

## Magnitude 7.6 & 7.4 SOLOMON ISLANDS

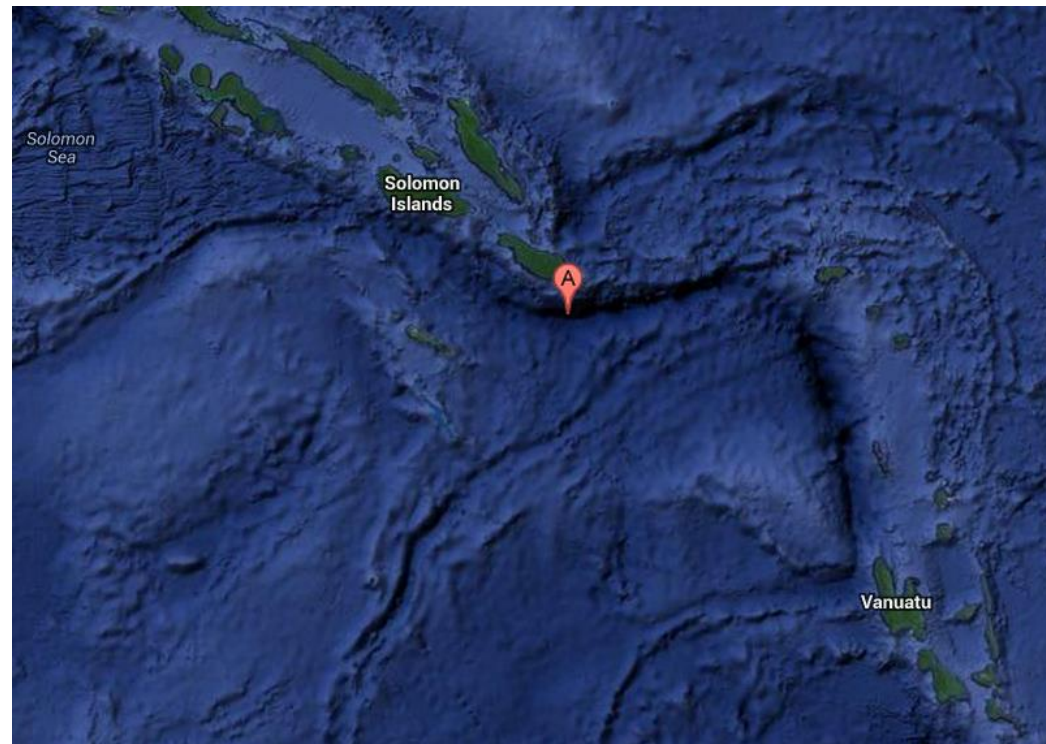
Saturday, April 12, 2014 at 20:14:39 UTC

Sunday, April 13, 2014 at 12:36:18 UTC



A magnitude 7.6 earthquake struck near the Solomon Islands on Sunday morning local time; there were no immediate reports of damage. The earthquake was centered 100 km (60 miles) south of Kira Kira, a town on the island of Makira, at a depth of 29 km (18 miles).

A magnitude 7.4 earthquake occurred less than 24 hours later approximately 20 km to the southwest of the magnitude 7.6 earthquake.



Kirakira, Makira

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The Modified-Mercalli Intensity scale is a twelve-stage scale, from I to XII, that indicates the severity of ground shaking.

