Earthquake Location

triangulation with real data

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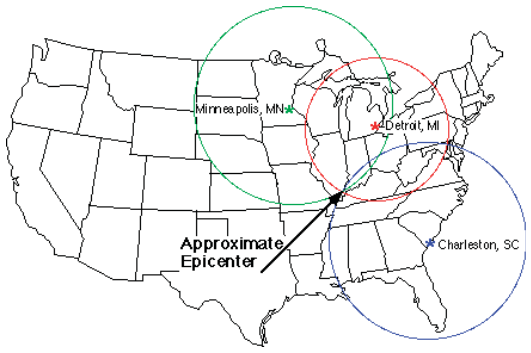
Using the skills that you acquired in the picking P and S arrivals, you can now locate an earthquake using real seismic records. The three seismograms in this activity are unfiltered station records from a single event that occurred on August 1, 1999. You will analyze the records and locate the earthquake using a method known as Triangulation.



Triangulation is a method that uses distance information determined from 3 seismic stations to uniquely locate the earthquake. On a map, circles are drawn around each seismic station. The radius of the circle are scaled to the estimated distance from the station to the earthquake. The 3 circles will share one unique intersection that locates the earthquake.

- On each of the attached seismograms determine the time of the P and S arrivals. The name of the station is represented with a three letter code on the seismogram. Record your answers below.

Pasadena, California (PAS)

P Wave Arrival Time (seconds) _____

S Wave Arrival Time (seconds) _____

- Calculate S - P Time (subtract P time from S time) _____

Dugway, Utah (DUG)

P Wave Arrival Time (seconds) _____

S Wave Arrival Time (seconds) _____

- Calculate S - P Time (subtract P time from S time) _____

Berkley, California (CMB)

P Wave Arrival Time (seconds) _____

S Wave Arrival Time (seconds) _____

- Calculate S - P Time (subtract P time from S time) _____

• For each station, determine the distance from the station to the event. This is done using the formula (S-P time) * 8 km/s.

• Multiply the S - P times for each station by 8. Record the distance below.

(PAS) distance (km) _____

(DUG) distance (km) _____

(CMB) distance (km) _____

Pasadena (PAS)

• Find the scale on the map. Using a compass, set the distance between the point and the pencil to the distance determined for the Pasadena station using the map scale. Setting the compass will require estimating.

• Place the point of the compass on the station (marked by a triangle on the map).

• Draw a circle around the station, the circle has a radius equal to the distance to the event. (The radius is the distance from the center of a circle to its edge). The epicenter of the earthquake is somewhere on the edge of that circle.

• Repeat the above steps to draw a circle around the remaining two stations. Each station should be in the center of a circle.

