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Review Article

Era of Unpredictable Earthquakes to Predictable: A New Perspective to Predict Earthquakes to Mitigate Loss of Life and Destruction of Property in Japan, California and Mexico

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Abstract

The single-most important purpose of this observational successful earthquake prediction research is to mitigate the loss of life and destruction of property by earthquakes. The basic innovative concept is entirely new and related to the tectonic plate activities of epicenter zones, may not familiar to many and may not be readily found in the existing literature. This manuscript is prepared based on 35 years of earthquake prediction study and over 10 years of observation of onshore observable precursors and the corresponding earthquakes. Past precursory phenomena for earthquakes have been observed, recorded, analyzed and can be used to predict future earthquakes for seismically risky regions, Japan, California and Mexico. It is significant to mention that there are more than 250 epicenter zones and equal number of precursor areas identified, centrifugal force due to the orbital motion of the earth is the major driving force of tectonic plates, each and every epicenter zone has its own creation of atmospheric weather anomalies, due to the change in position of the orbital motion of the earth. Though all form of weather anomalies are preceded by earthquakes, among them rainfall is the best earthquake precursor and rainfall location is best to identify the future earthquake direction, location frame, time frame and magnitude frame can be established 15 days before earthquakes occur. Based on this prediction method each and every individual earthquake can be predicted without false alarm in Japan, California and Mexico.

Keywords: Orbital motion of the earth; Centrifugal force; Tectonic plate motion; Epicenter zone; Precursors; Atmospheric weather anomalies and earthquakes

Introduction

This observational earthquake prediction study based on the innovative concept of tectonic plate motion of epicenter zones. There are several unsuccessful earthquake prediction papers have been published over the past 60 years. The main reason for failure to predict earthquakes are due to the wrong understanding of major force behind the tectonic plates, epicenter zone concept of cyclone formation and failure to connect the atmospheric weather phenomena with seismic phenomena. Epicenter zone comprises movable tectonic plates. Centrifugal force due to the orbital motion of the earth triggers tectonic plate motions of epicenter zones. Orbital motion of the earth with 23.5° tilt causes seasonal variation on earth every year at same places. Each and every epicenter zone have its own creation of all forms of atmospheric weather anomalies and are seismically related precursor. The change in position of the orbital motion of the earth causes different atmospheric weather anomalies at different epicenter zones. So, the seasonal atmospheric anomalies are always followed by seismic activity. Atmospheric weather anomalies are the preparatory phase for earthquakes to occur [1].

Some Type of Natural Disasters

Earthquakes, Volcanoes, Landslides, Famines & Droughts, Hurricanes, Tornados, and Cyclones. Extreme precipitation and flooding. Extreme Temperature (Heat & Cold) and Wildfires.

Misleading Driving Force for Tectonic Plates

There are more than one solution are describing about the driving force for tectonic plates. Some of them are thermal convection, heat within the Earth, ridge push and slab pull, convection currents and more.

Centrifugal Force Due to Orbital Motion of the Earth is the Major Driving Force of Tectonic Plates

It is found that the major driving force of tectonic plates and yearly seasonal variation at different regions of epicenter zones are related centrifugal force due to the orbital motion of the earth. Both atmospheric and seismic anomalies of varying severity level due to the change in position of the orbital motion of the earth with reference to the Sun.

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Table 1: Number of epicenter zones in Japan, California and Mexico.

JAPAN: 17	MEXICO: 31
Hokkaido, Japan	Offshore Tamaulipas, Mexico
Near East coast of Honshu, Japan	Off coast of Nayarit, Mexico
Near S coast of Honshu, Japan	Offshore Veracruz, Mexico
Eastern Honshu, Japan	Offshore Jalisco, Mexico
Off East coast of Honshu, Japan	Offshore Guerrero, Mexico
Sea of Japan	Offshore Oaxaca, Mexico
Near S coast of W Honshu, Japan	Offshore Chiapas, Mexico
Shikoku, Japan	Offshore Colima, Mexico
SE Shikoku, Japan	Offshore Michoacán, Mexico
Kyushu, Japan	Off coast of Chiapas, Mexico
Ryukyu, Islands, Japan	Off coast of Sinaloa, Mexico
SE of Ryukyu, Islands, Japan	Off coast of Jalisco, Mexico
SW of Ryukyu, Islands, Japan	Off coast of Colima, Mexico
North West Ryukyu, Islands, Japan	Off coast of Michoacan, Mexico
Izu Island, Japan	Off coast Oaxaca, Mexico
Bonin Islands	Revilla Gigedo Islands
Volcano Islands, Japan	Chihuahua, Mexico
	Nuevo Leon, Mexico
CALIFORNIA: 9	Queretaro, Mexico
Off coast of Northern California	San Luis Potosi, Mexico
Offshore Northern California	Jalisco, Mexico
Northern California	Michoacán, Mexico
Offshore Central California	Tabasco, Mexico
Central California	Durango, Mexico
Greater Los Angeles area, Calif.	Coahuila, Mexico
Southern California	Nayarit, Mexico
Gulf of California	Veracruz, Mexico
Revilla Gigedo Islands region	Chiapas, Mexico
	Oaxaca, Mexico
	Guerrero, Mexico
	Baja California, Mexico

