

STUDENT MASTER

One Ocean, Many Estuaries

Look at a globe. What color do you see the most of on the globe's surface? Earth looks pretty blue, doesn't it? That's because 71% of Earth's surface is covered with water and most of that is ocean. The Pacific Ocean is connected to the Indian Ocean on one side and the Atlantic Ocean on the other. The Arctic and Southern Oceans are connected to both the Atlantic and Pacific oceans. There is really only one global ocean.

Wherever rivers from the land meet the ocean or sea, there is the possibility that conditions will support the formation of an estuary. If fresh water from rivers can meet the salt water from the ocean in a semi- enclosed location, then you will find an estuary.

Procedure

1. Take a look along the coastlines of the world's continents on the Student Master: *World Estuary Map*. Find the dots, which represent estuary locations.
2. Look at the latitude and longitude coordinates in the table below. These coordinates are for locations that may or may not be estuaries. Use the *World Estuary Map* to determine if an estuary exists at the locations listed in the table. Circle the location's coordinates in the table if you think that location is an estuary.

Location	
35° N, 147° E (Kanagawa, Japan)	65° N, 160° W (N. Alaska)
16° N, 100° W (Mexico)	46° N, 70° W (Great Lakes)
40° S, 150° E (Australia)	51° N, 0.5° W (United Kingdom)
20° S, 70° W (South America)	70° N, 50° W (Greenland)

3. Use the Student Master: *World Estuary Map* and the Teacher Master: *Sea Surface Temperature* to answer the following questions.

Questions

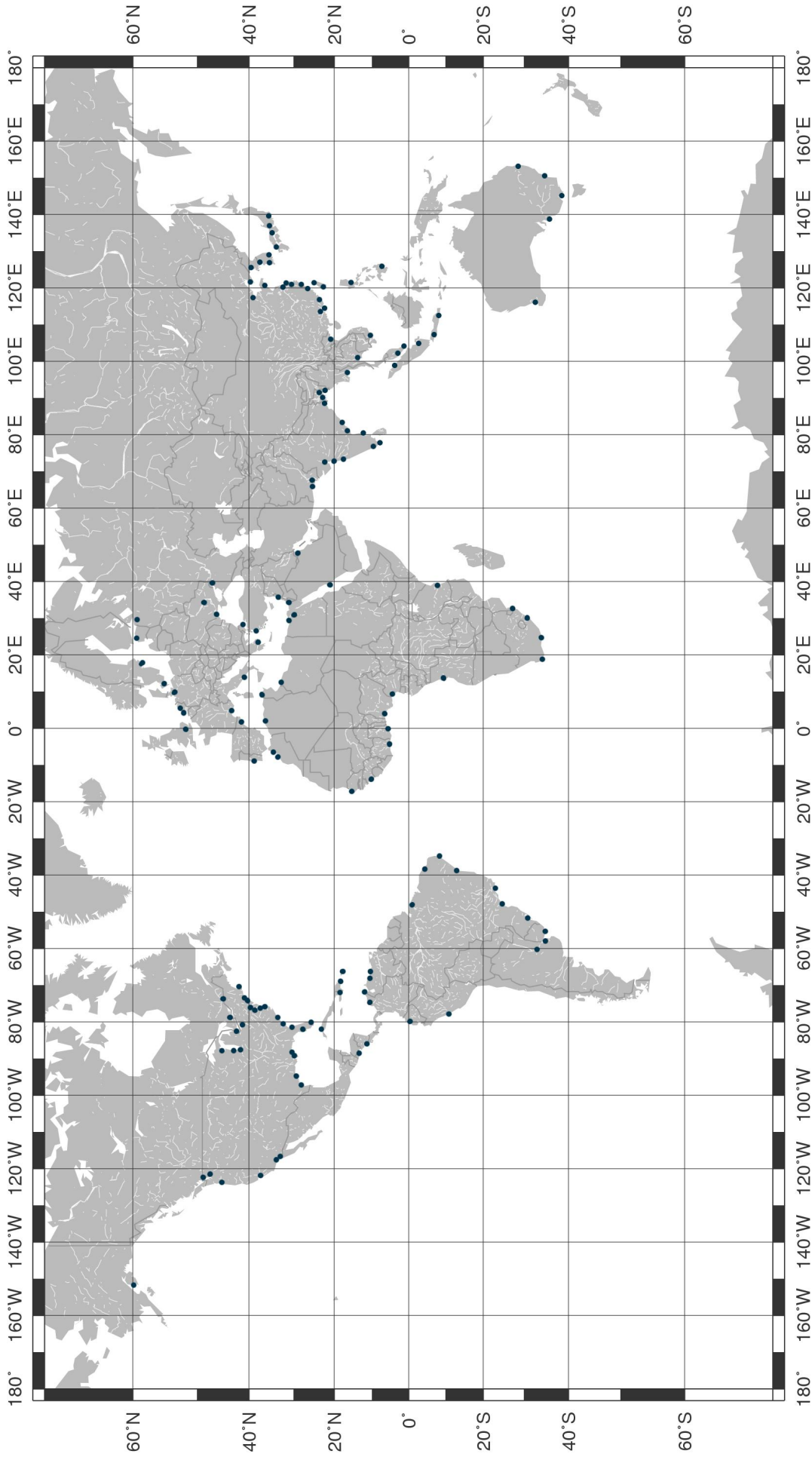
- Q1. Use the World Estuary Map to locate the mouth of the Amazon River in northeast South America. Record the latitude and longitude.
- Q2. Water found in estuaries at latitude 0° is always warm. Why do you think that's true?
- Q3. Do you think that the water temperatures are the same for every estuary on Earth, no matter its location? Why or why not?
- Q4. What is the relationship between ocean water temperature and estuary water temperature?