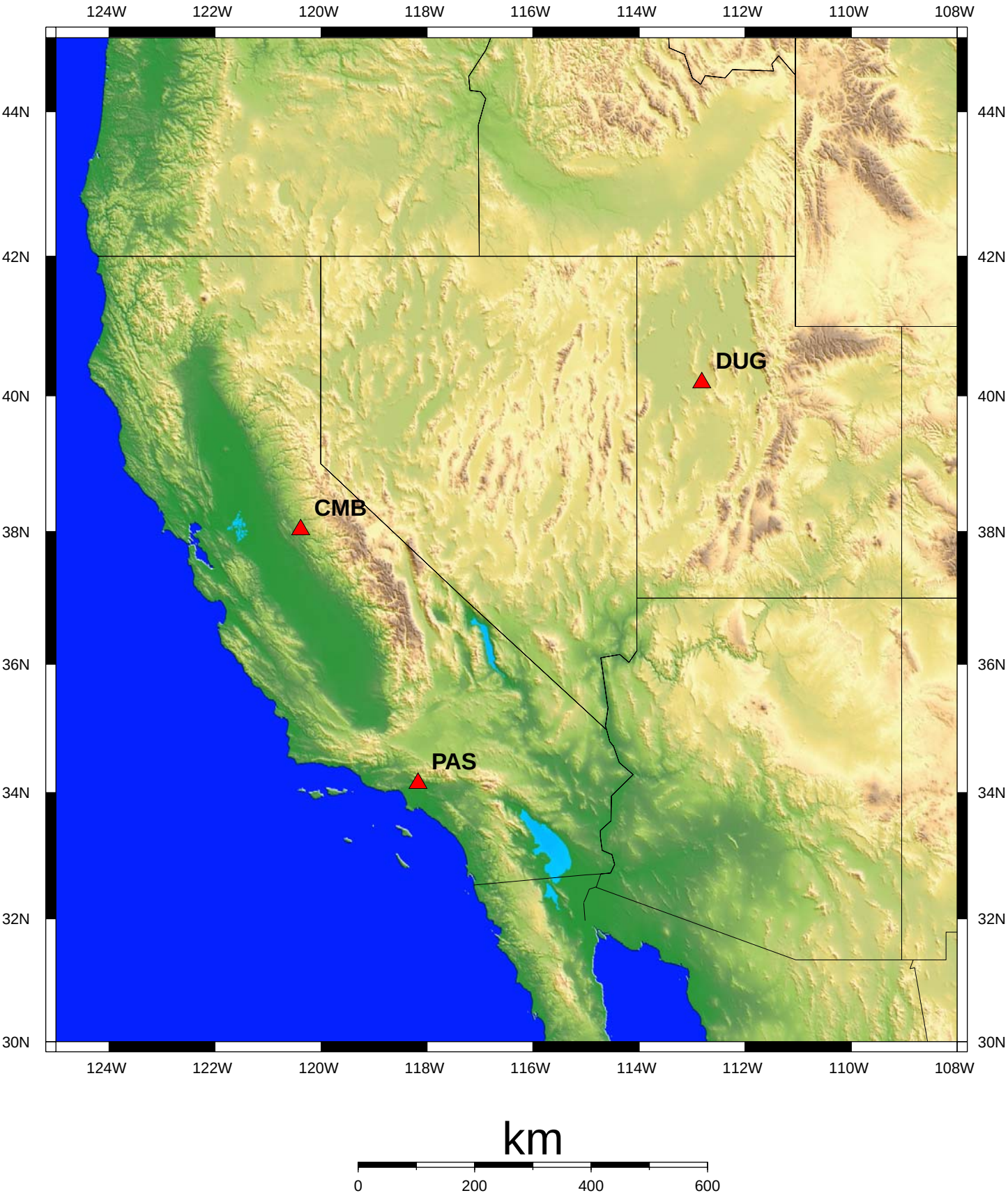
Event Location

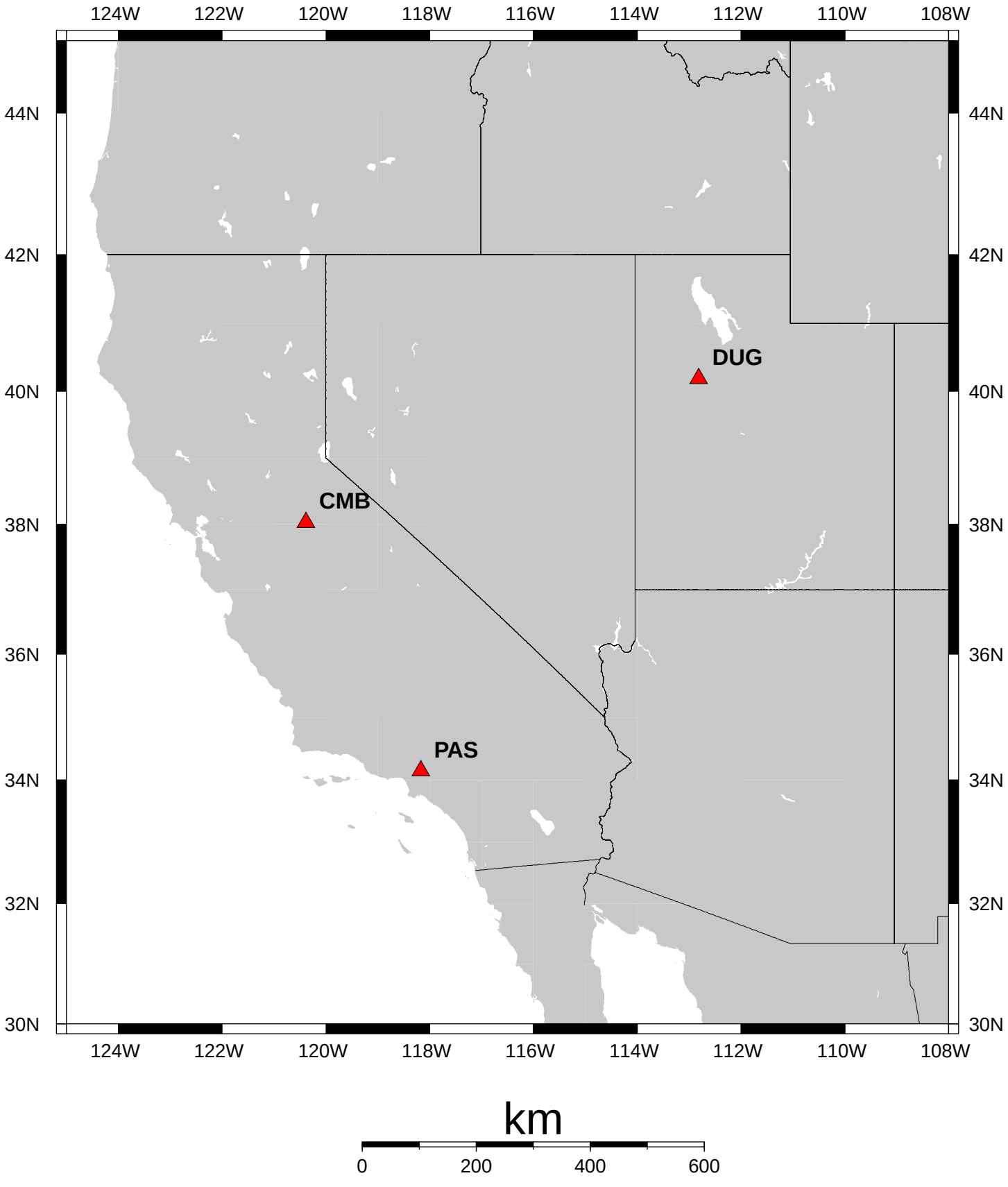
• If you have picked P and S correctly and drawn circles accurately all of the circles will overlap at one point. The point where all of the circles overlap is the approximate epicenter of the earthquake.

