

Visit to an Ocean Planet



GLOBAL WINDS AND OCEAN CURRENTS

The surface currents of the major ocean basins show similarities to the prevailing wind systems that drive them. Contained by continental boundaries and deflected by Earth's rotation, these surface currents flow in large, roughly circular patterns called *gyres*. Gyres play an important role in redistributing heat from the low to middle and high latitudes, thus influencing air temperature, weather, and climate.

After completing this investigation, you should be able to:

- Demonstrate the influence of wind on ocean currents.
- Describe the typical gyre circulation of surface currents in two major ocean basins.

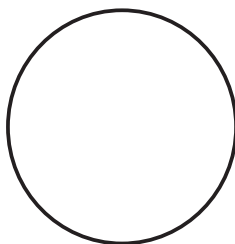
MATERIALS:

Shallow clear glass pie plate or clear plastic container of similar size and shape. Several drinking straws (those which are flexible work best), about two-dozen small paper circles made by punching holes in a manila file folder.

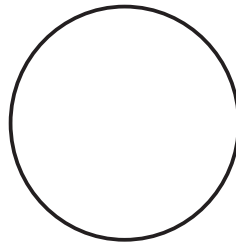
INVESTIGATIONS:

1. Partially fill the dish with water and let it stand a minute or two. Sprinkle paper circles randomly on the water surface. From the left and right sides, blow through a straw positioned so the lower section of the straw is at a low angle to and almost touching the water. Determine the best straw positions that cause the water in the dish to flow in a clockwise "gyre" (viewed from above) as evidenced by the motion of the floating paper circles. Repeat the procedure to produce a counterclockwise "gyre." On the circles below labeled CLOCKWISE and COUNTERCLOCKWISE and representing the dish as viewed from above, draw the straw positions with arrows representing air and water motions.
2. Now move your straw to new locations until you find the best position that will produce two

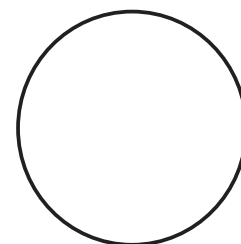
CLOCKWISE



COUNTERCLOCKWISE

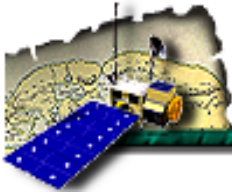


TWO GYRES



gyres simultaneously in the dish. Draw the straw position and show air and water motions by arrows on the circle above labeled TWO GYRES and representing the dish as viewed from above.

3. Place the dish on a copy of the map accompanying this activity so that the equator runs through the center of the dish from left to right. Position the end of the straw so air will blow from east to west on the water along the equator. Blow air steadily through the straw to simulate the east to



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west flow of the trade winds found at the lower latitudes. If available, two other persons can blow air through straws from west to east along the 50° North and South Latitude lines to simulate the west to east component of the prevailing westerlies.

4. Observe the surface currents generated. On the basis of what you observe, and taking into account the continental boundaries as shown on map, predict the location of gyres in the North Pacific and South Pacific oceans. Record your prediction by removing the dish and drawing arrows showing surface currents on the map.

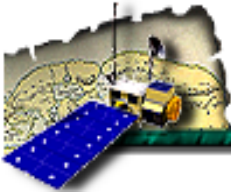
QUESTIONS:

1. The ocean gyres you have drawn are centered at a latitude of approximately (0°) (30°) (60°).
2. As seen from above, the gyre circulation pattern in the Northern Hemisphere shows a (clockwise) (counterclockwise) flow. In the Southern Hemisphere, the gyre circulation is (clockwise) (counterclockwise).
3. In both the North and South Pacific Oceans, the gyre circulation transports warm water from equatorial regions pole-ward along the (east) (west) coasts of the continents. The same gyres transport cold water from the higher latitudes towards the equator along the (east) (west) coasts of the continents.

(Note: This investigation can be made into a classroom demonstration or group activity by employing an overhead projector and a transparency of the map.)

SOURCE

The Maury Project, American Meteorological Society



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