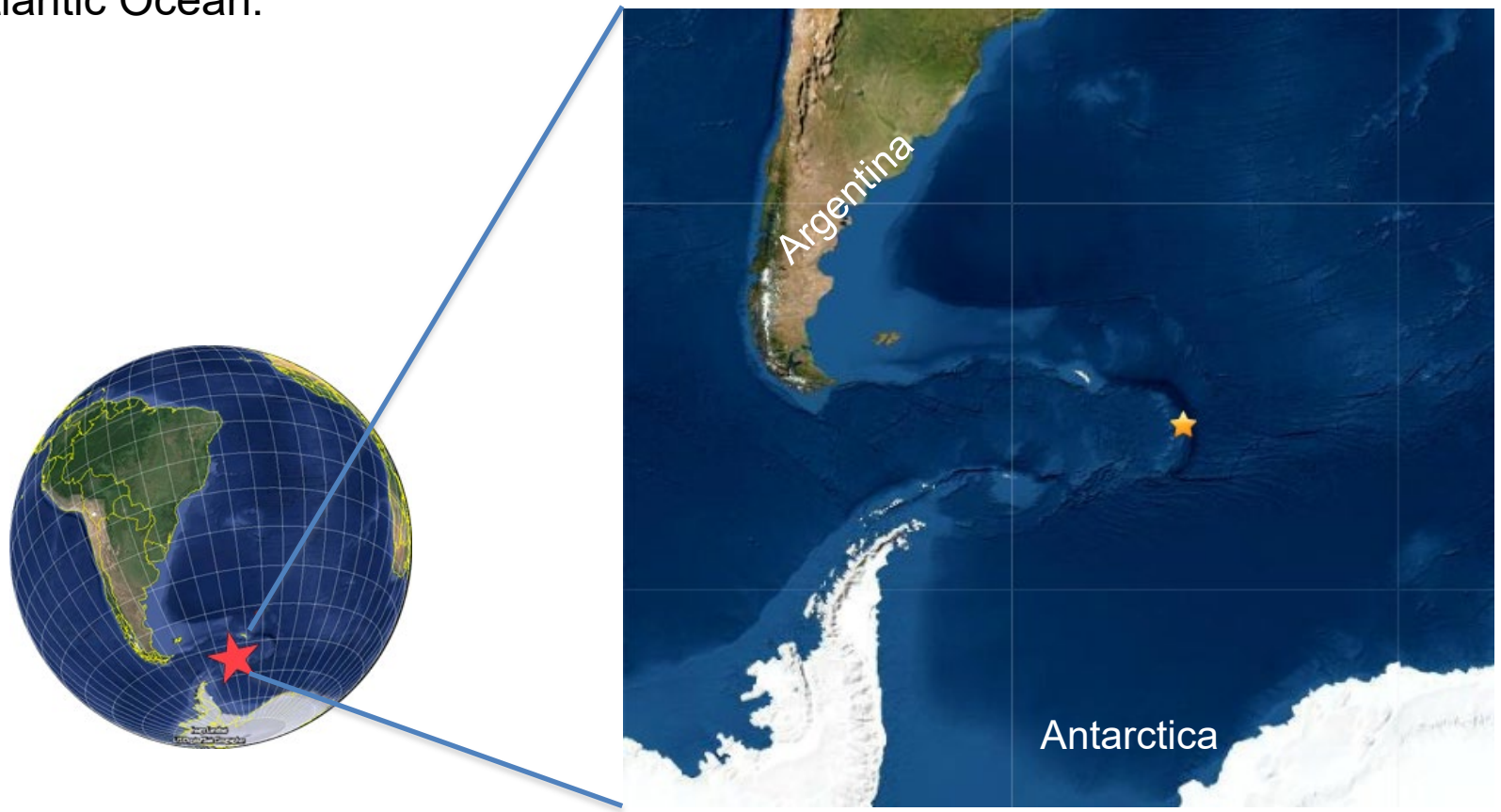
Magnitude 7.5 SOUTH SANDWICH ISLANDS

Thursday, August 12, 2021 at 18:32:54 UTC

Latitude 57.596° S
Longitude 25.187° W
Depth 63.3 km

A magnitude 7.5 earthquake occurred at a depth of 63.3 km (39.3 miles) in the South Sandwich Islands, an uninhabited British territory off the coast of Argentina in the southern Atlantic Ocean.