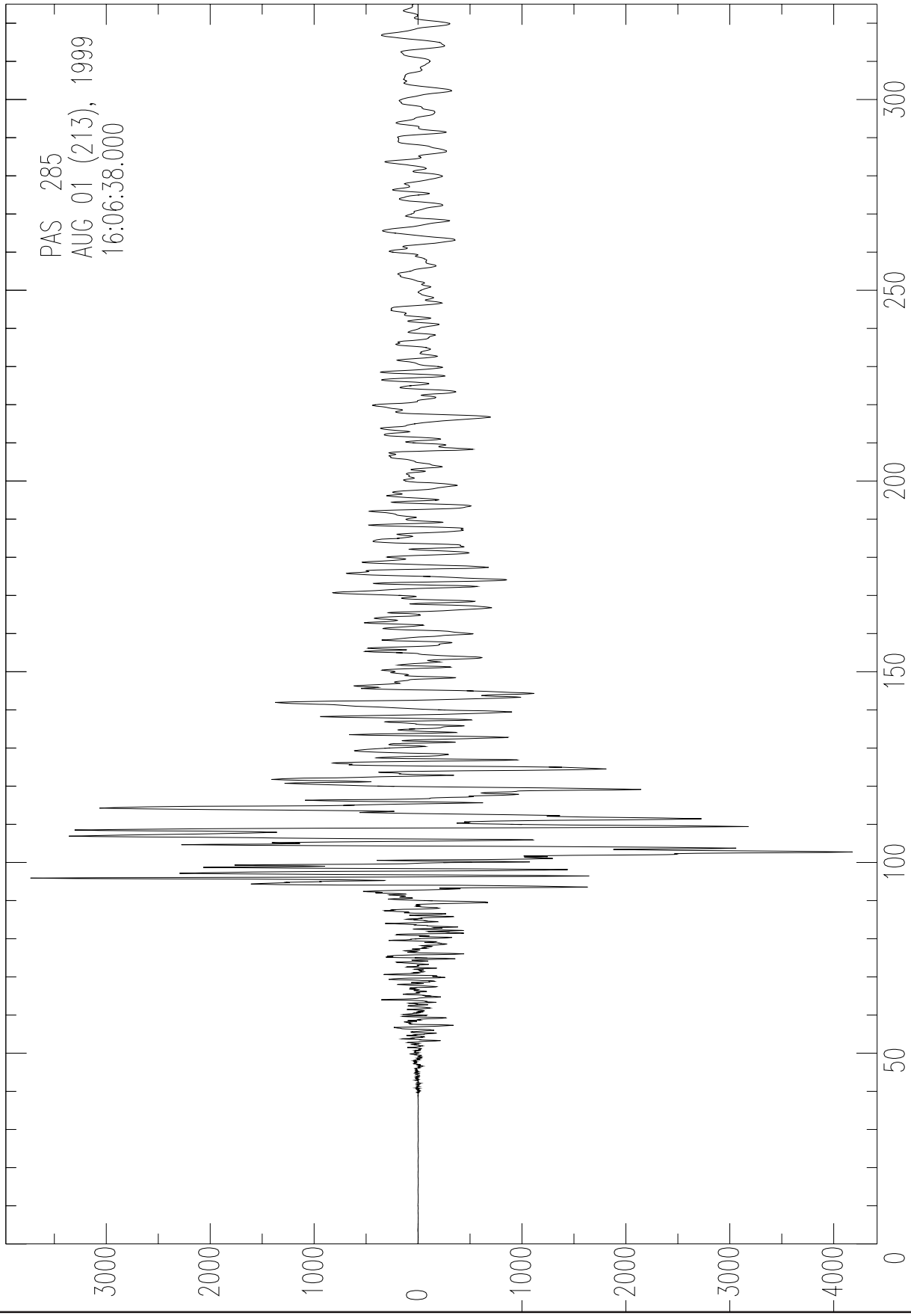
• Determine the Latitude and Longitude of the earthquake from the map and record it below.