Unsuccessful Earthquake Precursors and Precursors Study and Analysis

Animal behavior, Dilatancy-diffusion, Changes in Vp/Vs, Radon emissions, Electromagnetic anomalies, Now casting, Elastic rebound, Characteristic earthquakes, Clusters of earthquakes and slow-slip events, fault-slip behaviors and more.

Methodology: Earthquake Prediction and Prediction Criteria

- **Earthquake related Precursor:** Atmospheric weather anomalies.

- **Best precursor:** a) Rainfall and Rainfall location; b) Snowfall location (Seismic activity in case of absence of rainfall).

- **Amount of rainfall:** 50mm and above [2].

- **Distance of future Earthquake location with respect to rainfall location:** a) Mostly within 15°; b) In some cases up to 20°plus.

- The direction of low depression/ storm/cyclone/typhoon and hurricane generation would be the direction or orientation of future earthquake location. The orientation of earthquake location from rainfall location varies from region to region, due to space constraint, only limited regions tabulated.

- **Magnitude:** a) Depending on site geological conditions and severity of weather changes; b) Mostly within 4-6 on Richter scale (lower magnitude not recorded).

- The time lag between precipitation/snowfall and seismicity mostly within 15 days (Table 1).

Japan

Japan archipelago comprises 16,000 Islands, among them Hokkaido, Honshu, Shikako, Kyushu are the major Islands and has 17 epicenter zones.

Season: Japan has different seasons, like typhoon, rainfall, snowfall and forest fire at different duration of time.

The snow season: Long and in some places begins as early as November and lasts into May, with the peak being in February.

Pacific Typhoon Season: May to October each year, August and September are the peak. Since, all form of season and atmospheric seasonal variations are the creation of epicenter zones, they are seismically related precursor to earthquakes.

The generation process of earthquake is always preceded by at least one or more atmospheric weather anomalies, it may be heat waves, rainfall, snowfall accompanied with strong winds. The lead time between atmospheric weather anomalies followed by earthquakes of Magnitude 4-6 is normally 10-15 days in some cases it takes 2-4 weeks. Only record rainfall or snowfall may followed by earthquakes of magnitude above 6 cause devastating effect. One interesting information, rainfall accompanied with snowfall followed by earthquakes are stronger than rainfall alone. In general, the direction of storm formation would be the direction for future earthquake. For Japan epicenter zones are to the east of precursor (rainfall and snowfall) area [3,4].

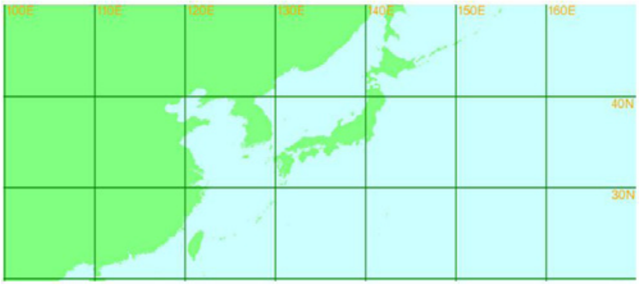
The amount of rainfall equal or above 50mm at one or more location is quite easy and quick to record than snowfall quantity, then the rainfall location is used to instantly identify the future earthquake direction, time frame (10-15 days after rainfall/snowfall), Location frame, depending on rainfall location the resulting earthquakes locations would be at same or within 5° latitude and normally up to 15-20° longitude variation and magnitude frame (M4-6 on Richter scale) (Map 1 and Table 2-4).