Epicenter from U.S. Geological Survey

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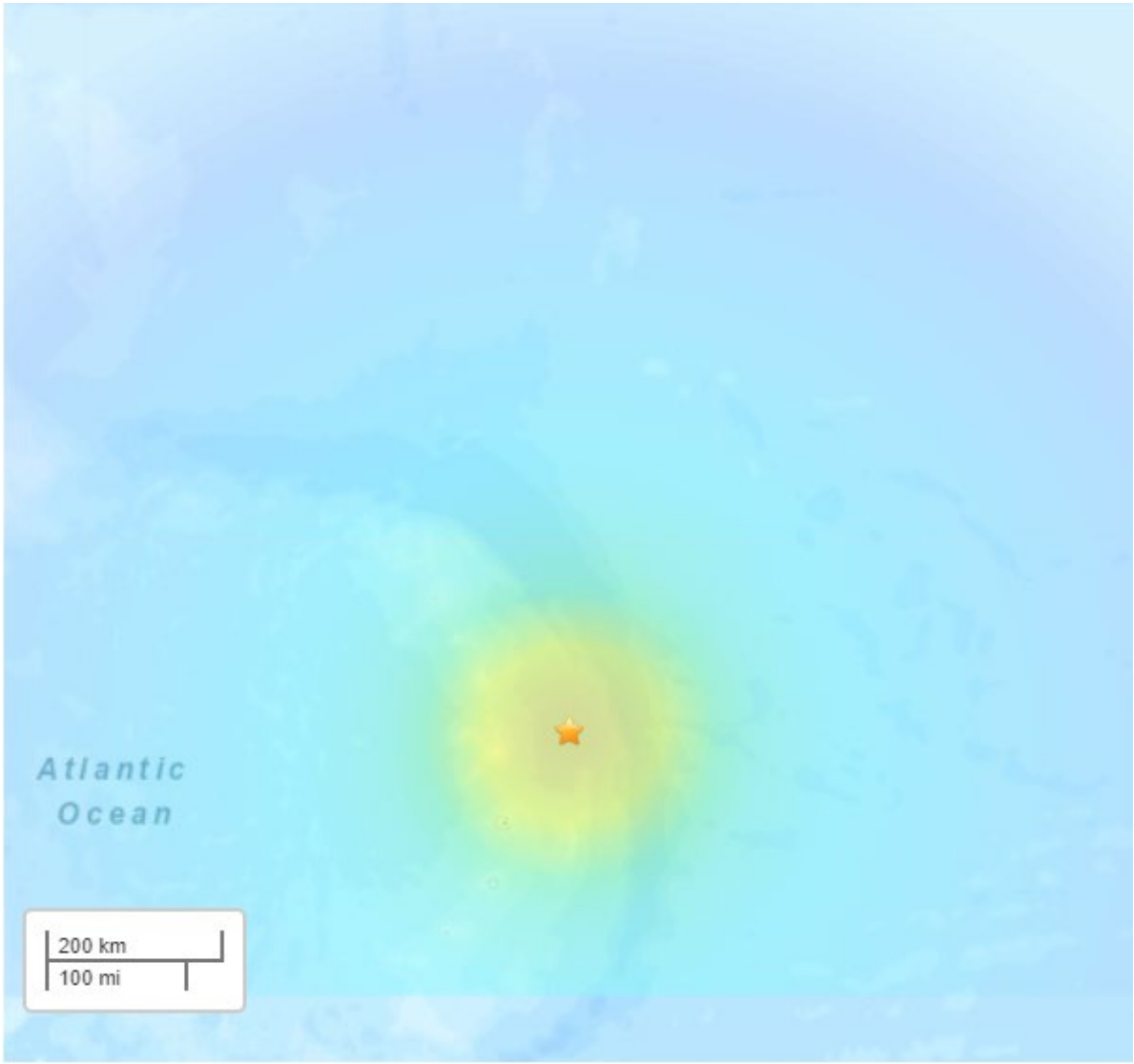
The Modified-Mercalli Intensity (MMI) scale is a ten-stage scale that indicates the severity of ground shaking. Intensity is dependent on the magnitude, depth, bedrock, and location.

The uninhabited islands nearest the earthquake experienced strong shaking.

MMI	Perceived Shaking
X	Extreme
IX	Violent
VIII	Severe
VII	Very Strong
VI	Strong
V	Moderate
IV	Light
II-III	Weak
I	Not Felt