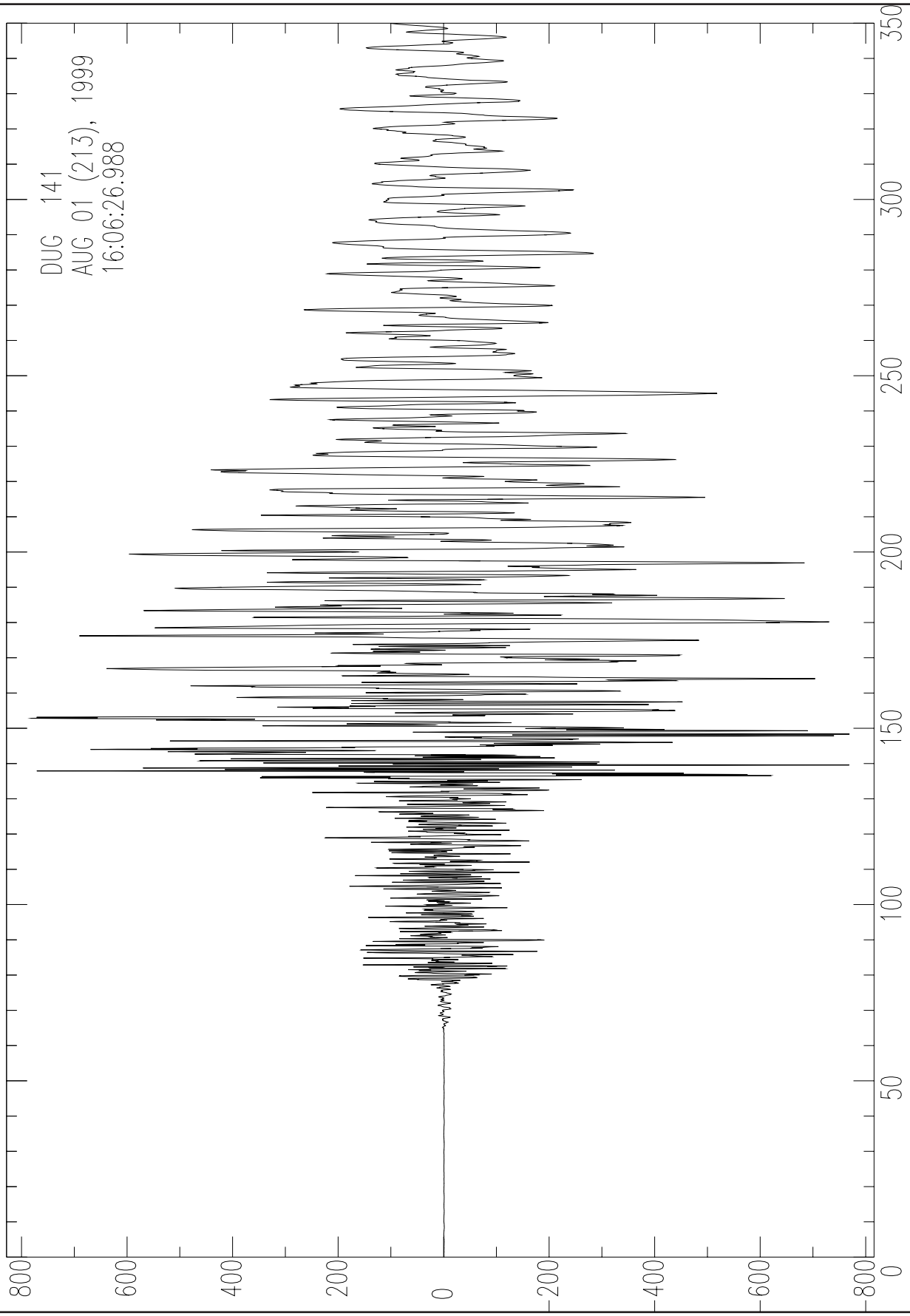
Latitude _____

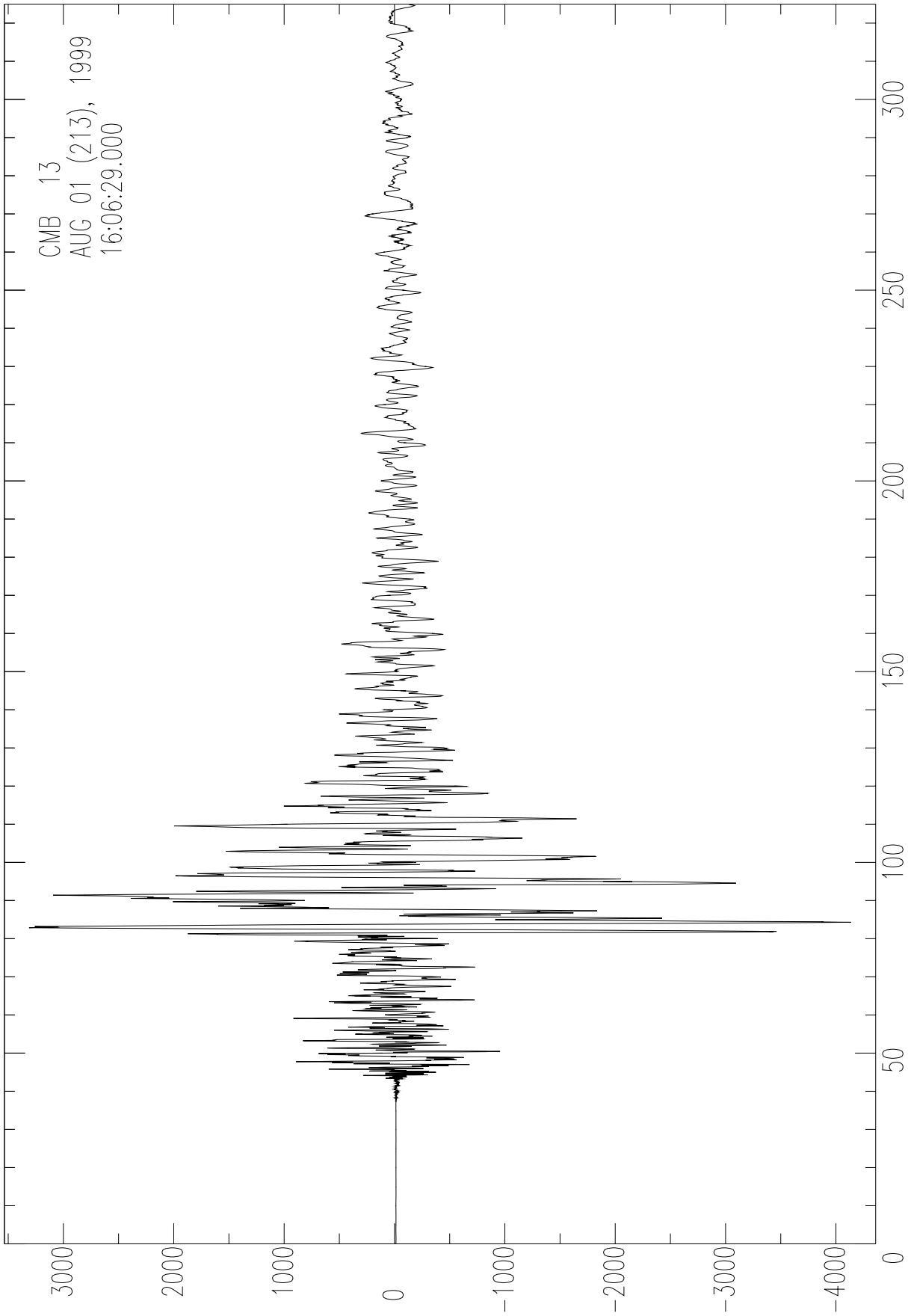
Longitude _____