California: Much Debated San Francisco, California Regions

California has 8 islands, 9 ECZs and has hurricane, rainfall and snowfall season. Earthquakes occurs at peak season only. Precursors from Western US and earthquakes are in same region.

Seasons in California

Wildfire season: May through October, but wildfires can occur



Map 1: Seismically more active and vulnerable Epicenter zone range, Honshu, Japan: 34-36N; 140-141E.

Table 2: Geological co-ordinates range of precursor areas and Epicenter Zones.

Major Epicenter Zones	Geological co-ordinates of precursor areas	Geological co-ordinates of Epicenter Zones
Hokkaido	38-44N; 124-145E	40-45N; 140-149E
Honshu	31-40N; 122-140E	33-39N; 139-144E
Shikoku	31-34N; 129-133E	32-33N; 132-134E
Kyushu	29-34N; 129-134E	30-32N; 130-131E
Izu Islands	24-35N; 125-135E	29-32N;138-141E
Bonin Islands	22-27N; 121-129E	26-29N; 138-141E
Ryukyu islands	24-32N; 115-129E	25-29N; 125-131E
Southwestern Ryukyu Isl.,	24-30N; 106-119E	24-25N; 123-125E
Volcanic Islands	22-28N; 125-129E	22-23N; 143-145E

Table 3: Past Seasonal variations related devastating earthquakes in Honshu, Japan.

Japan	Seasonal variations
March 11, 2011 Near the East Coast of Honshu, Japan M9.1/38.30ºN; 142.37ºE	The snow season in Japan is long and in some places begins as early as November and lasts into May, with the peak being in February.
March 2, 1933 Off the East Coast of Honshu, Japan M8.4/39.21ºN; 144.59ºE	

at any time.

Hurricanes season: May is the least active month, while September is the most active.

Snowfall season: November through April is the rainy season in California. Areas like the high country of the Sierra Nevada, where mountains reach over 14,000 feet, can get as much as 38 feet of snow over the course of the season.

Prominent weather changes, Hurricane, release of massive amount of tectonic plates of frictional heat cause snowfall originate from Western US.

Snowfall: From Seattle, Wash, to Portland, Ore.

Heavy Rain and Snow for the Northwest: Colorado Avalanche.

Severe weather outbreak (deadly Tornados (166 to 200 mph) Sweeps) Midwest (Table 5-7 and Map 2).

Mexico

Astounding observation results, atmospheric weather anomalies of US Southern Gulf States drastically affected by:

Mexico epicenter zones

Mexico archipelago has 100 Islands, 31 epicenter zones , with this more number of epicenter zones, triggering yearly 800 extremely deadly tornadoes and continuous atrocious atmospheric weather anomalies in US southern Gulf states and seismically active all through the year. Precursor area in US Southern Gulf states and epicenter zones in Mexico, has separate precursor areas [5].

Season: The forest fire season normally occurs between January and July.

Hurricane season in Mexico officially lasts from the beginning of June through the end of November, but you're at greatest risk of encountering a hurricane between the months of August and October.

Rainy season from June to mid-October and significantly less rain during the remainder of the year. February and July generally are the driest and wettest months, respectively [6,7].

The lead time between precursor generation and earthquake generation is usually 10-15 days in exceptional case it may extend to 2-4 weeks. Storms are originated from Gulf of Mexico, so the south of precursor area (US Southern Gulf states) is epicenter zone (Gulf of Mexico). Distance within 20-25° latitude (Table 8,9 and Map 3).

Conclusion

Every year the change in position of orbital motion of the earth causes different atmospheric weather changes at different epicenter zones. This study strongly demonstrates the relationship between nature's atmospheric weather anomalies and the occurrence of earthquakes; driving force of tectonic plates identified and explained by illustration then the observed few events of rainfall followed by earthquakes.

No equipment, no instrument used, no expense and daily rainfall map only used. Over the last 35 years of this earthquake prediction research study and over 10 years of rigorous observation of both the earthquake precursor and earthquake events scientifically convincing and notably successful [8-10].