USGS estimated shaking intensity from M 7.5 Earthquake

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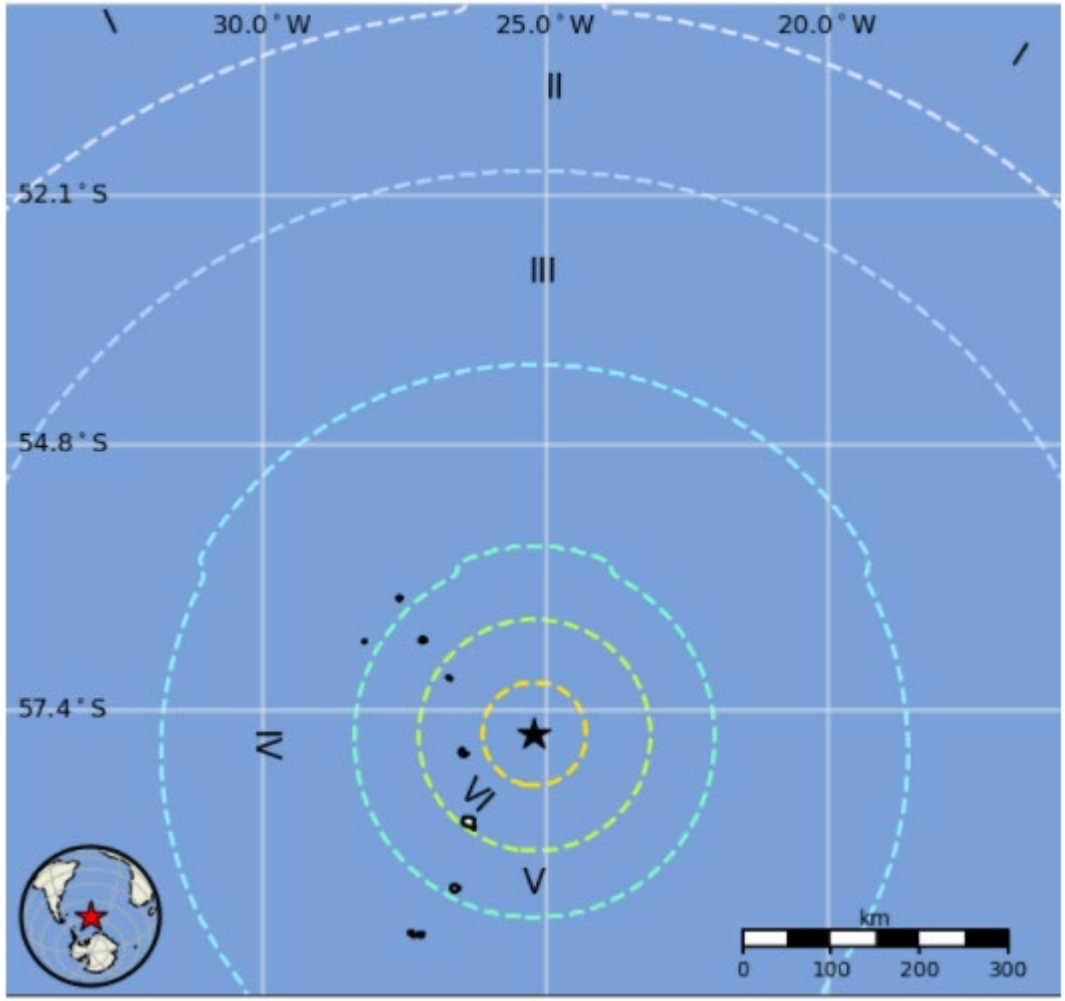
The USGS PAGER map shows the population exposed to different Modified Mercalli Intensity (MMI) levels.

The USGS estimates that no one felt this earthquake.

I	Not Felt	0 k*
II-III	Weak	0 k*
IV	Light	0 k*
V	Moderate	0 k
VI	Strong	0 k
VII	Very Strong	0 k
VIII	Severe	0 k
IX	Violent	0 k
X	Extreme	0 k



The color-coded contour lines outline regions of MMI intensity. The total population exposure to a given MMI value is obtained by summing the population between the contour lines. The estimated population exposure to each MMI Intensity is shown in the table.

Image courtesy of the US Geological Survey

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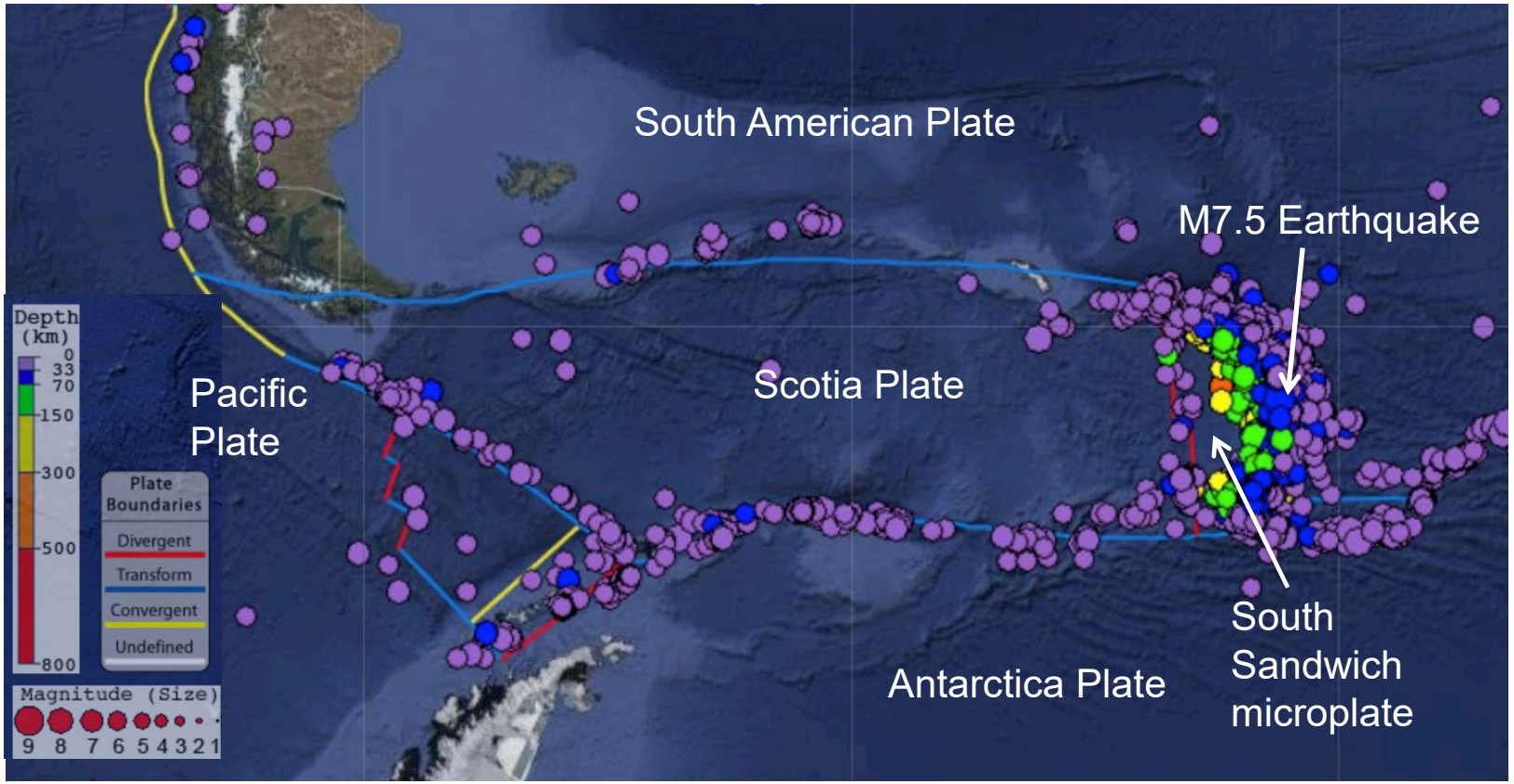
This earthquake epicenter is labeled on the map below along with the most recent 2000 earthquakes of magnitude ≥ 5. The subduction zone between the South Sandwich microplate and South American Plate has frequent earthquakes with depths increasing from east-to-west across the convergent plate boundary.