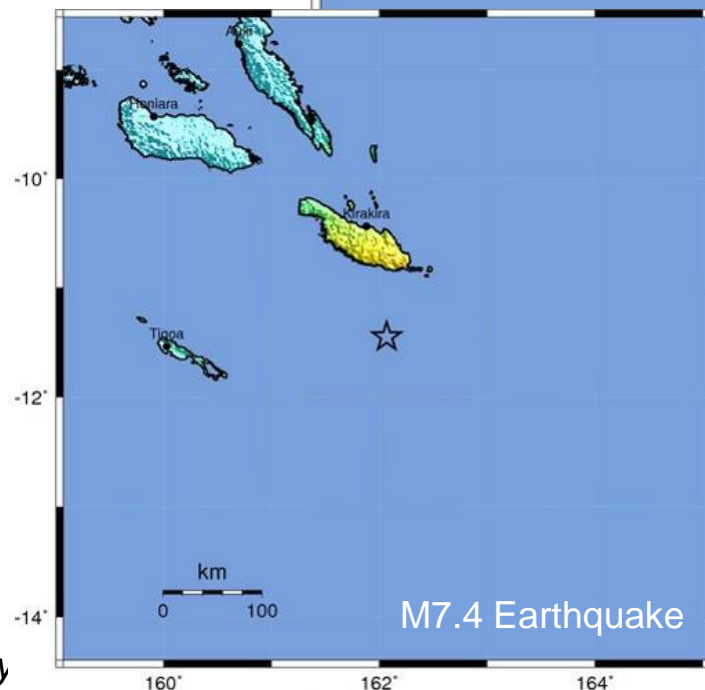
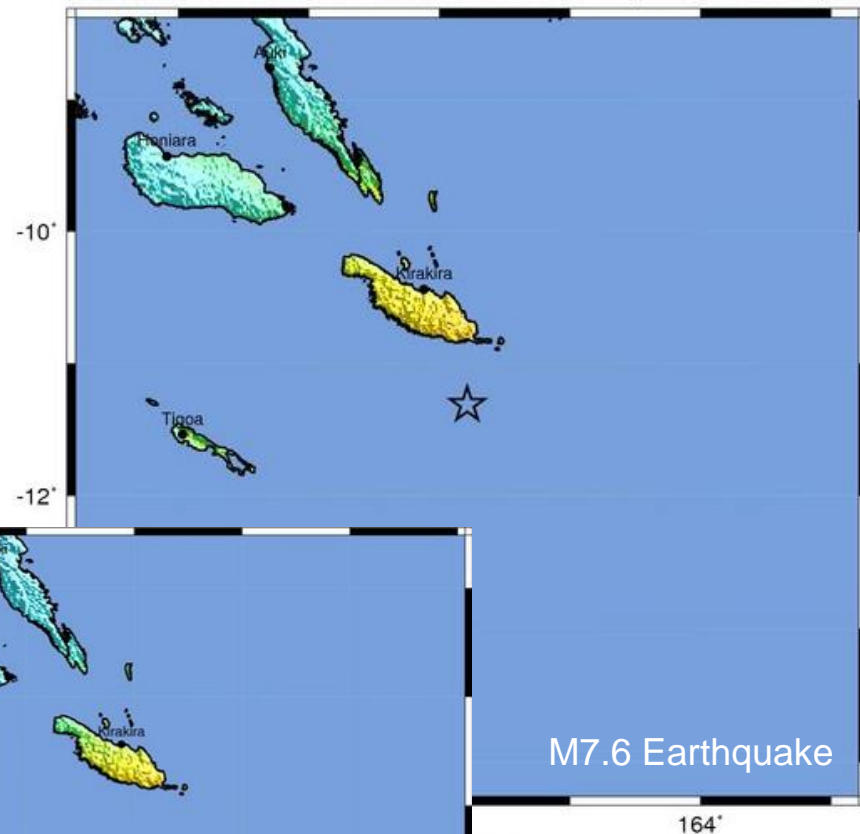
The island of Makira with a population of ~40,000 experienced strong and very strong shaking from the M7.6 earthquake and the M7.4 aftershock.

## Modified Mercalli Intensity



## Perceived Shaking

Extreme  
Violent  
Severe  
Very Strong  
Strong  
Moderate  
Light  
Weak  
Not Felt



USGS Estimated Shaking Intensities

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USGS PAGER

Population Exposed to Earthquake Shaking

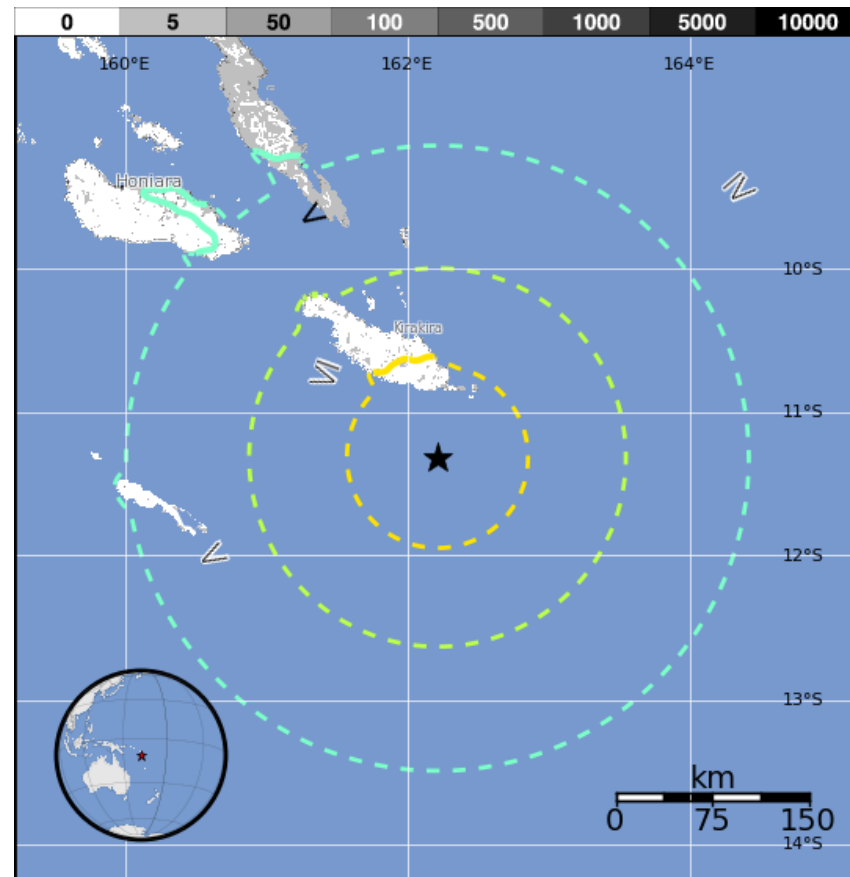
## Magnitude 7.6 earthquake:

