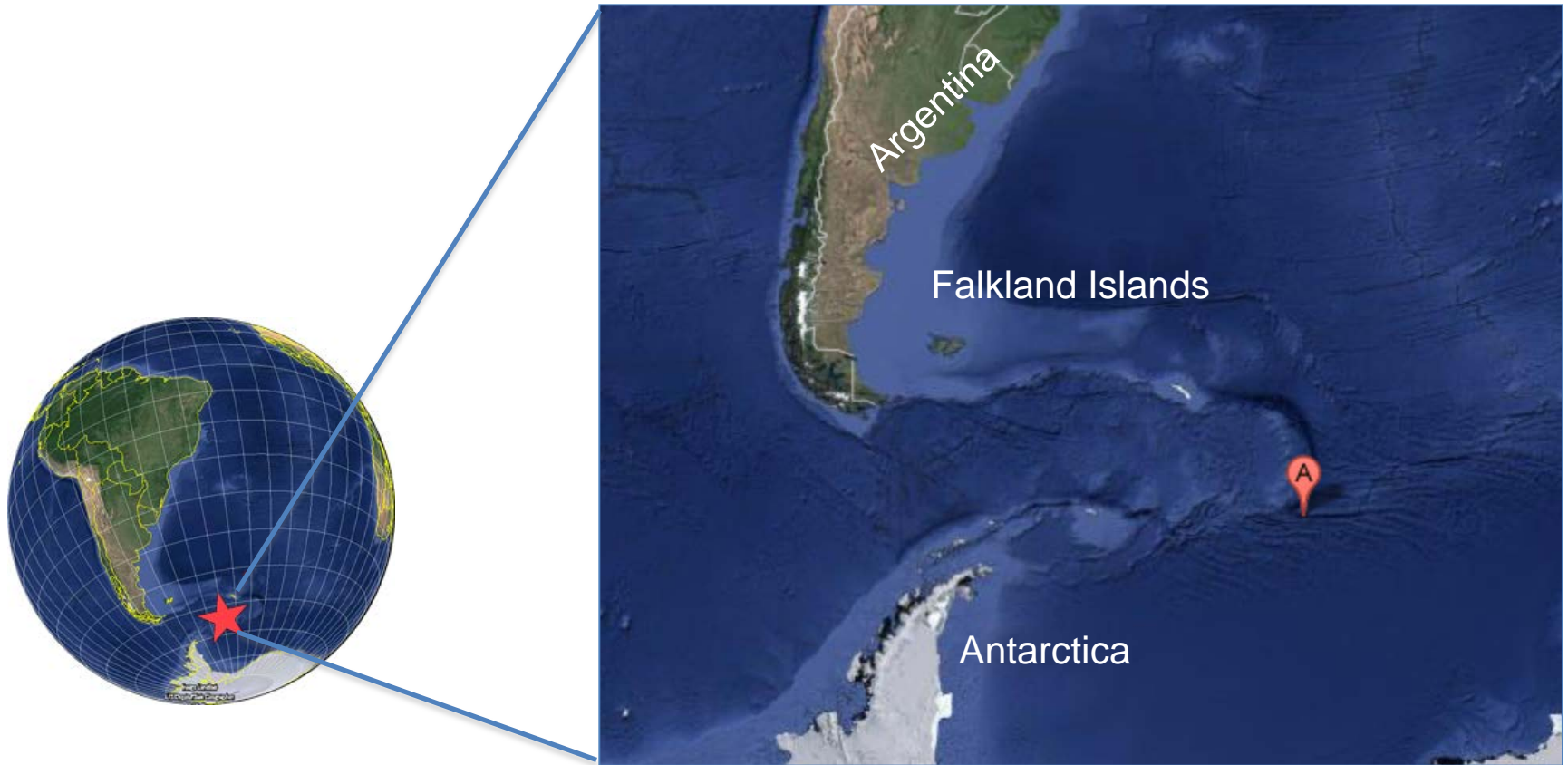


# Magnitude 7.3 SOUTH SANDWICH ISLANDS

Monday, July 15, 2013 at 14:03:42 UTC

A magnitude 7.3 earthquake rocked the South Sandwich Islands, an uninhabited British territory off the coast of Argentina in the southern Atlantic Ocean.