Map created with the IRIS Earthquake Browser

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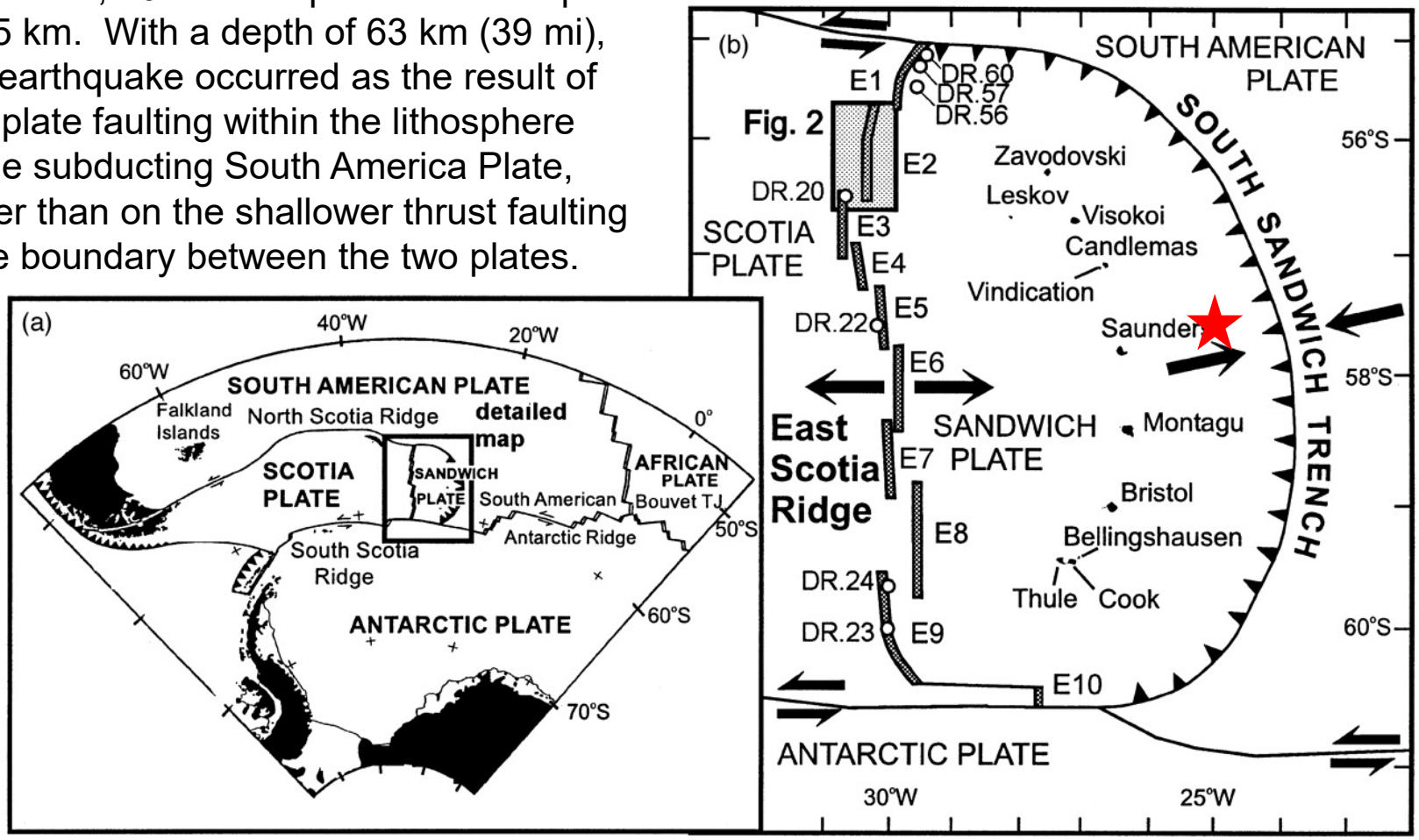
The earthquake epicenter (red star) is located about 70 km (43 mi) east of Saunders Island. The South American Plate subducts towards the west beneath the South Sandwich microplate. In the region of this earthquake, the South America Plate subducts at a rate of ~7 cm/yr. According to the US Geological Survey, the top of the South American Plate in the vicinity of August 12, 2021 earthquake is at a depth of 25 km. With a depth of 63 km (39 mi), this earthquake occurred as the result of intraplate faulting within the lithosphere of the subducting South America Plate, rather than on the shallower thrust faulting plate boundary between the two plates.