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

14,000 people were exposed to very strong shaking, with an additional 29,000 people experiencing strong shaking from 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	--*	--*	267k*	99k	29k	14k	0k	0k	0k
Perceived Shaking	Not Felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme

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USGS PAGER

Population Exposed to Earthquake Shaking

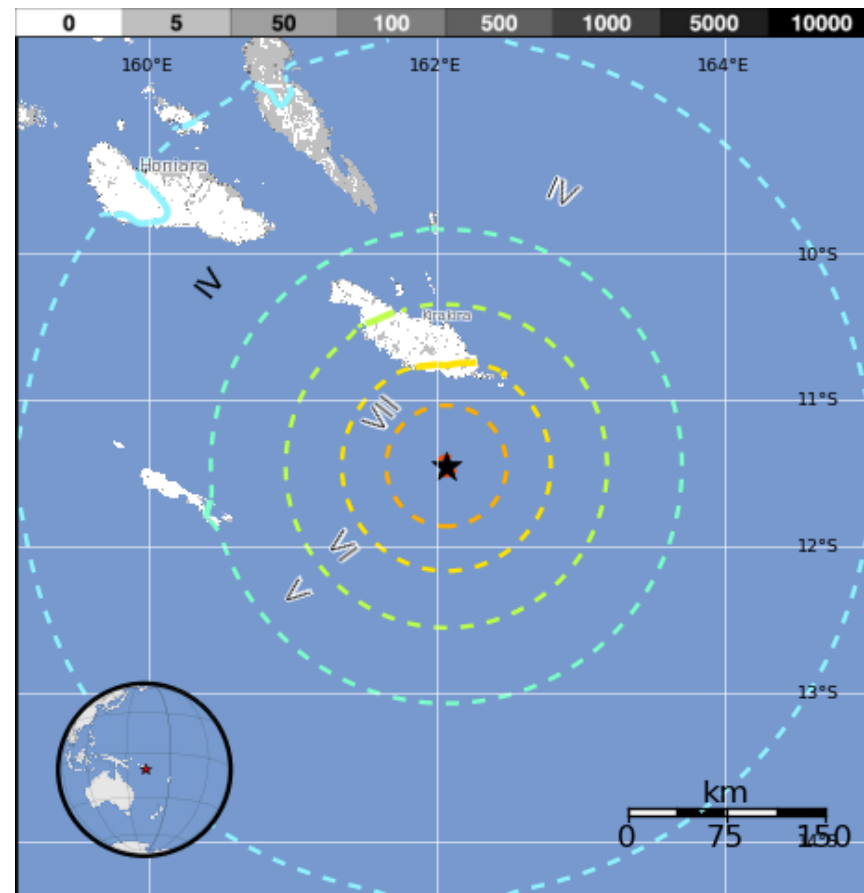
## Magnitude 7.4 earthquake:

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

While the same people were shaken in the aftershock, the intensity of shaking was less. Only 7,000 people experienced very strong shaking and 18,000 experienced strong shaking.

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	--*	107k*	250k	19k	18k	7k	0k	0k	0k
Perceived Shaking	Not Felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme