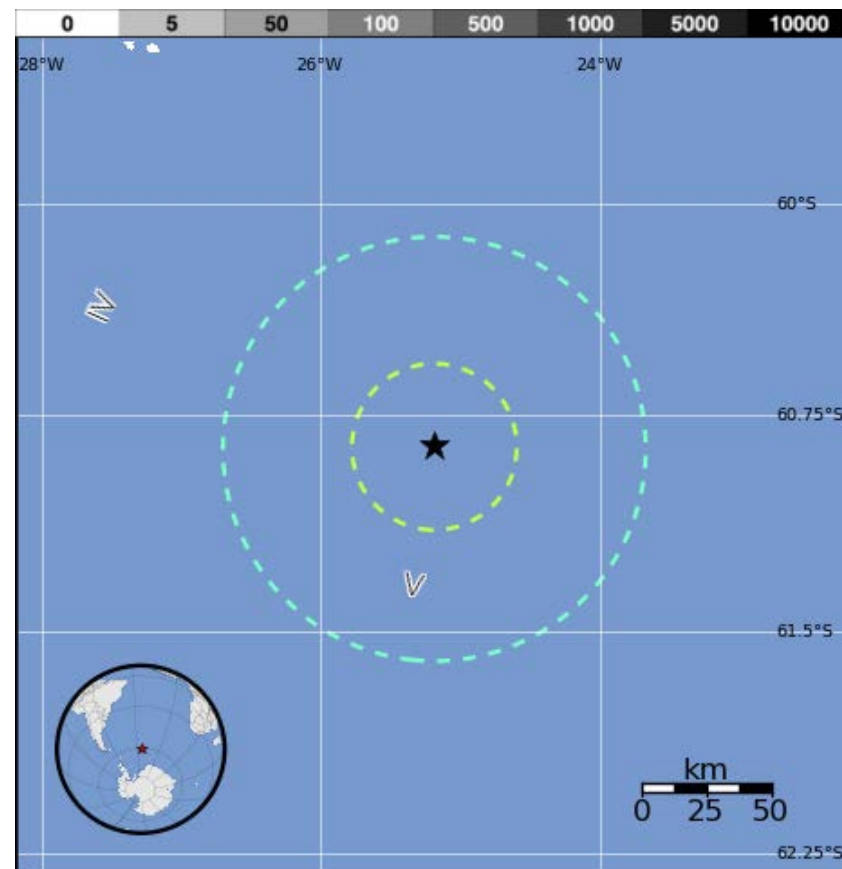
*Epicenter from U.S. Geological Survey*

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

The USGS is estimating that no one felt this earthquake.

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 below.

