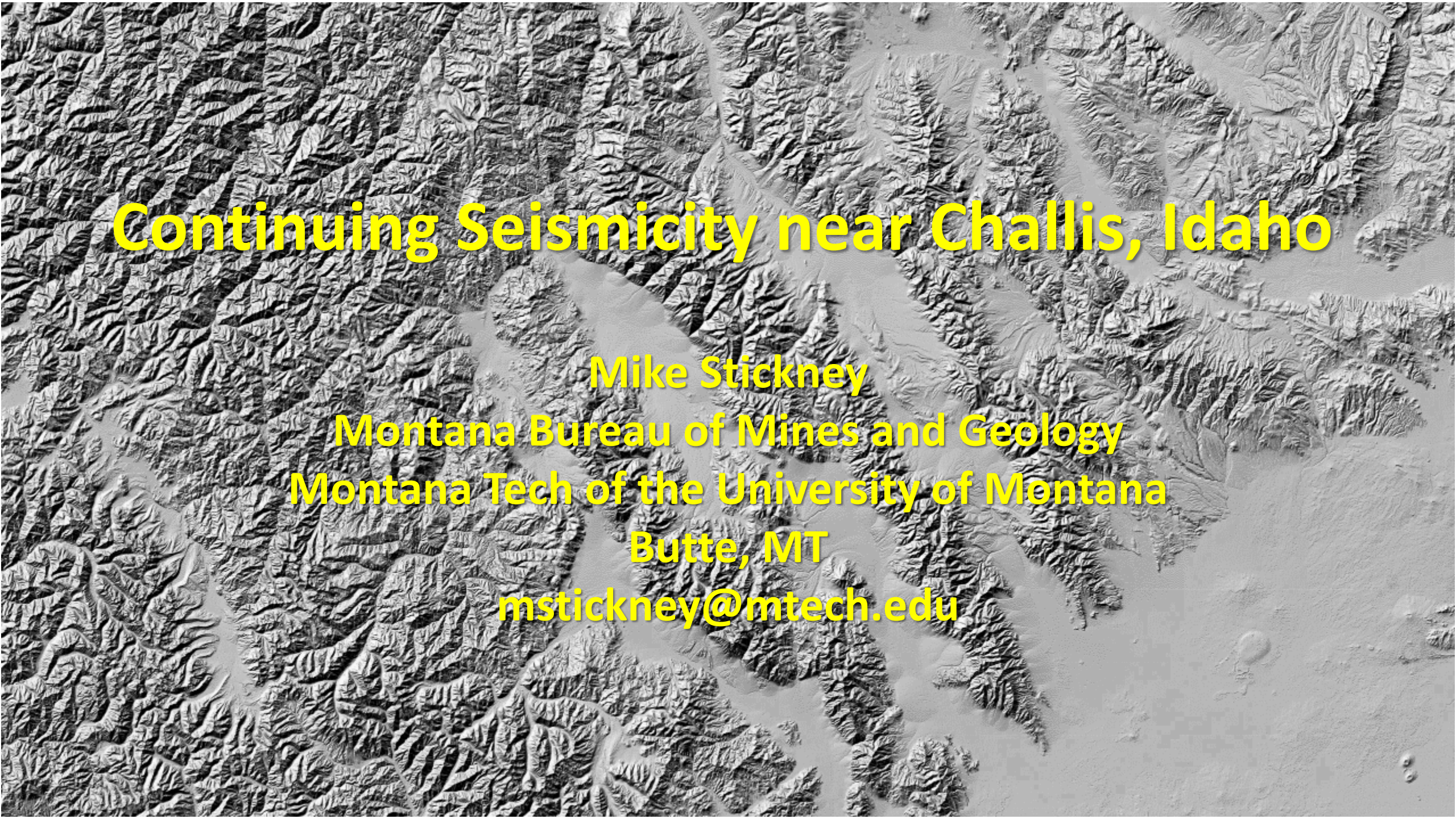
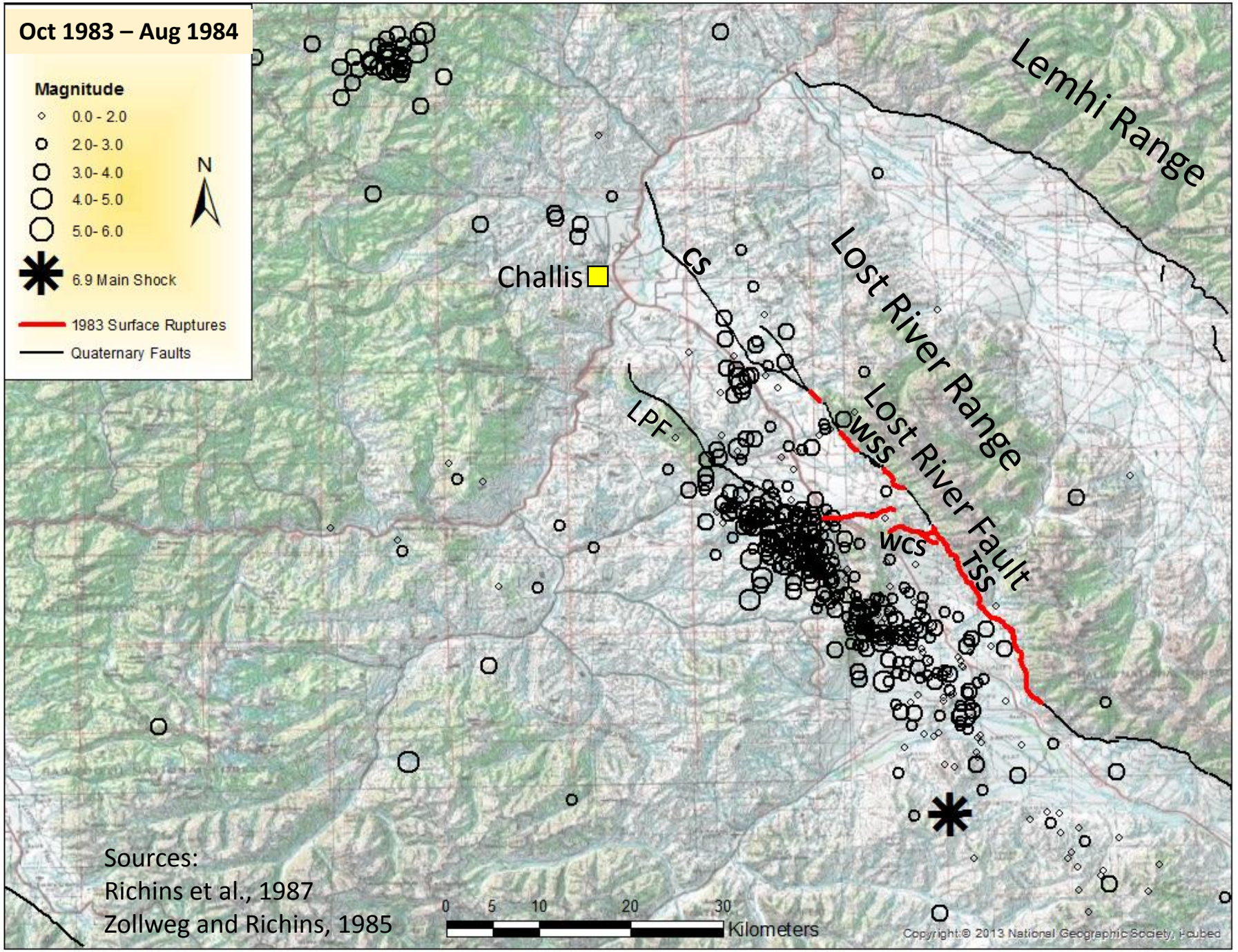


Continuing Seismicity near Challis, Idaho

Mike Stickney
Montana Bureau of Mines and Geology
