

Ocean current and global weather essay sample



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The ocean is the largest habitat for life on earth, and is vital to the land habitats as well. The ocean regulates the earth's weather patterns. The main force influencing global climate is the solar energy of the sun. Because the earth is a sphere its surface is not heated equally by incoming solar energy. The equatorial areas receive more sunlight while the poles receive less because sunlight strikes at an oblique angle so much of the sunlight are reflected away. Solar radiation striking the ocean near the equator warms the surface water and causes evaporation. Half of the incoming solar energy is utilized in converting water from the dense liquid to the lighter gaseous state. As the water vapor rises into the atmosphere and away from the equator it cools, condenses and falls as rain or dew. With the lightweight gaseous water vapor removed the dry air is heavy and denser and begins to sink.

The area of lighter air rising near the equator creates a low pressure zone, whereas the areas of heavy, sinking air to the north and south of the equator create high pressure zones. Together the pressure zones form a weather cell. There are three types of weather cells; equatorial cell, mid-latitude cell and polar cell. These cells act as heat pumps driven by solar radiation and the evaporation of sea water. When the water vapor in the atmosphere condenses, the stored heat required for its evaporation is released and it warms the air above the higher latitudes. Weather cells redistribute 2/3 of the equatorial solar radiation to the rest of the globe. The rest is redistributed by ocean currents.

Air flows from areas of high pressure to areas of low pressure. This flowing air is called wind. The winds in the equatorial weather cells blow towards the

equator. Winds are deflected relative to the earth's spinning surface in phenomenon known as the Coriolis Effect. The winds flowing towards the equator from both hemispheres receive a westerly component. Winds in the mid-latitude cell are given an easterly push (westerlies). While the polar cell winds receive a westerly push. The winds in the equatorial cells are called the eastern trade winds. The eastern trade winds blowing across the surface of the ocean near the equator set the warm water in motion as a surface current. The water flows from east to west and when the currents run into the continents, they split and flow north or south, eventually completing an ocean wide loop or gyre and returning to the equator. In the Pacific Ocean, the northern hemisphere surface current gyre is a mirror image of the southern hemisphere gyre.

Upwelling and El Niño

During the spring the northern hemisphere of the Pacific basin, a stationary high pressure zone develops off the Pacific Northwest. Winds from this high pressure zone blow along the coastline out of the northwest. Upwelling begins when the northwest wind blows along the shoreline and pushes against the upper surface layer of water, causing it to flow southward. As the surface water layer flows it is affected by the Coriolis Effect and is deflected away from the shore.

The offshore-flowing surface water is replaced by colder water which wells up from below. Upwelling causes the cold water from below to come to the upper, sunlit portion of the ocean. Nutrient fertilizers from the bottom foster a tremendous level of photosynthesis in the single-celled marine plants called phytoplankton. Upwelling is a predictable, annual process; however, it

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is occasionally disrupted by changes in the global weather patterns. In the south central Pacific Ocean, the easterly trade winds that blow just below the equator occasionally drop in intensity or shift direction. The warm surface water that is ordinarily pushed westward by the wind moves eastward instead where it bumps into South America and continues southward along the coast. This unusual warm water current was named El Nino. El Nino meant poor fishing.

TIDES

Gravitation is an attraction between two masses; it is proportional to the product of their masses and inversely proportional to the square distance between them. The spinning motion of the earth-moon pair creates centrifugal force. The bulges of the water are known as lunar tides, the peaks are the high tides and the troughs are the low tides.