*Image courtesy of the US Geological Survey*



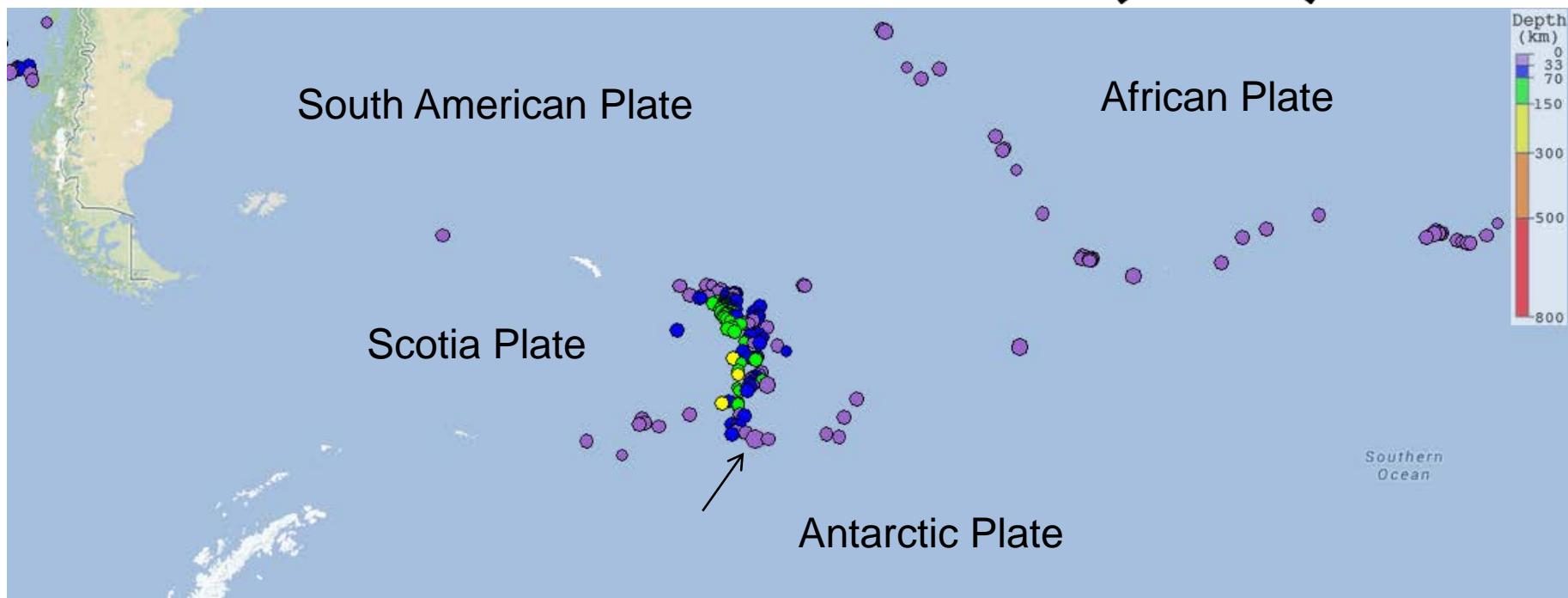
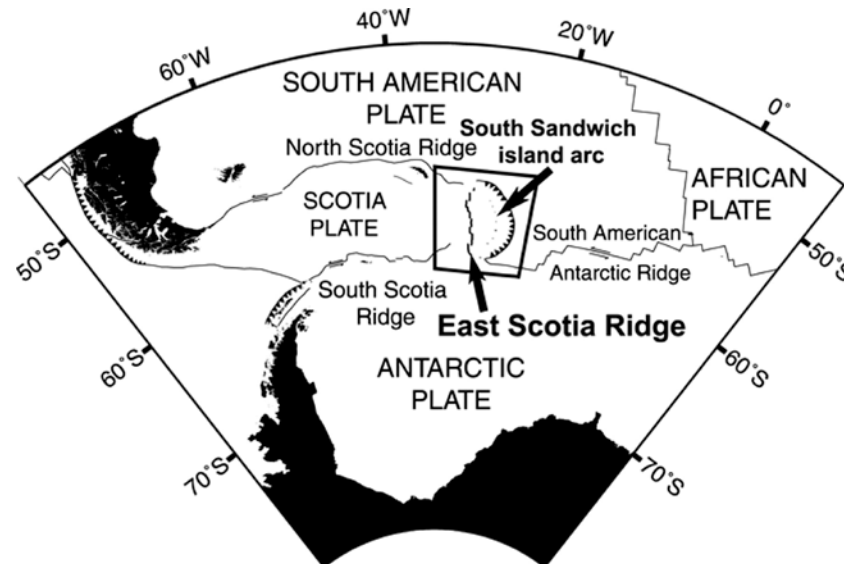
Estimated <a href="#">Modified Mercalli Intensity</a>	I	II-III	IV	V	VI	VII	VIII	IX	X
Est. Population Exposure	--*	--*	0k	0k	0k	0k	0k	0k	0k
Perceived Shaking	Not Felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme

# Magnitude 7.3 SOUTH SANDWICH ISLANDS

Monday, July 15, 2013 at 14:03:42 UTC

## Earthquake and Historic Seismicity

This earthquake epicenter is plotted on the map with regional seismicity since 1990.