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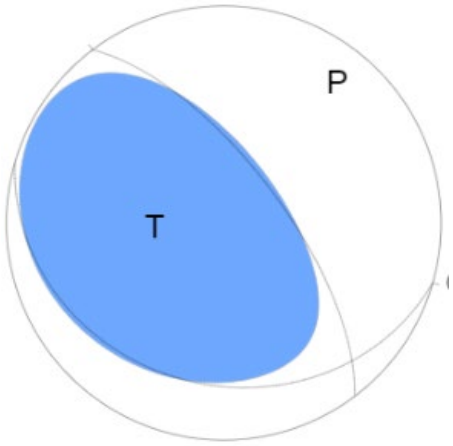
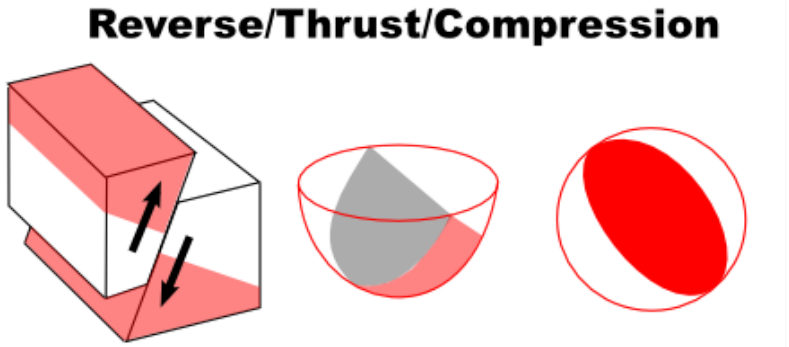
The focal mechanism is how seismologists plot the 3-D stress orientations of an earthquake. Because an earthquake occurs as slip on a fault, it generates primary (P) waves in quadrants where the first pulse is compressional (shaded) and quadrants where the first pulse is extensional (white). The orientation of these quadrants determined from recorded seismic waves identifies the type of fault that produced the earthquake.

Given the estimated depths of the earthquake and of the subducted slab, this earthquake likely initiated in the lower half of the subducted South America plate as a result of compressional forces caused by downward bending of the subducted plate.