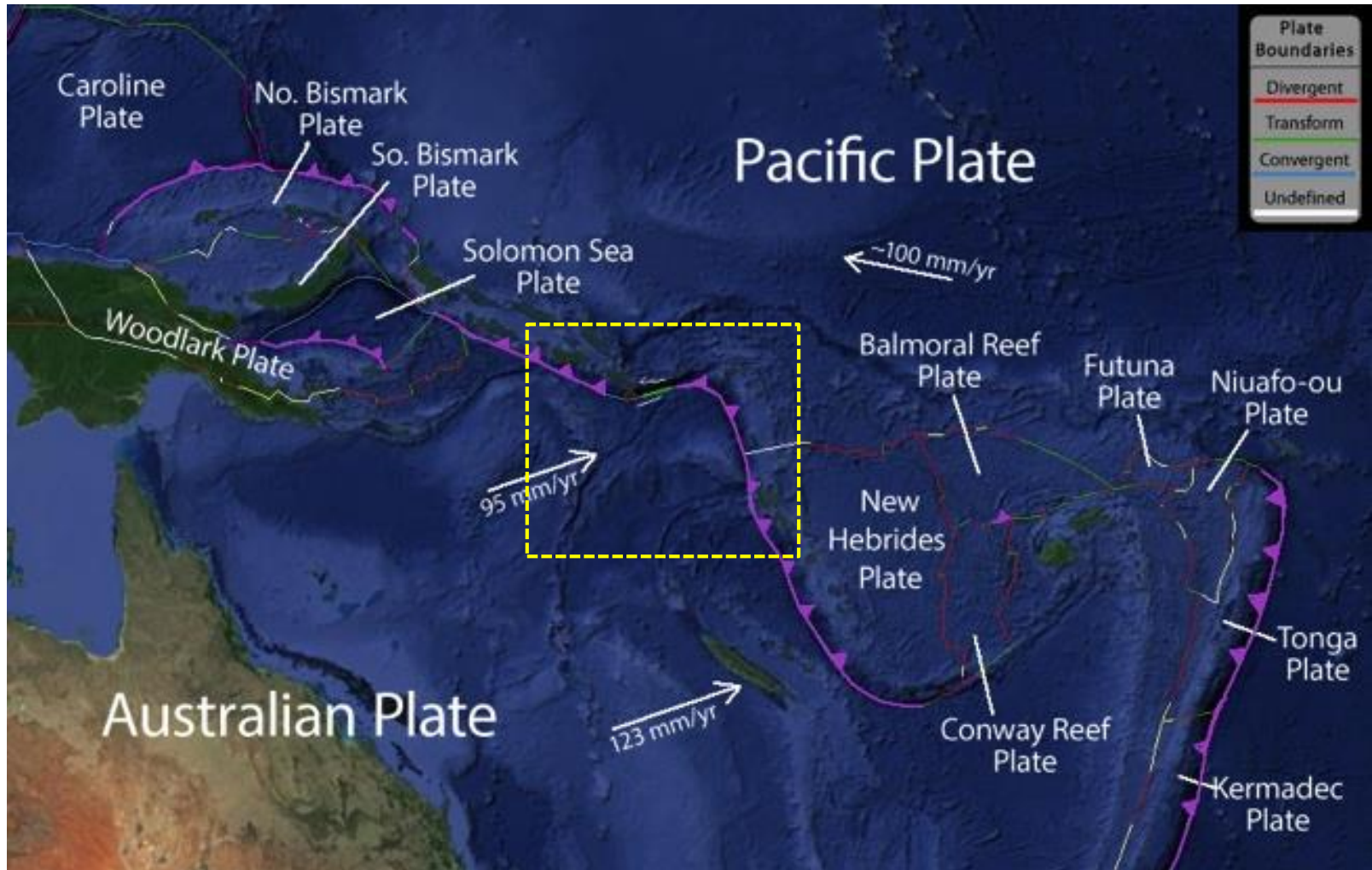


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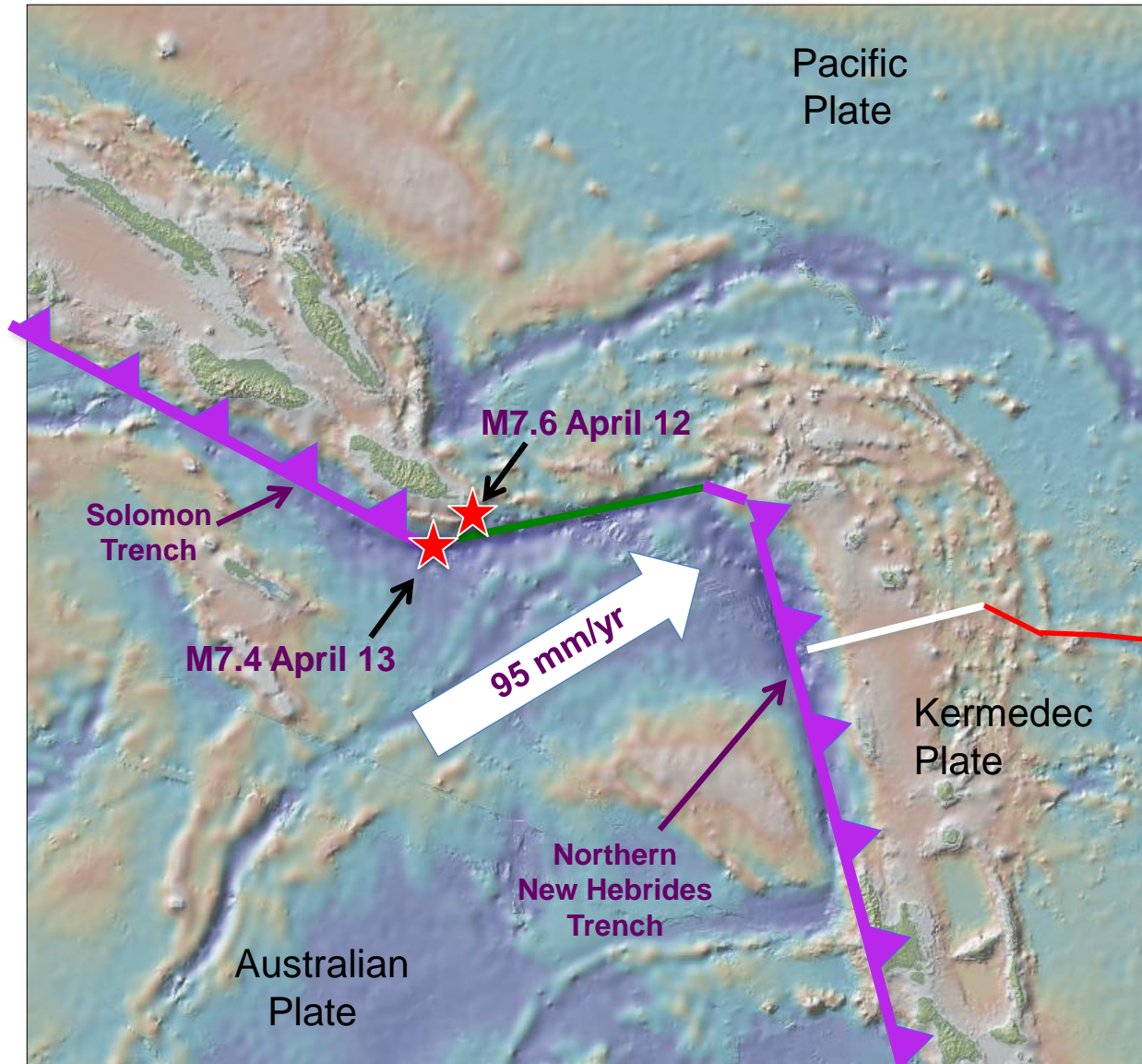
This regional map shows the complexity of major tectonic plates and microplates due to the convergence between the Australian and Pacific plates. The rectangle outlines the map area on the next slide.



