the ocean.
    - When you are ready to serve, scoop out the servings at an angle so that you can see all the different layers from the top.
  6. Of course, when you're tired of being artistic, eat the rest of the pudding! (Don't forget the whipped cream.)

### Wrap Up

1. What do the different colors of gelatin represent? (Different sea level heights)
2. Where was the sea height the highest?
3. Why is the sea level higher in these locations?

Source: [NASA Space Place: What is El Niño anyway?](#)

Students will investigate the differences in sea surface height during an El Niño event by creating a model with gelatin, sherbet and whipped creme.

### Earth System Data Explorer

- [Daily Sea Surface Temperatures](#)