

Quake illustrates force of plate movement

David Perlman, San Francisco Chronicle, 1-11-10

The powerful earthquake that rocked the seabed off the Northern California coast near Eureka on Saturday underscores the complexity of seismic dangers within the Earth's crust, and is likely to be followed by a large aftershock this week - but it is not expected to exceed the 6.5 magnitude of the temblor that was felt as far away as Reno, scientists said Sunday.

A "probability report" from the U.S. Geological Survey said there is a 65 percent chance for a "strong and possibly damaging aftershock" from the temblor in the next seven days. As many as 90 weaker aftershocks are expected to be felt in local communities, the report said, but it's not probable any will be larger than Saturday's mainshock.

More than 20 smaller aftershocks - some with magnitudes larger than 4 - churned the seabed throughout the day Sunday.

Although Californians are most conscious of the quakes that constantly hit the San Andreas Fault Zone, where its many offshoots include the dangerous Rodgers Creek and Hayward faults, offshore quakes are extremely common.

Saturday's quake was unrelated to the San Andreas, but struck within the southern end of an offshore geological feature of the Earth's crust called the Gorda Plate, according to David Oppenheimer, a seismologist with the Geological Survey's main research center in Menlo Park.

Scientists have long known that the entire crust of the Earth is composed of vast crustal plates that are constantly in slow movement. The familiar San Andreas Zone, for example, marks the boundary between the huge Pacific Plate and the North American Plate, and when these two plates suddenly slip after building up pressure grinding past each other, potentially deadly quakes are the result.

The Gorda Plate, with its eastern edge along the coasts of California and Oregon, is a much smaller slab of the crust, and above it lies a far larger segment of the crust called the Juan de Fuca Plate that extends along the coast well north of Seattle and Vancouver Island.

The San Andreas Fault's northern end veers sharply west at Point Arena in Mendocino County, and there the fault is known as the Mendocino Fracture Zone. That area - the most seismically active in the continental United States - marks the southern edge of the Gorda Plate and the boundary between the Gorda and Pacific plates.

"It's a highly complex region," Oppenheimer said, "and the convergence of all these plates has generated earthquakes of many types.

Saturday's powerful temblor was known as a "strike-slip" quake, where the convergence of the Pacific and Gorda plates caused one side to slip past the other.

The Gorda and Juan de Fuca plates, however, form part of an offshore crustal segment called the Cascadia Subduction Zone where the huge slabs dip deep beneath the North American Plate and can cause truly giant

quakes every few hundred years. Those quakes actually are the tectonic forces that have raised the volcanic Cascade Mountains, including - in California - Mounts Shasta and Lassen.

Saturday's offshore quake struck 18 miles deep within the Gorda Plate, in an area very close to the epicenters of two large aftershocks that followed a magnitude 7.1 earthquake on land near Petrolia and Cape Mendocino on April 25, 1992.

Those two aftershocks, centered 16 miles offshore and within the Gorda Plate's southern edge, registered magnitudes of 6.6 and 6.7. They were very similar, Oppenheimer said, to Saturday's 6.5 magnitude mainshock - which struck at 39 seconds past 4:27 p.m., 23 miles northwest of Ferndale and 29 miles southwest of Eureka.