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These earthquakes occurred along a portion of the Australian–Pacific Plate boundary that transitions from thrust to transform tectonics between the Solomon Trench to the northwest and the New Hebrides Trench farther east.

According to the USGS, the M7.6 strike-slip earthquake likely represented Australian–Pacific Plate boundary faulting, while the M7.4 earthquake is located south of the plate boundary and may represent tearing of the Australian Plate to accommodate this interaction transition.

Large arrow shows relative motion of Australian Plate with respect to Pacific Plate.



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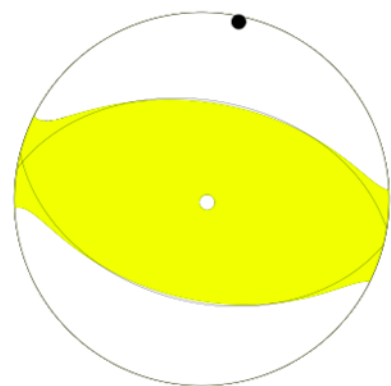
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M7.6

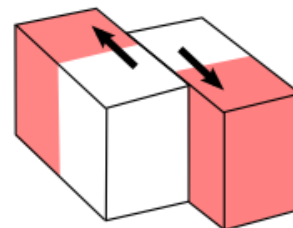
The focal mechanism for the M7.6 earthquake was nearly pure strike-slip faulting. Because the NW-SE oriented nodal plane is nearly parallel to the boundary between the Australian and Pacific Plates in this location, this is most likely the fault plane and this was a left-lateral strike-slip earthquake.



M7.4

The focal mechanism for the M7.4 earthquake indicates thrust faulting on a fault plane oriented WNW – ESE. Australian - Pacific relative plate motion is oblique to the local “transform” plate boundary causing a component of compression.