USGS WPhase Centroid Moment Tensor Solution

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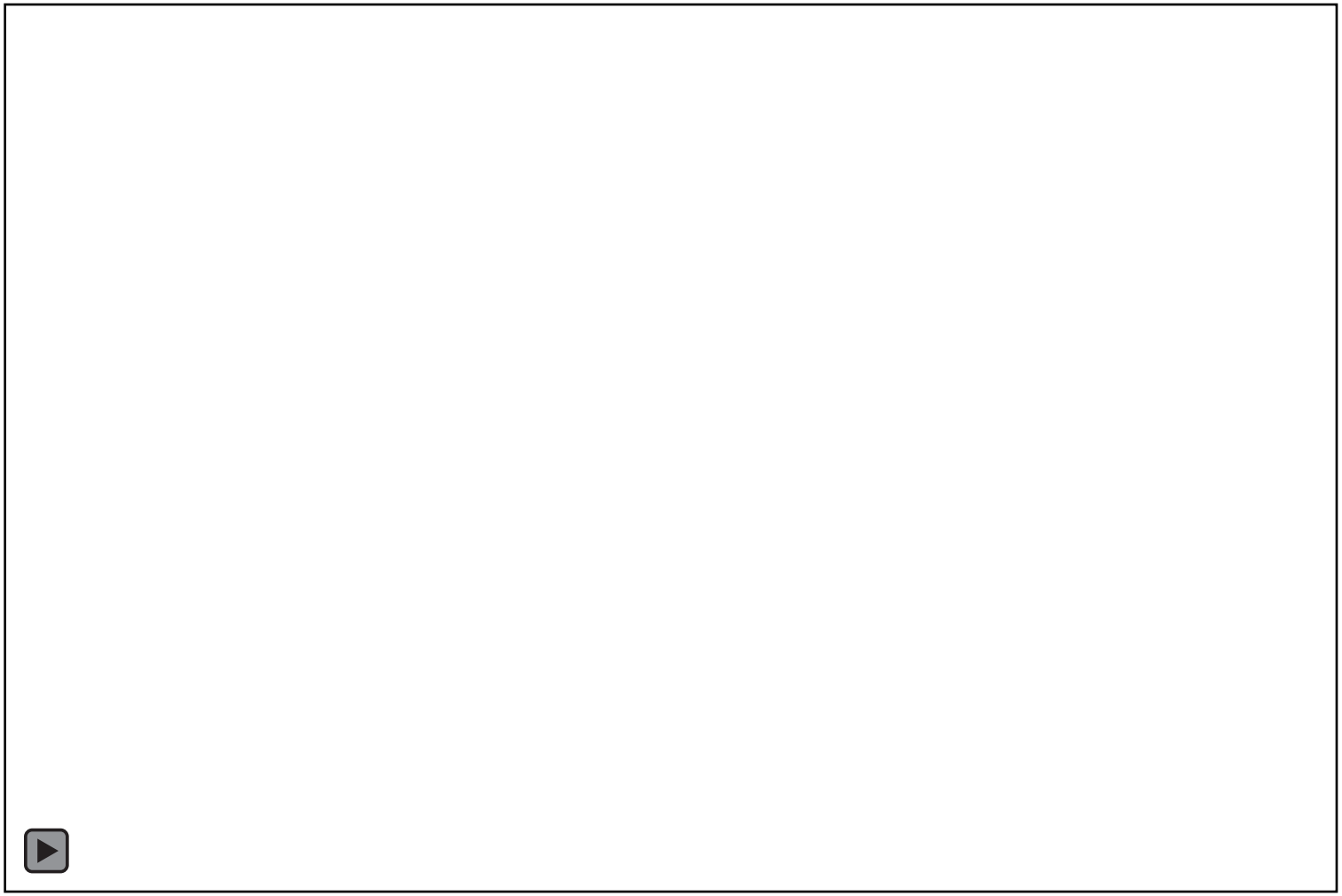
Animating the earthquakes including the mainshock and aftershocks.



Animation created with the IRIS Earthquake Browser

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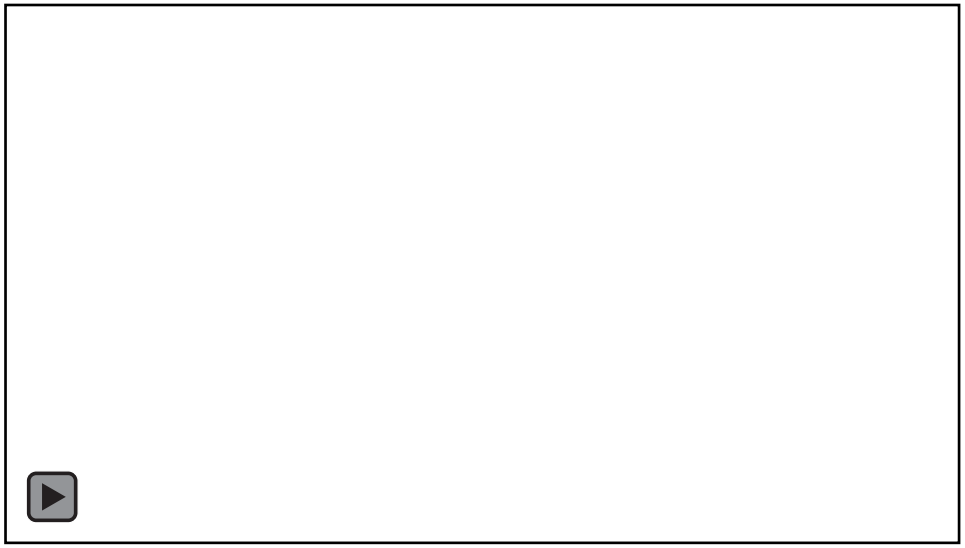
A **mainshock** is largest magnitude earthquake during an earthquake sequence.

Aftershocks are smaller earthquakes occurring after a large earthquake as the fault adjusts to the new state of stress.

The graph shows how the number of aftershocks and the magnitude of aftershocks decay with increasing time since the main shock. The number of aftershocks also decreases with distance from the main shock.

A **foreshock** is a smaller magnitude earthquake that precedes the mainshock.

There are no special characteristics of a foreshock that let us know it is a foreshock until the mainshock occurs. There were no foreshocks for this earthquake.