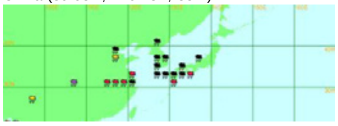
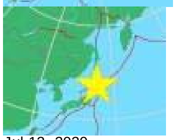
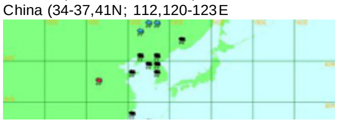
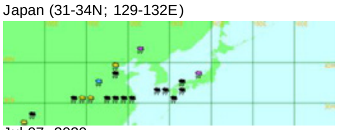
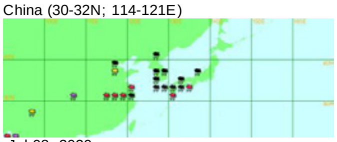
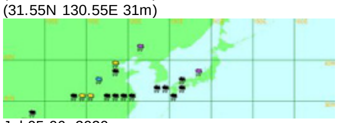
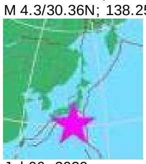
Successful Findings

Tectonic plate motion

- Gravitational force plays a major role in moving objects in the Universe.
- Strongest centrifugal force, due to the orbital motion of the earth is the major driving force of tectonic plates.

Successfully identified

- More than 250 epicenter zones and equal number of precursor areas. Japan has 17, California has 9 and Mexico has 2.
- The different epicenter zones are set to more active at different position of the earth with reference to the Sun.
- Devastating earthquakes are also seasonal related, as tectonic plates are always in motion cause minor earthquakes are happening all through the year.
- It is verifiable and testable in just 15 days.

Jul.07, 2020 N Korea (40.96N; 126.60E, 306m) China (39.93N; 116.28E, 55m) 	Jul.13, 2020 Hokkaido, Japan M5.0/41.18N; 142.72E   Jul.12, 2020 Off East coast of Honshu, Japan M4.9/40.97N; 143.11E
Aug.04, 2020 China (45.76N; 132.96E, 103m) N Korea (38 & 40N; 126-127E) S Korea (36-38N; 126-127E) China (34-37,41N; 112,120-123E) 	Aug.12, 2020 Hokkaido, Japan M4.6/41.43N; 142.55E M4.3/43.98N; 145.00E 
Jul.05-06, 2020 Japan (31-34N; 129-132E)  Jul.07, 2020 S Korea (33-36N; 126-128E) Japan (32-36N; 129-136E) (31.93N; 131.41E, 15m) (31.55N; 130.55E, 31m) Jul.07, 2020 China (30-32N; 114-121E)  Jul.08, 2020 Japan (33-37N; 130-139E) (32.70N; 128.83E, 26m) 	Jul.08, 2020 Near East coast of Honshu, Japan M4.4/37.72N; 141.55E Jul.09, 2020 M4.5/39.86N; 143.40E Off East coast of Honshu, Japan M4.5/37.23N; 142.43E Jul.23, 2020 M4.6/36.85N; 142.21E 
Jul.05-06, 2020 Japan S (31.93N 131.41E 15m) (31.55N 130.55E 31m)  Jul.05-06, 2020 China (30-31N 106-121E)	Jul.06, 2020 Izu Islands, Japan M 4.3/30.36N; 138.25E  Jul.06, 2020 M5.6/31.45N; 138.13E

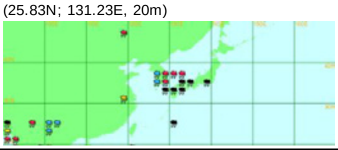
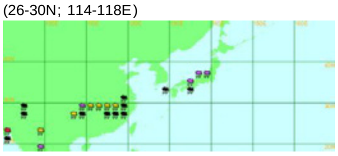
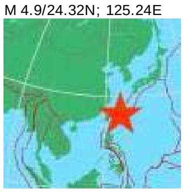
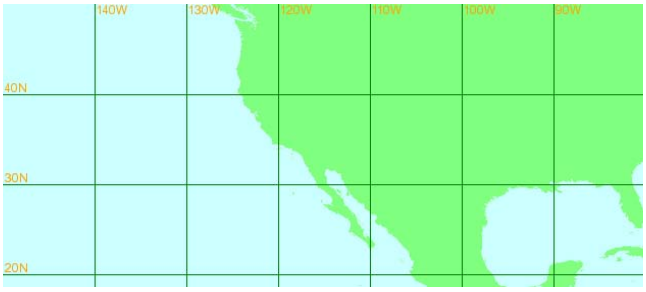
Jul.08, 2020 Japan S (32.73N; 129.86E, 35m) (31.93N; 131.41E, 15m) China (28-31N; 108-119E) 	Jul.16, 2020 SE Shikoku, Japan M5.1/30.33N; 136.72E   Jul.21,2020 Kyushu, Japan M4.8/30.11N; 131.08E
Jul.14, 2020 Japan (25.83N; 131.23E, 20m) 	Jul.28, 2020 Bonin Islands, Japan M4.7/26.12N; 142.51E 
Jul.09, 2020 China (26-30N; 114-118E) 	Jul.20, 2020 SW of Ryukyu, Islands, Japan M 4.9/24.32N; 125.24E   Jul.22, 2020 Volcano Islands Japan M4.8/24.34N; 143.16E

