

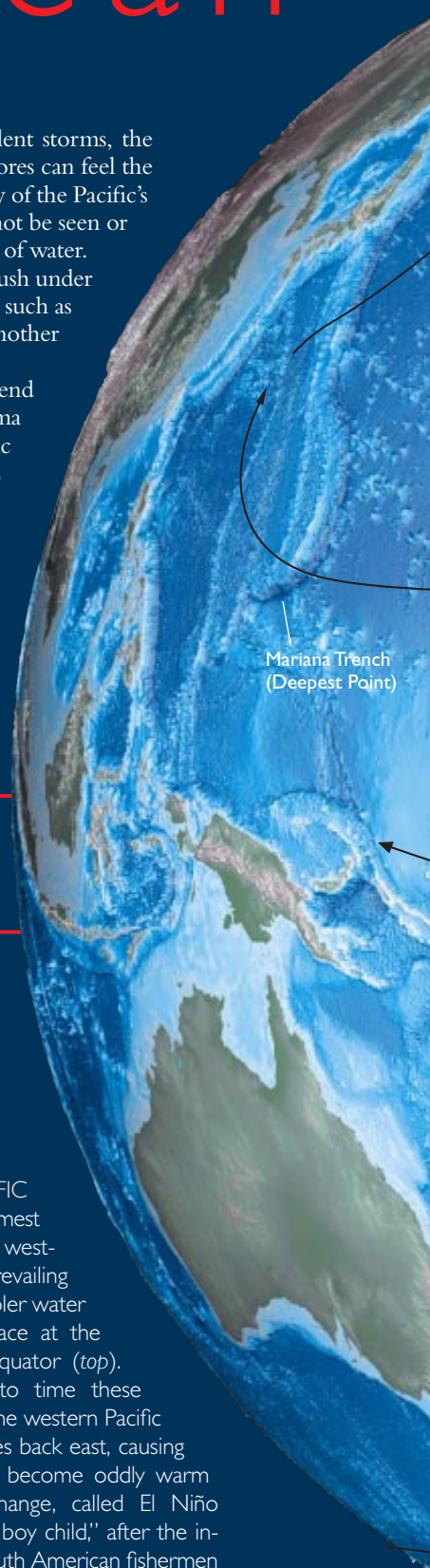
# Pacific Ocean

**N**amed by Portuguese explorer Ferdinand Magellan, who believed it to be free of violent storms, the Pacific Ocean is not, in fact, so pacific. Its tropics can be roiled by typhoons, and its shores can feel the brunt of tsunamis—great waves generated by earthquakes. Traveling much faster than any of the Pacific's normal currents (*right*), tsunamis cross the open ocean at the speed of a modern jet. Yet they cannot be seen or felt far from land: only when tsunamis reach the shallows do they build into monstrosly tall walls of water.

The Pacific is particularly prone to tsunamis because its underlying tectonic plates continually push under adjacent continents and seas at subduction zones. These collisions are marked by oceanic trenches such as the Mariana Trench (*right*), which includes the deepest spot on the earth. Grinding against one another along the periphery of the basin, the crashing plates cause powerful temblors.

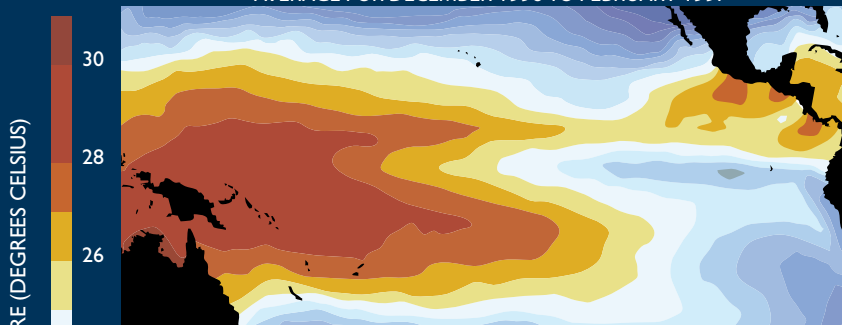
Because sediments blanketing oceanic plates melt and create buoyant magma when they descend into the earth and heat up, the margins of the Pacific are studded with volcanoes. The rising magma at these sites contains small amounts of water, which burst into steam at the surface. Thus, Pacific rim volcanoes are often violently explosive—the eruptions of Mount Pinatubo in the Philippines and Mount St. Helens in Washington State being well-known examples.

Other Pacific volcanoes are more sedate. For instance, eruptions from Hawaiian volcanoes are comparatively gentle because their magma has very little water. The dry magma emerges from above a hot spot deep within the earth's mantle. And just as a blowtorch poised below a slab of moving metal would burn a charred line at the surface, the Hawaiian hot spot leaves a trace of volcanic islands and seamounts on the Pacific plate, which inches slowly to the northwest. The pronounced bend seen in the Hawaiian–Emperor Seamount Chain (*right*) reflects a change in the direction of plate motion that occurred 43 million years ago. (*Editors' note:* To allow the entire Pacific hemisphere to be seen clearly, an unconventional map projection has been used here.)

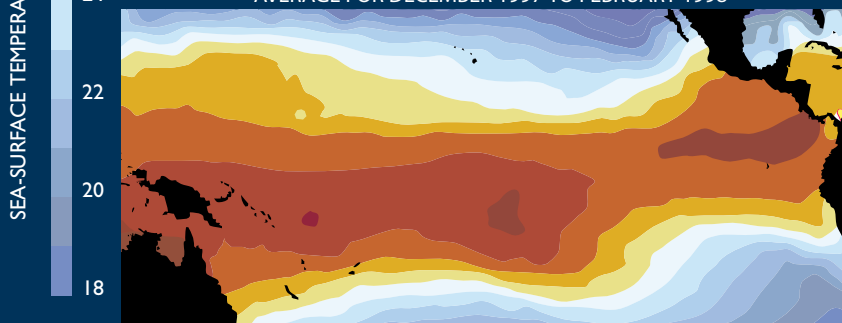


Area: 165,250,000 square kilometers  
Average Depth: 4,280 meters  
Maximum Depth: 11,034 meters

AVERAGE FOR DECEMBER 1996 TO FEBRUARY 1997



AVERAGE FOR DECEMBER 1997 TO FEBRUARY 1998



TROPICAL PACIFIC usually has its warmest waters pushed westward by the prevailing winds, so that cooler water rises to the surface at the east along the equator (*top*). But from time to time these breezes fail, and the western Pacific warm pool sashes back east, causing the sea there to become oddly warm (*bottom*). This change, called El Niño (Spanish for “the boy child,” after the infant Christ) by South American fishermen who observed it to arrive in December, can alter weather throughout the world.



Japan Current  
(Kuroshio)

California Current

Hawaiian-Emperor Seamount Chain

Hawaiian Hot Spot

North Equatorial Current

Galápagos Hot Spot

South Equatorial Current

Peru Current

Kermadec Trench  
Tonga Trench

Louisville Ridge

Antarctic Circumpolar Current

WILLIAM F. HAYBY