## Strike-Slip



Block model

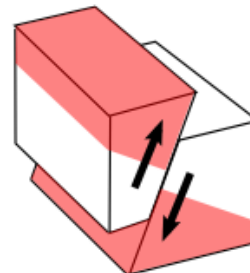


Focal Sphere



2D Projection of Focal Sphere

## Reverse/Thrust/Compression

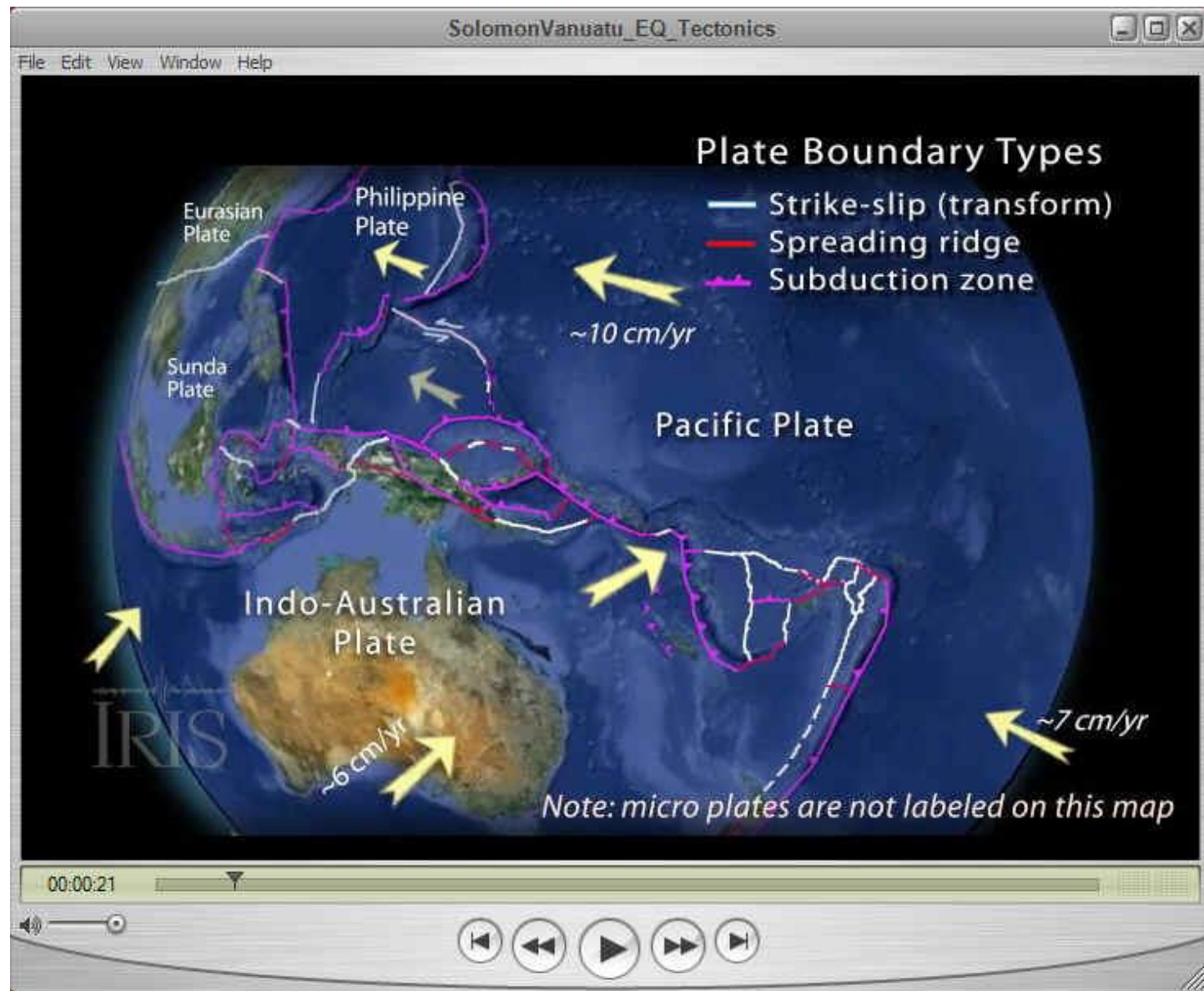


USGS Centroid Moment Tensor Solutions:  
The tension axis (white dot) reflects the minimum compressive stress direction. The pressure axis (black dot) reflects the maximum compressive stress direction.

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Regional tectonic complexities involving the convergence of the Australian and Pacific Plates.