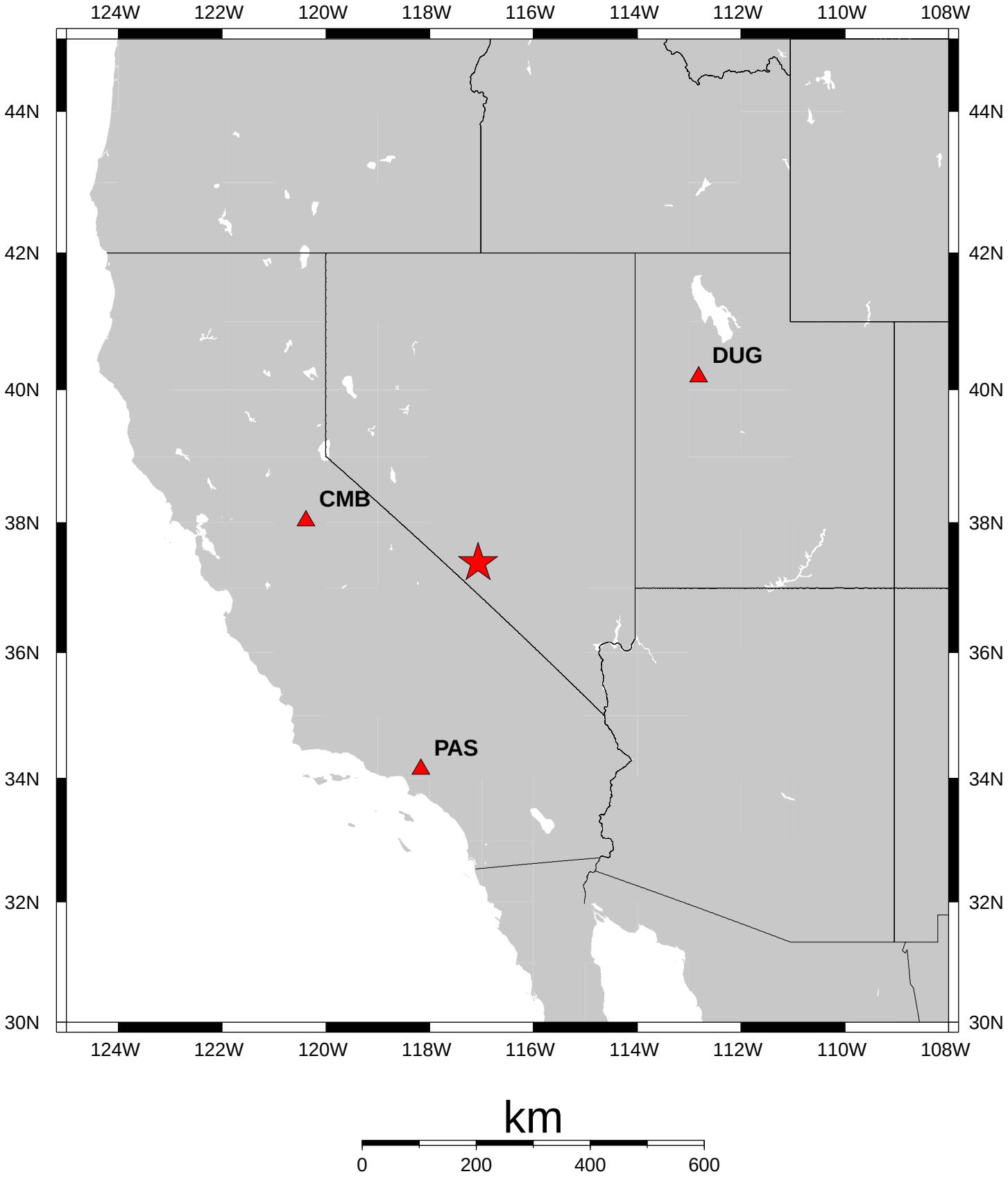












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