Table 4: Japan is seismically more active in July August and September 7. Result: Few sample of events data of rainfall/snowfall/heatwave/wild fire followed by earthquakes.
The Star icons represent the geological coordinates of rainfall location (left column) and earthquakes at corresponding location (right column) Samples of rainfall precursor before earthquakes at different regions of Japan.

- In general earthquakes are short-term nature just 2-4 weeks, vary in exceptional case.
- Scientific reason for short term nature of earthquakes found
- The capacity to predict earthquakes 100% without false alarm even without the need of statistical and mathematical model.
- Basic physics is enough to predict earthquakes reliably.
- Earthquake predictions are easy and no expense. Every individual earthquake can be predictable.
- Orientation of earthquake location could be identified.
- Sequence of natural events leads to earthquakes identified.



Map 2:

Table 5: Geological co-ordinates of precursor areas and epicenter zone range.

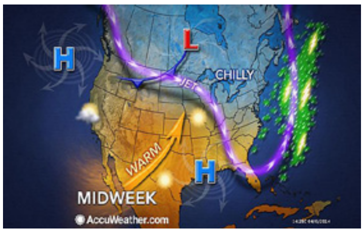
Major Epicenter Zones	Geological co-ordinates of precursor areas range	Geological co-ordinates of Epicenter Zones range
North to South California	11-47N; 93-124W	19-41N; 127W

Table 6: California precursor area range and epicenter zone range.

Major Epicenter Zones	Geological co-ordinates of precursor areas	Geological co-ordinates of Epicenter Zones
Off coast of Northern California	Snowfall	Off coast of Northern California 40.48N; 127.08W
Northern California	40,47N; 122, 124W Snowfall: from Seattle, Wash., to Portland, Ore. Heavy Rain and Snow for the Northwest: Colorado Avalanche. Severe weather outbreak (deadly Tornados (166 to 200 mph) Sweeps) Midwest.	Northern California 38-41N; 122-124W
Central California	Big Temperature Swings for Midwest, Northeast	Central California 36-37N; 117-118W
Greater Los Angeles area, Calif.	Heat wave and wild fire	Greater Los Angeles area, Calif. 34-35N; 118-119W
Southern California	Arizona (34N; 112W) wildfire grows to 5,000 acres	Southern California; 33-34N; 115-117W
Gulf of California	23-32N; 93-111W	Gulf of California 23-30N; 106-113W
Revilla Gigedo Islands region	11-17N; 97-107W	19-20N; 108-109W

- All form of weather anomalies are always prior to seismic anomalies for the corresponding epicenter zone, this is the most significant findings in this observation study.
- When seasonal variations for different region of the earth is associated with the position of the earth with respect to the Sun, then the process of earthquakes are also related with seasonal variations.
- In future studying the position of the earth with respect to the Sun, reveal the secret of massive earthquakes and tsunamis in the year Dec 26, 2004, Indian Ocean and March 11, 2011, Japan.
- The safe earthquake prediction method for Japan, California and Mexico regions are over.

Table 7: Sample observation of precursor and corresponding earthquakes in California region.