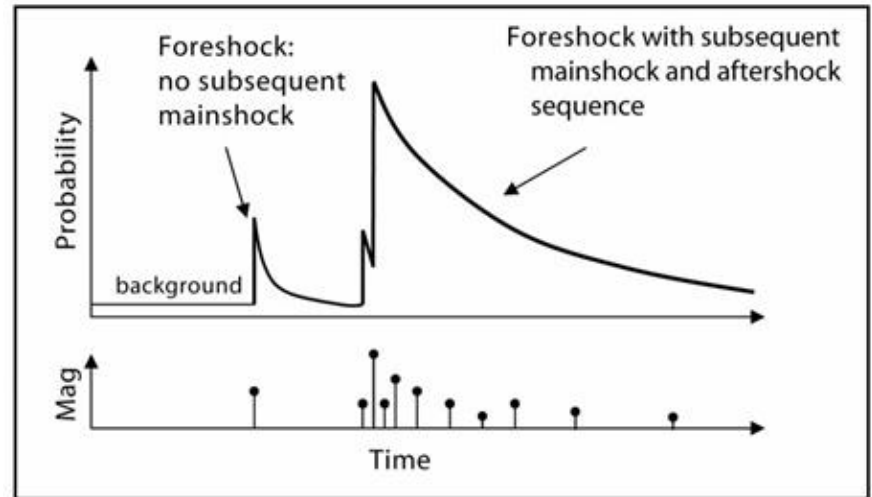


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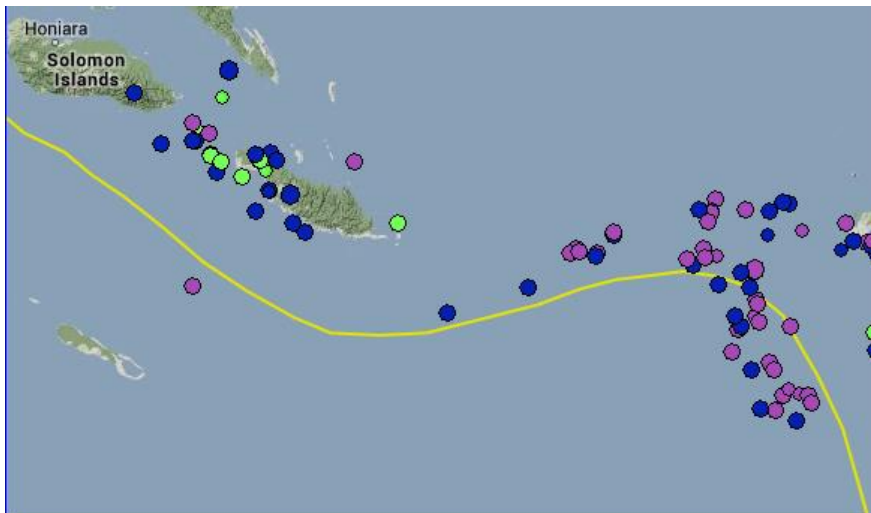
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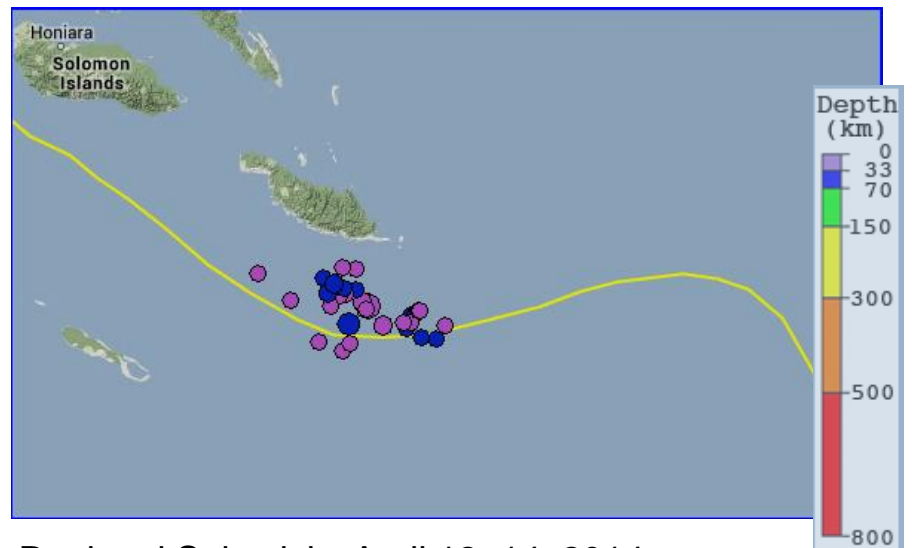
Aftershock sequences follow predictable patterns as a group, although the individual earthquakes are themselves not predictable. The graph shows how the number of aftershocks and the magnitude of aftershocks decay with increasing time since the main shock. The number of aftershocks also decreases with distance from the main shock.