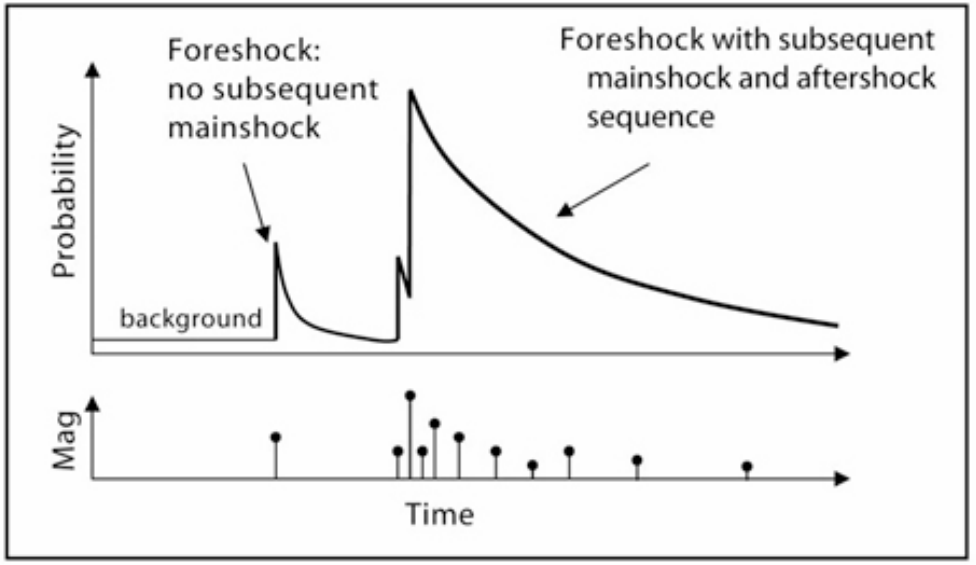


Image courtesy of the US Geological Survey

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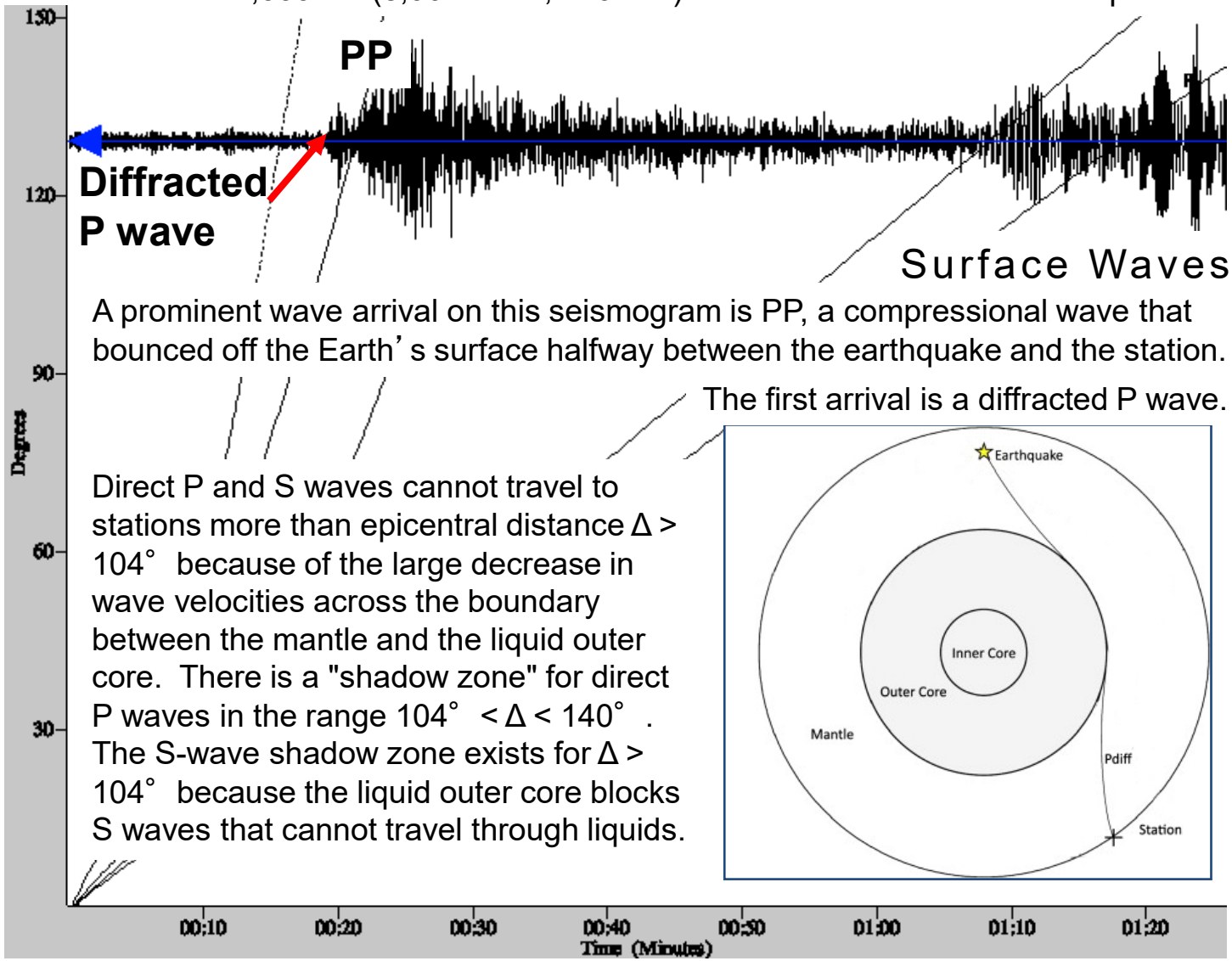
The record of the earthquake in Bend, Oregon (BNOR) is illustrated below. Bend is 14,333 km (8,907 miles, 129.1°) from the location of this earthquake.