April 08, 2014 Big Temperature Swings for Midwest, Northeast 	Central California; 35.47N; 118.52W
Arizona wildfire in eastern Arizona (34N; 112W) **Record Warmth to Move Into Southern California.**	Southern California; 33-34N; 116-117W
Feb 28, 2014 Rogue storms, Rain and snow in California Los Angeles suburbs (40.50N; 122.30W, 53mm) (40.15N; 122.25W, 58.3mm)	Mar.10,2014/ M6.9 (4.8;4.4) California ; 41.04N; 124.54W Off coast of Northern California; 41.89N; 126.92W Offshore Northern California; 40.35N; 124.62W Central California; 36.12N; 118.05W Southern California; 35.06N; 118.29W Greater Los Angeles area, Calif.; 34.13N; 118.49W Greater Los Angeles area, Calif.; 33.93N; 117.92W Gulf of California; 27.66N; 111.64W
Wildfires in New Mexico	Gulf of California: 24.20N; 108.81W

- This observational earthquake research studies are the great service to the humanity.

Availability of Data and Materials

The meteorological data daily rainfall location was obtained from www.http://severe.worldweather.wmo.int/rain/b5/ and other weather events gathered from wunderground.com/hurricane; gdacs.org; earthobservatory.nasa.gov/Natural Hazards and journals.

Seismic data required to evaluate the conclusions in the paper are available from https://www.emsc-csem.org/Earthquake/world/M4/.

Declaration

Availability of data and material

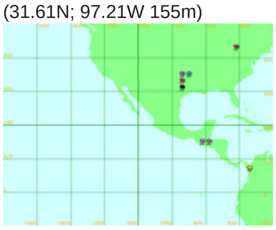
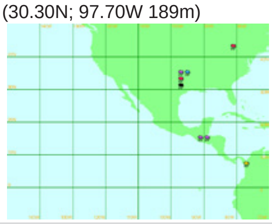
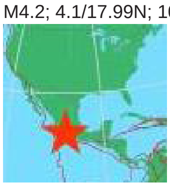
For rainfall and snowfall http://severe.worldweather.wmo.int/

Table 8: Weather precursor in US Southern Gulf states and series of earthquakes in Mexico.

Mexico	Range of Geological co-ordinates of precursor areas	Range of Geological co-ordinates of Epicenter Zones, Mexico
Rain in US-Mexico	US:28-30N; 80,85,88,93-102W Mexico:16-22N; 88,92-98,102-104W	Chiapas, Mexico: 15-16N; 92-93W Offshore Chiapas, Mexico: 14.368ºN; 93.305ºW Oaxaca, Mexico: 16-17N; 94-98W Offshore Oaxaca, Mexico: 16N; 94-95W
Storm in US	Central Gulf coast and into parts of Mississippi and Alabama. This includes New Orleans, Baston Rouge, Mobile, Jackson and Montgomery.	Veracruz, Mexico: 17.966ºN; 95.071ºW Offshore Veracruz, Mexico: 18.334ºN; 94.306ºW Offshore Jalisco, Mexico: 18.863ºN; 104.959ºW

Map 3: Geological co-ordinates of precursor areas: 29-32N; 81-102W, US Gulf States Geological co-ordinates of Epicenter Zones, Mexico: 14-27N; 91-107W.

Table 9: Rainfall in US Southern Gulf States and earthquakes in corresponding epicenter zones in Mexico.

Sep 02, 2020 US OK (35.38N; 97.60W 398m) AR (35.33N; 94.36W 141m) Sep 03, 2020 US TX (32.90N; 97.03W 182m) (31.61N; 97.21W 155m)  Sep 07, 2020 US IL (41.45N; 90.51W 181m) TX (25.91N; 97.41W 8m) Sep 10, 2020 US TX (33.96N; 98.48W 314m) (31.36N; 100.50W 582m) (30.30N; 97.70W 189m) 	Sep 06, 2020 Offshore Guerrero, Mexico Guerrero, Mexico M4.2; 4.1/17.99N; 101.80W  Sep 09, 2020 Offshore Oaxaca, Mexico Offshore Chiapas, Mexico Sep 16, 2020 Offshore Oaxaca, Mexico Sep 15, 2020 Oaxaca, Mexico Offshore Oaxaca, Mexico Offshore Michoacan, Mexico Guerrero, Mexico Sep 14, 2020 Off coast of Chiapas, Mexico Off coast Oaxaca, Mexico Offshore Oaxaca, Mexico Oaxaca, Mexico Sep 13, 2020 Oaxaca, Mexico Guerrero, Mexico Sep 12, 2020 Tabasco, Mexico Offshore Oaxaca, Mexico Chiapas, Mexico Oaxaca, Mexico Guerrero, Mexico

rain/b3/index.html.

Authors' contributions

Text prepared, data collection and analysis all performed by me only.

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