Climate Extension

- Q5. What clues on the Sea Surface Temperature maps helped you decide how the ocean water is moving?
- Q6. Where on the Earth are ocean water movements carrying heat towards the poles? Where are the currents bringing cool water towards the equator?
- Q7. If global climate change continues, predict how the Sea Surface Temperature maps might look in the year 2109?
- Q8. How could warming ocean temperature impact the estuary ecosystem?
- Q9. How might the influence of ocean temperatures on estuaries vary between a tidally well-flushed estuary and an estuary with little tidal flushing?

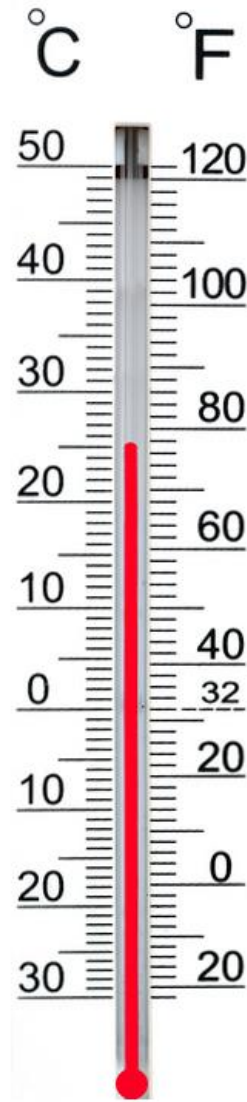
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World Estuary Map



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Celsius vs. Fahrenheit



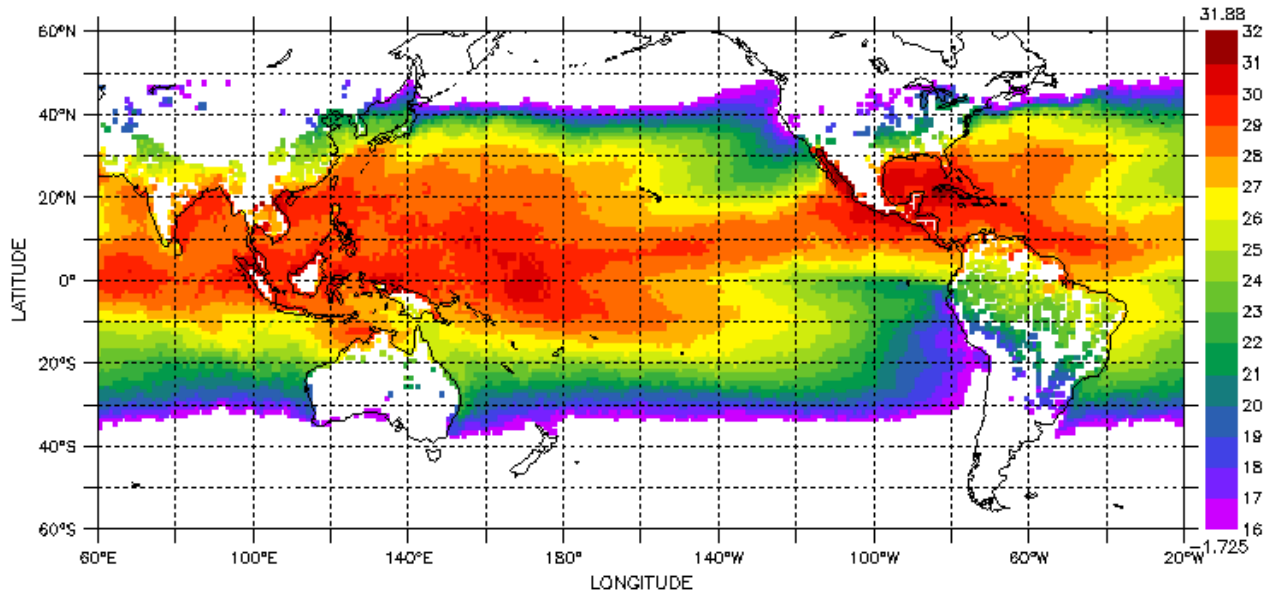
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Sea Surface Temperature

