Mendocino triple junction

The deformational chronicles of the tectonic plates is examined from the standpoint of movement of the numerous faults bounded by the structural topography andenvironmentand by the fault kinematics connected with the lately industrialized San Andreas transform margin. Accumulation and subduction are continuing underneath the continental margin north of the Mendocino fracture zone, with the linkage from the San Andreas fault system from the south. The continuous deformation due to the interactions among the Gorda, Pacific, and North American plates are collectively called the Mendocino Triple Junction.

The Mendocino Triple Junction stands for the setting of extreme change in plate tectonic processes from the convergence in the Cascadia subduction (north of the Mendocino Triple Junction) and the translation in the San Andreas system (south of the Mendocino Triple Junction. The abrupt changes form this tectonic processes resulted in the dramatic change in the thermic region in North America and the evolution in the lithosphere formation in the said region (Dickinson and Snyder, 561; Lachenbruch and Sass, 195-197; Zandt and Furlong, 377-378).

The unstable intersection of the fault zones called the Mendocino Triple Junction divided the Pacific region, and North America, including North California.

The meeting point

The Mendocino Triple Junction is an unstable triple junction located in the North California west coast that is comprised of the intersection of the Pacific Plate, the North American Plate, and the Gorda Plate (Oppeheimer et al.

1666). The junction has complex plate activities due to seismic destructive above 6. 5 in magnitude earthquakes that occurred over the past 100 years (Dengler et al., 48-50). The positioning of the Mendocino Triple Junction has transferred from its original location in the Los Angeles latitude to Cape Mendocino over the last decades. (Jachens and Griscom, 9380-9385).

One of its junctions, the San Andreas Fault, is located in the northwest-southwest portion of North America and the Pacific. The Pacific Plate moves northward simultaneously as the North American Plate moves to another region to collide with the Pacific Plate (Henstock, doi: 10. 1029/2001JB000902). The precise location of the San Andreas Fault is not established because of the complexities of the area (Simlila, 1402). Since the year 1800, statistics have shown that seven earthquakes have taken place with the least of magnitude four in the scale (Kelsey and Carver, 4799-4811).

Another junction in the Mendocino group is the Cascadia subduction zone that is located north of the Mendocino Triple Junction. The 15-degree subduction angle continues to escalate as the depth of the subducting plate increases (Dengler et al., 45). Earthquakes in this area occur after 300 to 560 years, depending upon ruptures if the zone crossing point (Clarke and Carver, 190).

The last area to be included in the Mendocino Triple Junction is the Gorda plate. The eastward movement of the Gorda Plate caused a clockwise movement in the Juan de Fuca plates, a plate formerly part of the Gorda region. The Mendocino zone remained still while the Gorda Plate repositions itself and interacts simultaneously with the Pacific Plate, therefore, increasing its deformation over time (Stoddard, 11527-11529).

The Mendocino Fault is a zone located between the Pacific Plate in the south and the Gorda Plate in the north. The lateral movement of this fault contributed to seismic activities in Cape Mendocino, extending to the coast of the Gorda Plate. Earthquakes have been reported along the Mendocino Fault in 1994 as the most recent and massive tectonic plate movements with an intensity of 7. 4 (Dengler et al., 45-50).

In this actively deforming area, imbricate thrusts and the axes of folds overlying blind thrusts in the accretion prism offshore are oriented west-northwest and project southeastward to align with several moderately low- to steep-dipping faults onshore. In the onshore region, the rocks bounded by these faults correspond to increasingly more distal parts of the uplifted accretion margin from northeast to southwest.

The underlying problem is then rooted in the steep-dipping Pacific-North American plate boundary and to be related to ongoing northward propagation of the San Andreas movement. The area south of Cape Mendocino is significantly associated with the Pacific-North American faulting and the transformation of the plate boundary.

The Future of Mendocino Triple Junction:

The history of the activities in the Mendocino Triple Junction can be a potential benchmark for the cause and intensity of future earthquakes, tectonic plate ruptures, and ground breakdown. The rupture in the plates is the immediate effect of the activities happening in the Mendocino Triple

Junction. Ground shaking can deliberately have an effect to structures, which is measured in the logarithmic scale to determine the intensity of the earthquake.

Ground shaking is accountable for most loss of life and man-made property destruction throughout an earthquake so the importance of historical evaluation and earthquake assessment can help in the improvement of building and architectural designs and standards. The shaking intensity during an earthquake is dependent on the position of the land area hit by the massive ground activity, the type of soil and the slope of the vicinity, and its distance from the earthquake’s epicenter.

Seismologists have monitored that a number of regions tend to repetitively encounter robust seismic trembling than other zones. This is due to the ground beneath these regions is comparatively soft than the other parts of the district. Soft soils intensify and amplify ground. Soft soils also intensify shear waves, creating a more hazardous and damaging effects on any structure lay on the ground. Individuals living in the area that have experienced strong earthquakes will be likely to suffer strong earthquakes in the future depending upon the distance of the region to the epicenter (source) of the massive ground shaking. Amplification is caused when a seismic wave moves through subsurface materials and is amplified to produce relatively higher horizontal and vertical motion. In contrast, bedrock has a tendency to dampen seismic waves and therefore reduce ground motion. About one-quarter of the entire earthquake energy released in California during historic times has occurred along the Humboldt County coast. The size, location, and frequency of past earthquakes give an indication of what to expect in the future. Strong earthquakes with epicenters onshore have recurred about every 20 years.

Since the 1870s, the largest of the historic seismic activity in the area of the Mendocino Triple Junction reached a magnitude of 7. 2, which took place in 1923. The Northern Coast affected areas have been the focal point in the Gorda Plate activity. The recurrence of the earthquakes in this area occurs every two years. Neighborhood in the coastal expanse from Cape Mendocino to Eureka has been smashed into frequent ground shaking than the remainder of the Humboldt County.

Earthquakes have hardly ever affected Northern Humboldt County in history. On the other hand, because the historic documentation is comparatively transitory, regions not distressed in the past may even be at danger. Massive and huge earthquakes have been a part of the lives on the north coast so residents ought to take measures to get ready for any earthquakes to come. Up to date earthquake activity consists of several large-scale happenings in the Cape Mendocino district. Three powerful earthquakes hit Cape Mendocino area, with magnitudes of 7. 1, 6. 6, and 6. 7, respectively , in 1992. A strong upheaval set upon the north coast in the Cape Mendocino area with a magnitude of 5. 6 last January 1997. The earthquake was situated on the Mendocino fault extremely close to the Mendocino Triple Junction.

The United States Geological Service (USGS) set up new building codes in preparation for the severe earthquakes in the Mendocino Triple Junction belt. “ Building codes provide the first line of defense against future earthquake damage and help to ensure public safety," said the USGS. According to the records of USGS, historical accounts provided a " firm basis for revising building codes to more fully reflect the need for extra strength in structures built on soft ground."

" Designing and building large structures is always a challenge, and that challenge is compounded when they are built in earthquake-prone areas. More than 60 deaths and about six billion dollars in property damage resulted from the Loma Prieta earthquake (caused by the San Andreas Fault). As earth scientists learn more about ground motion during earthquakes and structural engineers use this information to design stronger buildings, such loss of life and property can be reduced." Earthquake-resistant plan and construction are necessary to plummeting earthquake losses. These code amendments are a major step toward better earthquake safety to withstand large earthquakes can be further improved with groundwork bolts, cut off walls, and additional strengthening strategies.

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