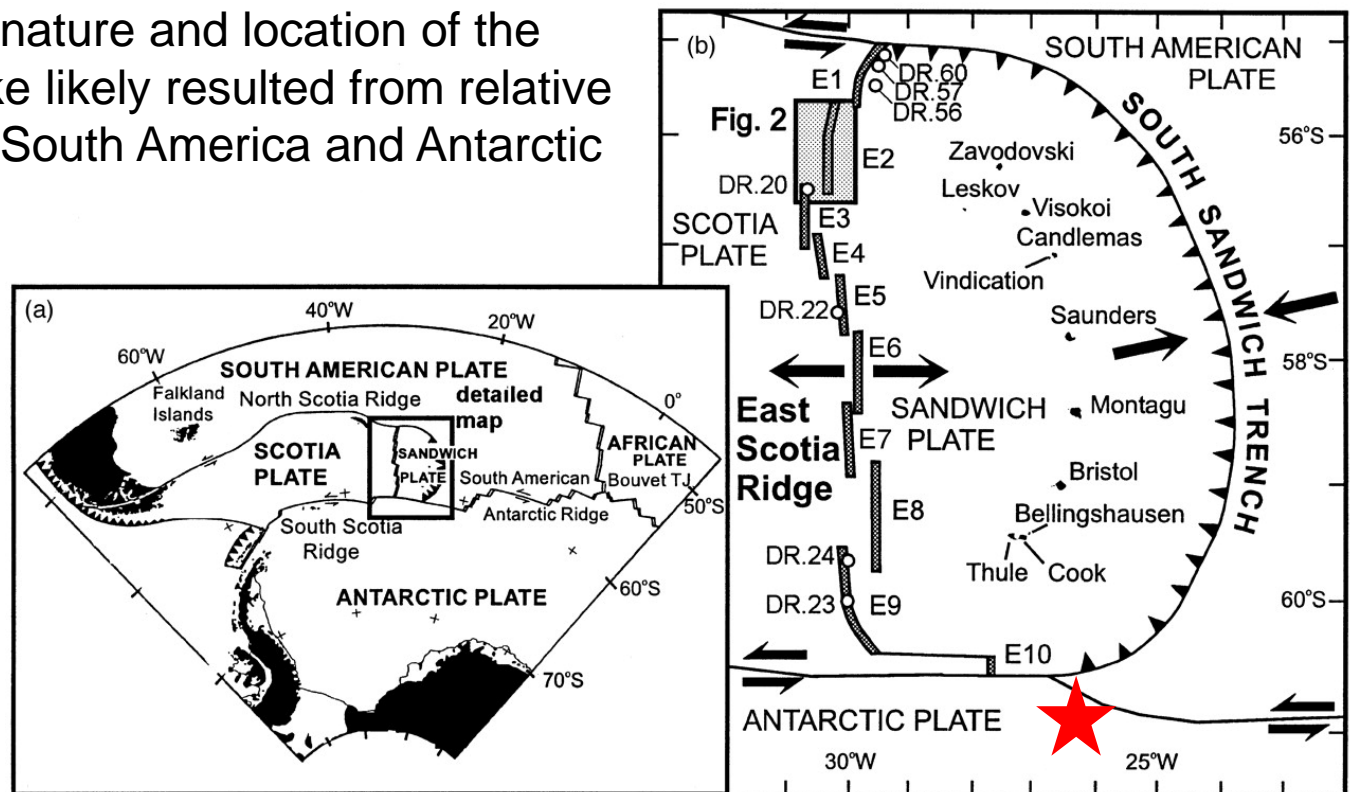


# Magnitude 7.3 SOUTH SANDWICH ISLANDS

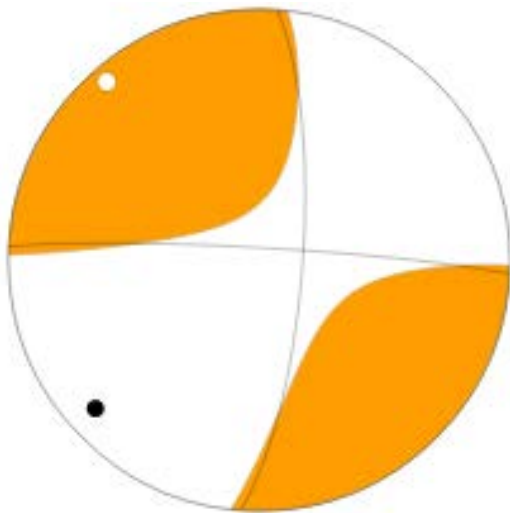
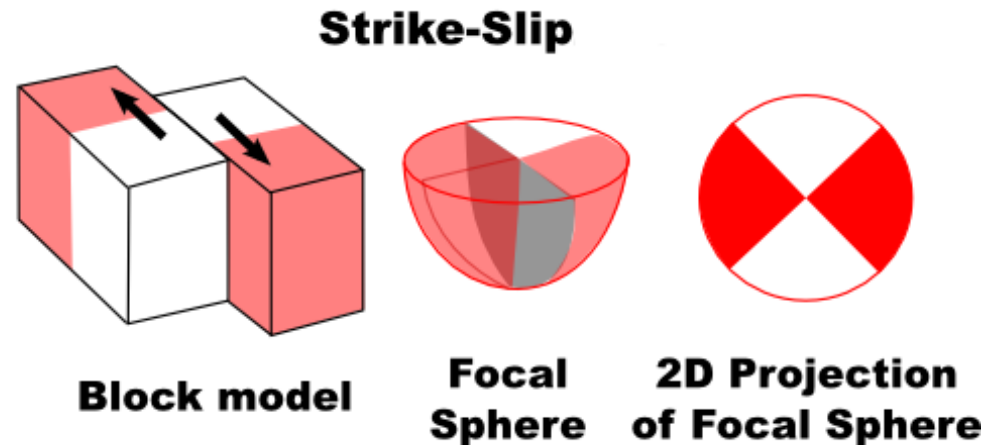
Monday, July 15, 2013 at 14:03:42 UTC