LAS 7.3/Ferret 6.72 NOAA/NODC

TIME : 15-SEP-2009 06:57

DATA SET: AVHRR Pathfinder SST V5



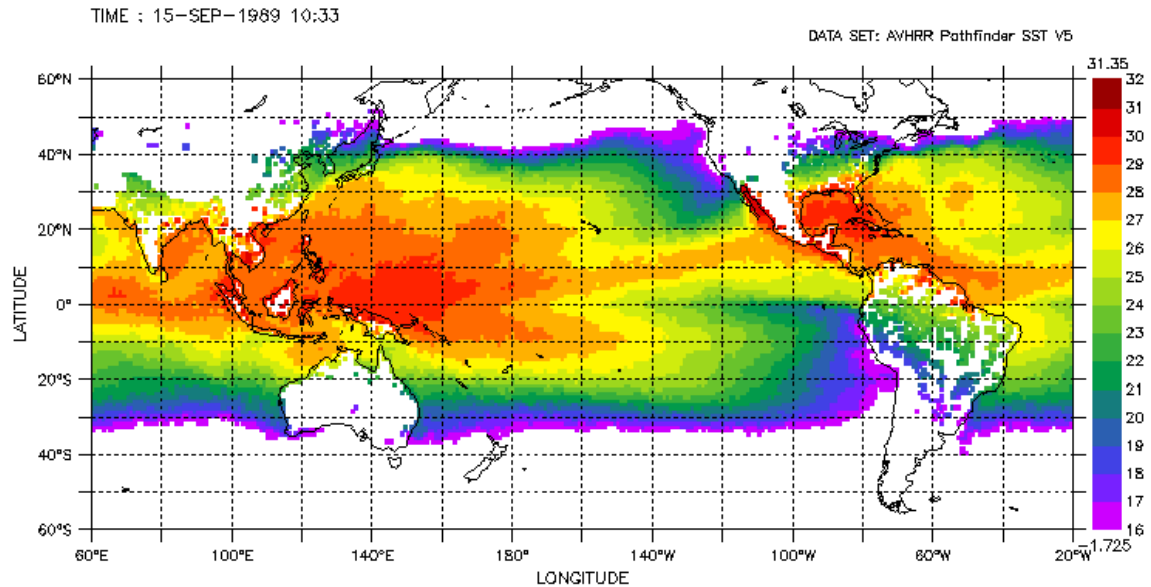
Sea Surface Temperature mixed night and day: monthly, One Degree, quality flag 4 (degrees Celsius)

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Sea Surface Temperature Maps

September 1989

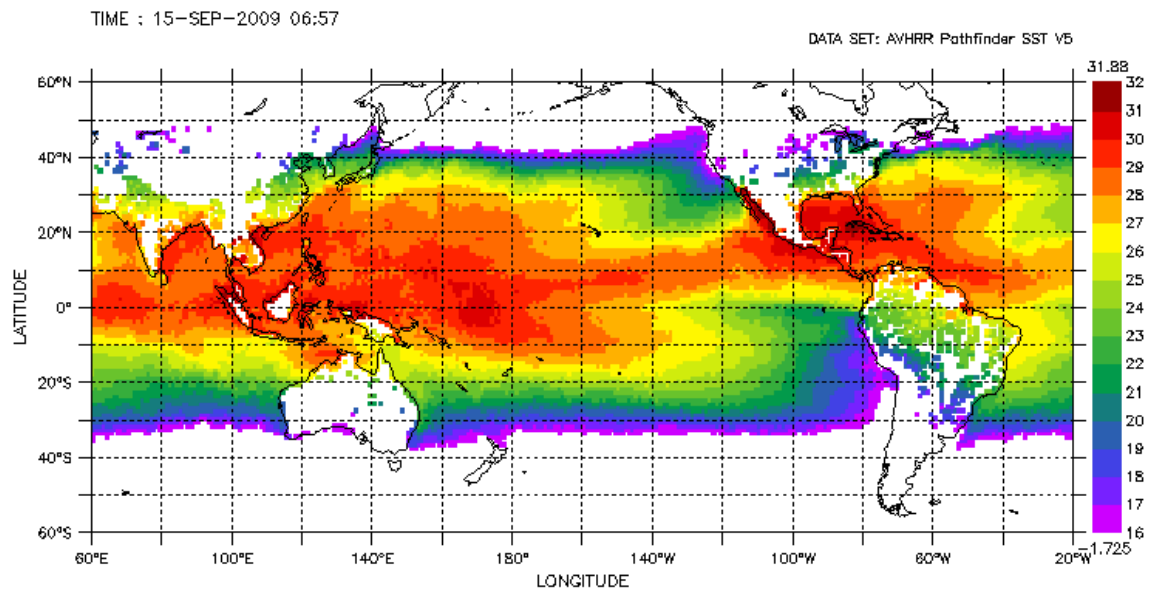
LAS 7.3/Ferret 6.72 NOAA/NODC



Sea Surface Temperature mixed night and day: monthly, One Degree, quality flag 4 (degrees Celsius)

September 2009

LAS 7.3/Ferret 6.72 NOAA/NODC



Sea Surface Temperature mixed night and day: monthly, One Degree, quality flag 4 (degrees Celsius)

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World Ocean Map

