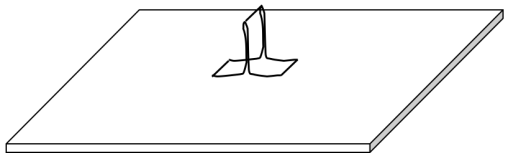
Atmospheric Divergence and Convergence

In this short demonstration, students model divergence and convergence in the atmosphere resulting in vertical air movement. This is an important process in atmospheric circulation.

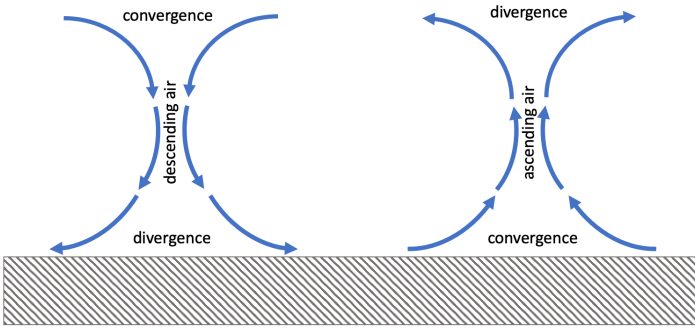
Materials



- Corrugated cardboard (~6 inch squares)
- Tape
- Straws (~3-4 inches long)

Cut the cardboard into approximately 6 inch squares.
Use tape to create a "handle" on the top surface of the cardboard as in the illustration.

Background



Divergence in the atmosphere is when air flows (wind) away from a region such as in a high pressure system. *Convergence* is when wind moves toward a region such as in a low pressure system. What happens with wind at the Earth's surface is coupled with air higher up in the atmosphere (aloft) and results in vertical air movement. In the left side of the figure, descending air is forced by convergence in the upper atmosphere and results in divergence at the Earth's surface. This results in a high pressure system at the Earth's surface in the region of the descending air. Descending air in the atmosphere is associated with dry and cloud-free conditions. Note that convergence aloft is coupled with divergence at the Earth's surface. Likewise, the right side of the figure shows that ascending air is associated with convergence at the Earth's surface and divergence aloft. This results in a low pressure system at the Earth's surface in the region of the ascending air. Ascending air is associated with atmospheric instability and precipitation. For a high or low pressure system at the surface to be sustained, it must be coupled convergence or divergence aloft, respectively.

Instructions

1. Place two straws on a flat table approximately 7 inches apart.
2. Hold the cardboard by the tape handle about 12 inches above the table and quickly move the cardboard downward onto the surface between the straws.
3. Students should observe that the straws move away.

In this example, the descending cardboard represents descending air and the movement of the straws represents divergence at the surface.

4. Place the cardboard on a flat surface with a straw laying on each side.
5. Quickly pull the cardboard up using the tape handle.
6. Student should observe that the straws move inward to where the cardboard was on the table

In this example, the ascending cardboard represents ascending air in the atmosphere and the movement of the straws represents convergence at the surface.