According to the USGS, the earthquake occurred ~100km east of a complex plate triple junction between the South America, Antarctica, and Sandwich plates. The South America plate currently subducts beneath the Sandwich plate at a rate of ~13mm/yr while sliding past the Antarctica plate with left-lateral motion along the South Sandwich Fracture Zone at a rate of ~14mm/yr.

Given the strike slip nature and location of the event, the earthquake likely resulted from relative motion between the South America and Antarctic plates.



The focal mechanism illustrated below indicates that the earthquake resulted from either left-lateral strike-slip motion on an east-west oriented fault plane or right-lateral strike-slip motion on a north-south oriented fault plane. Given the east-west alignment of historic earthquakes along the South Sandwich Fracture Zone, it is most likely that this earthquake was produced by left-lateral strike-slip motion on a transform fault at shallow oceanic crustal depths.



*USGS Centroid Moment Tensor Solution*

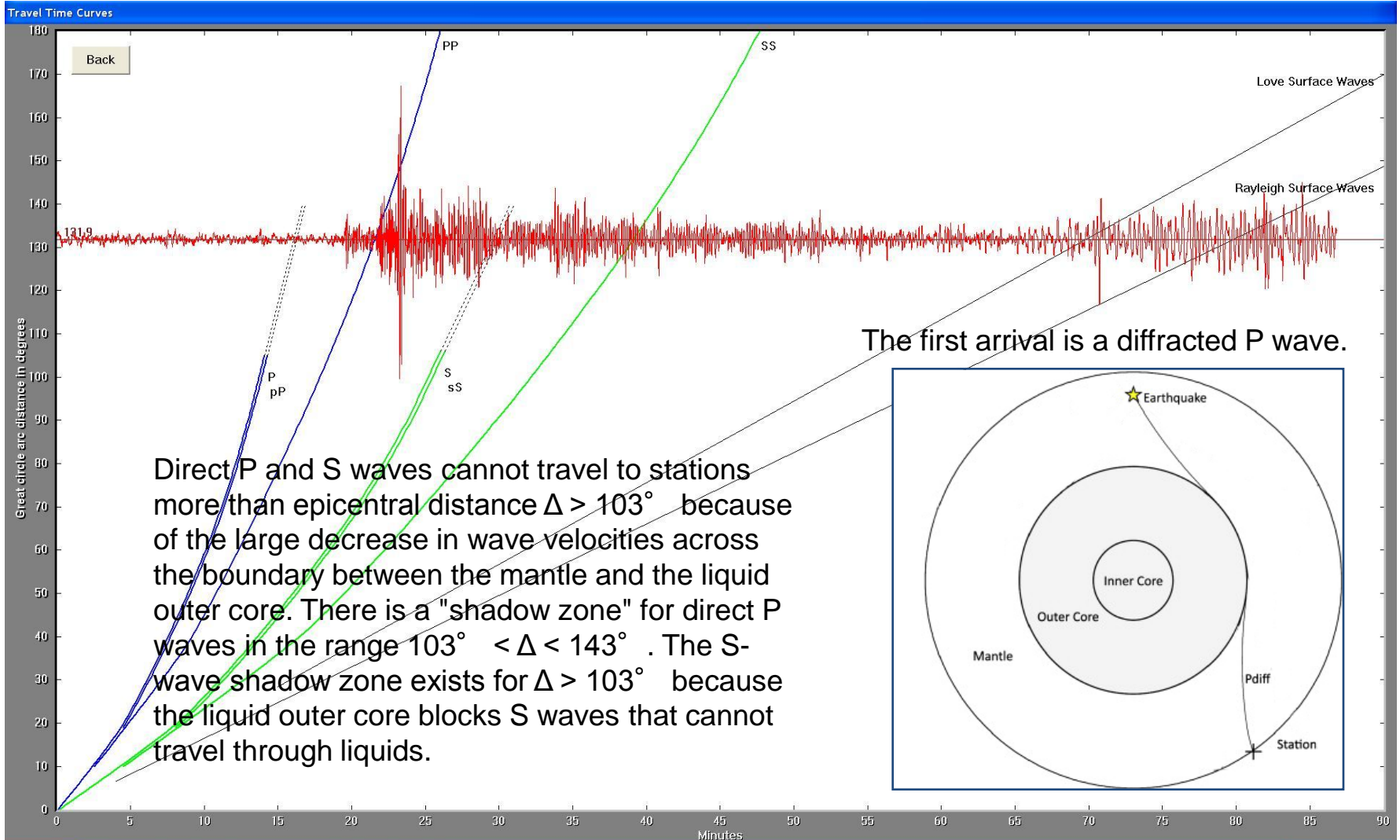
Shaded areas show quadrants of the focal sphere in which the P-wave first-motions are away from the source, and unshaded areas show quadrants in which the P-wave first-motions are toward the source. The dots represent the axis of maximum compressional strain (in black, called the "P-axis") and the axis of maximum extensional strain (in white, called the "T-axis") resulting from the earthquake. An introduction to focal mechanisms can be found in the animation at following URL: [http://www.iris.edu/hq/programs/education\\_and\\_outreach/animations/25](http://www.iris.edu/hq/programs/education_and_outreach/animations/25)