A prominent wave arrival on this seismogram is PP, a compressional wave that bounced off the Earth's surface halfway between the earthquake and the station.

The first arrival is a diffracted P wave.

Direct P and S waves cannot travel to stations more than epicentral distance Δ > 104° because of the large decrease in wave velocities across the boundary between the mantle and the liquid outer core. There is a "shadow zone" for direct P waves in the range 104° < Δ < 140° . The S-wave shadow zone exists for Δ > 104° because the liquid outer core blocks S waves that cannot travel through liquids.

Time

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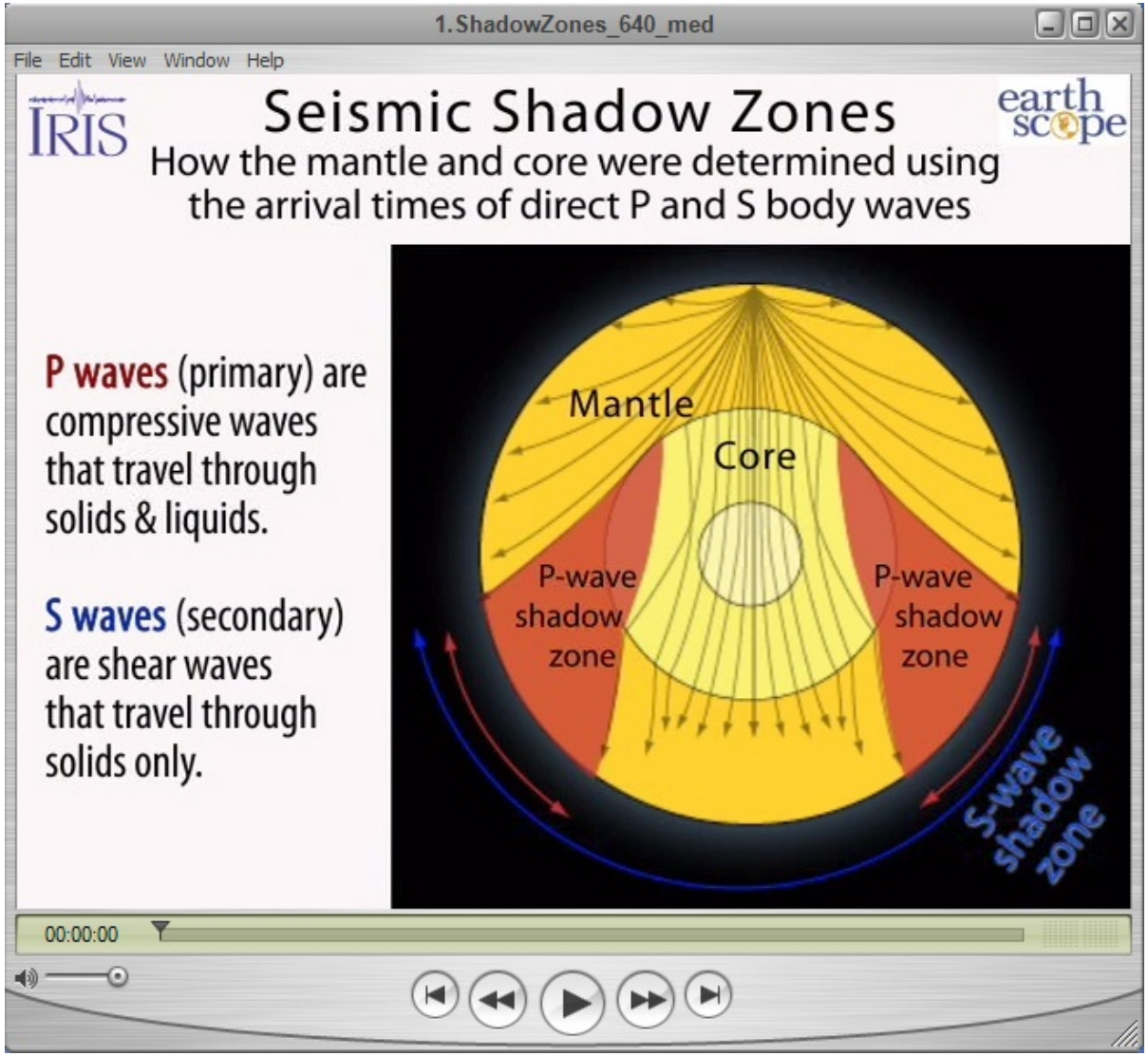
Animation explaining the seismic shadow zone.

Epicentral distance is the angle formed by the intersection of the line from the earthquake to Earth's center with the line from the observing point to the Earth's center.

S waves are observed up to a distance of 104° from an earthquake, but direct S waves are not recorded beyond this distance.

P waves also have a shadow zone between 104° and 140° .



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