*Image and text courtesy of the US Geological Survey*



Regional Seismicity April 11, 2013 - April 11, 2014



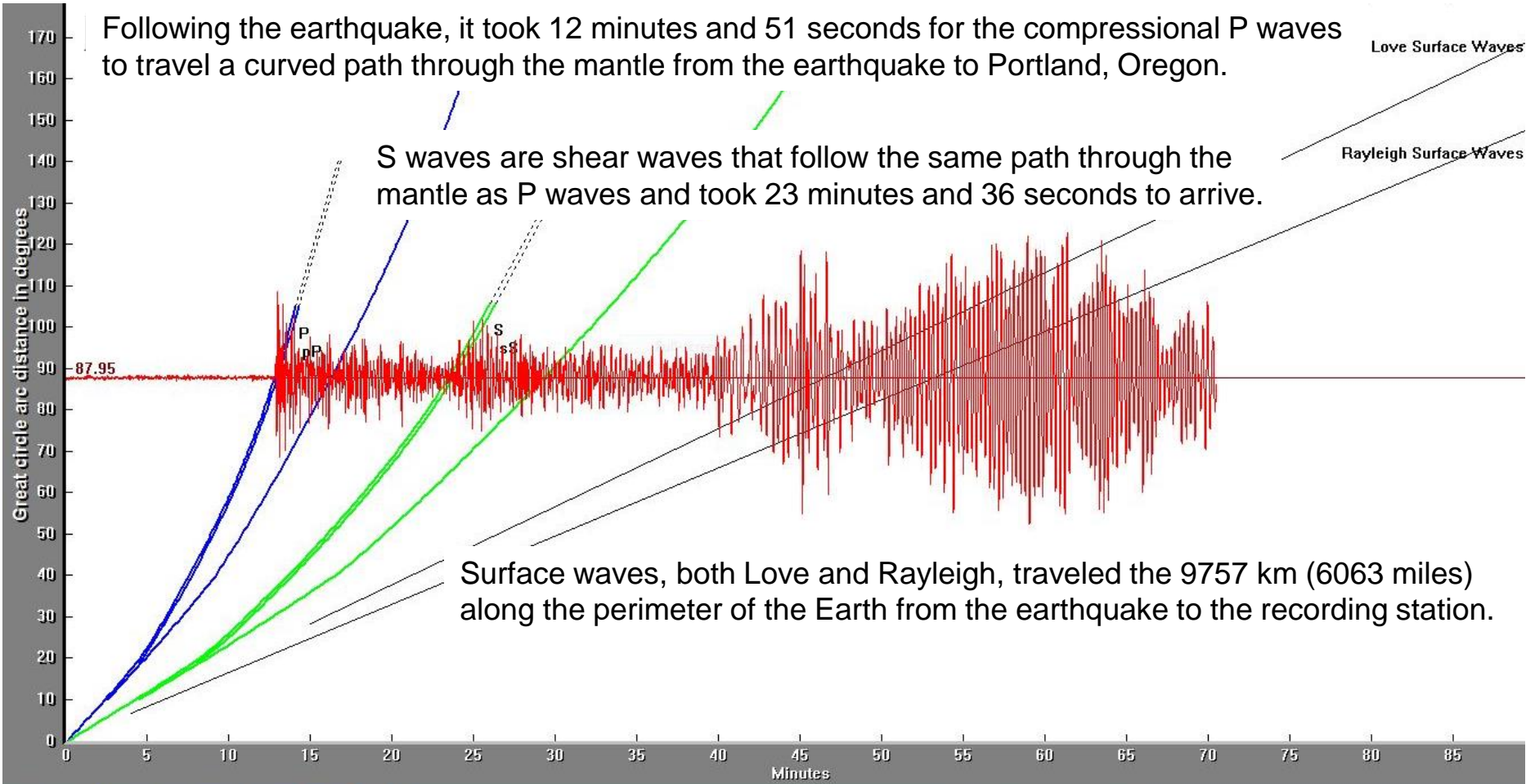
Regional Seismicity April 12-14, 2014

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The record of the M7.6 earthquake on the University of Portland seismometer (UPOR) is illustrated below. Portland is 9757 km (6063 miles,  $87.90^\circ$ ) from this earthquake.

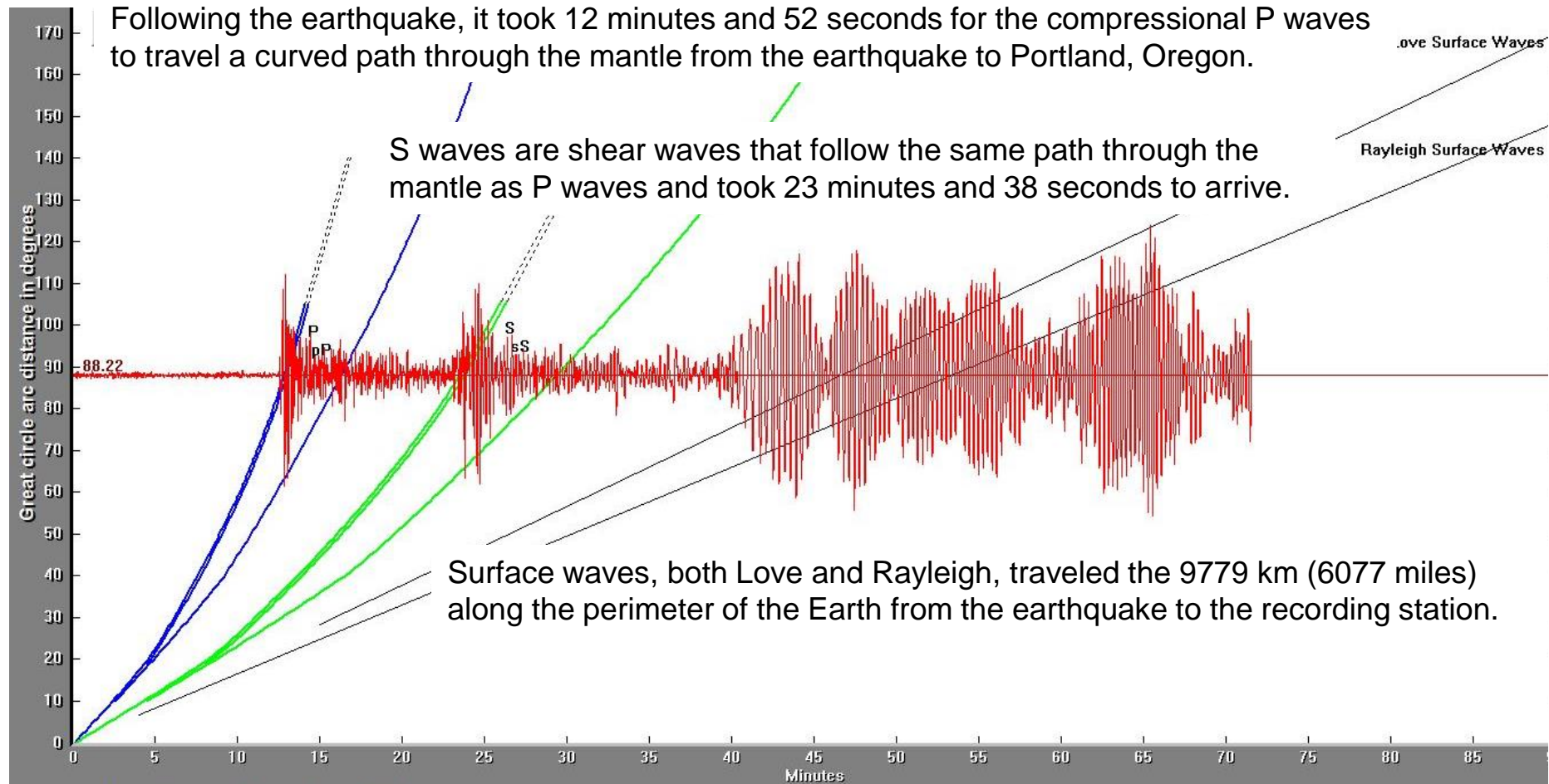


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The record of the M7.4 earthquake on the University of Portland seismometer (UPOR) is illustrated below. Portland is 9779 km (6077 miles,  $88.1^\circ$ ) from this earthquake.





**Teachable Moments are a service of**

IRIS Education & Public Outreach  
and  
The University of Portland