# Magnitude 7.3 SOUTH SANDWICH ISLANDS

Monday, July 15, 2013 at 14:03:42 UTC

The record of the earthquake on the University of Portland seismometer (UPOR) is illustrated below. Portland is 14,649 km (9102 miles, 131.6° ) from the location of this earthquake.



Direct P and S waves cannot travel to stations more than epicentral distance  $\Delta > 103^\circ$  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  $103^\circ < \Delta < 143^\circ$ . The S-wave shadow zone exists for  $\Delta > 103^\circ$  because the liquid outer core blocks S waves that cannot travel through liquids.

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 seen up to a distance of  $104^\circ$  from an earthquake, but direct S waves are not recorded after this distance.

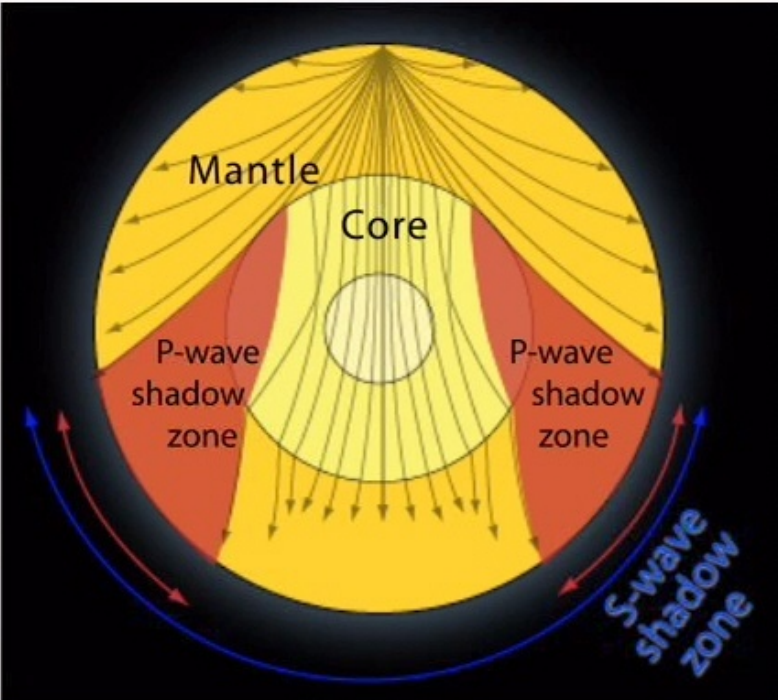
P waves also have a shadow zone between  $104^\circ$  and  $140^\circ$ .

1.ShadowZones\_640\_med

File Edit View Window Help

 **Seismic Shadow Zones** 

How the mantle and core were determined using the arrival times of direct P and S body waves



**P waves** (primary) are compressive waves that travel through solids & liquids.

**S waves** (secondary) are shear waves that travel through solids only.

00:00:00

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**Teachable Moments are a service of**

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and  
The University of Portland