Montana Tech of the University of Montana
Butte, MT
mstickney@mtech.edu


Oct 1983 – Aug 1984
Magnitude
0.0 - 2.0
2.0 - 3.0
3.0 - 4.0
4.0 - 5.0
5.0 - 6.0
6.9 Main Shock
1983 Surface Ruptures
Quaternary Faults
N
Challis
CS
LPF
WSS
WCS
TSS
Lost River Fault
Lost River Range
Lemhi Range
Sources:
Richins et al., 1987
Zollweg and Richins, 1985
0 5 10 20 30
Kilometers
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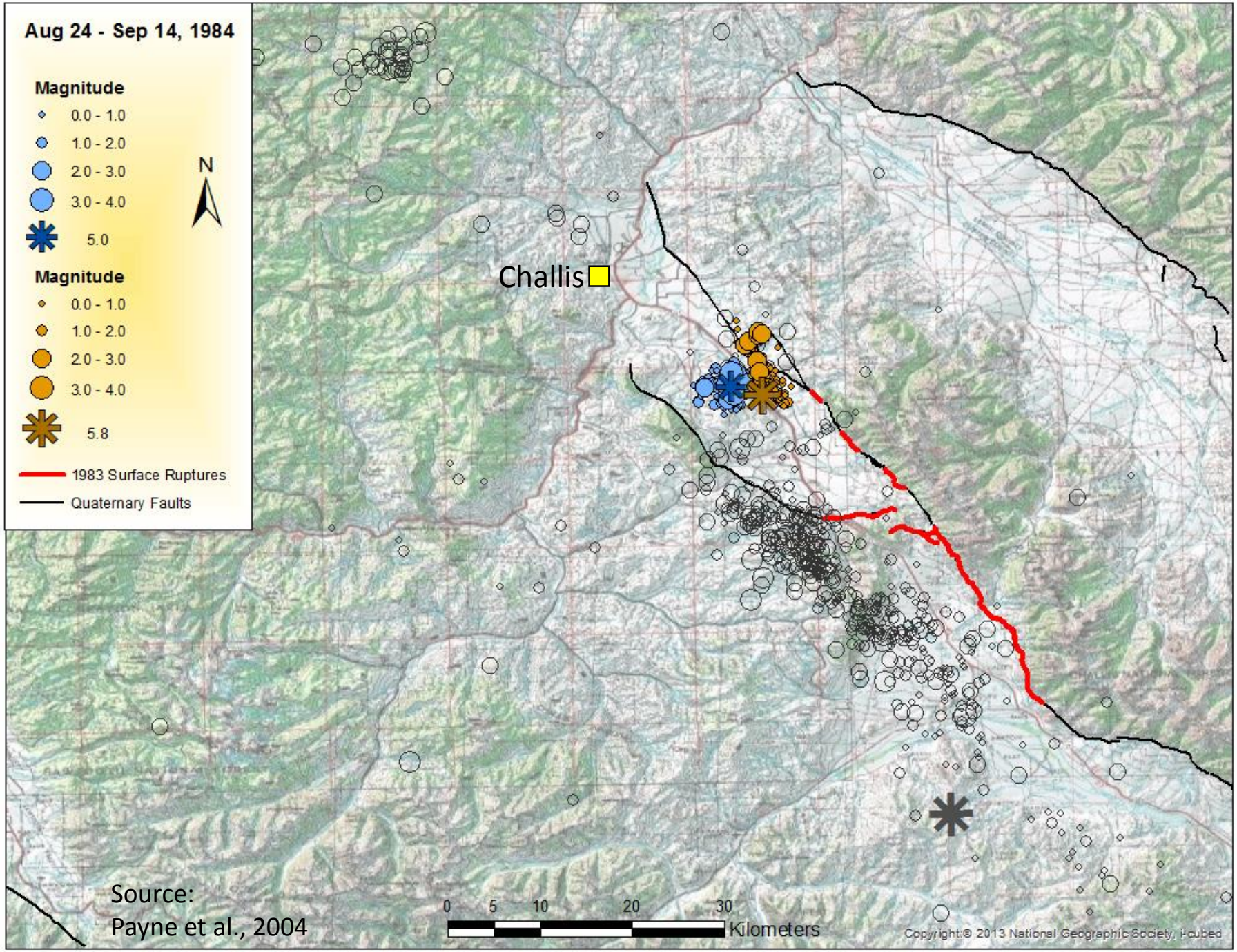
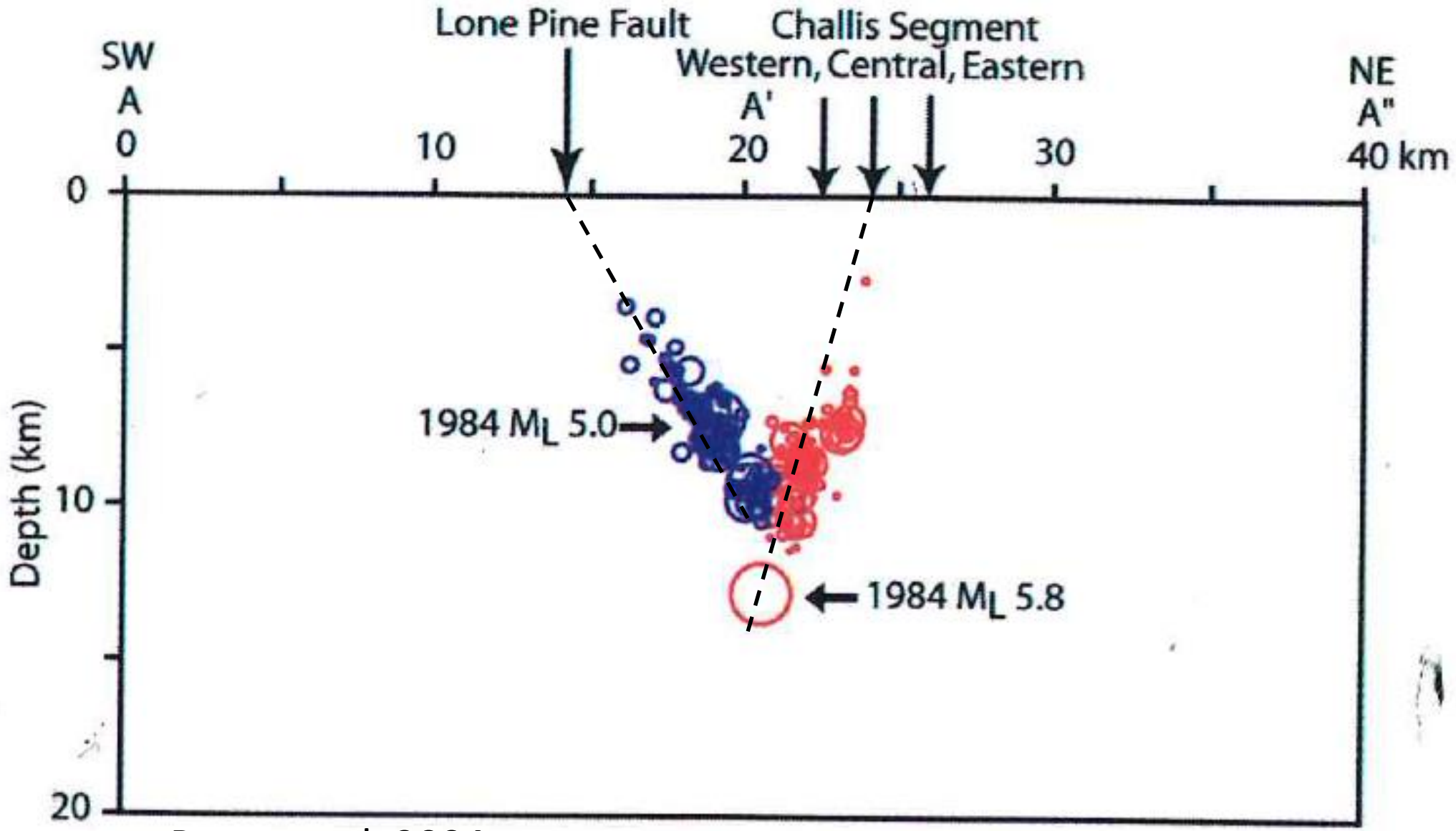
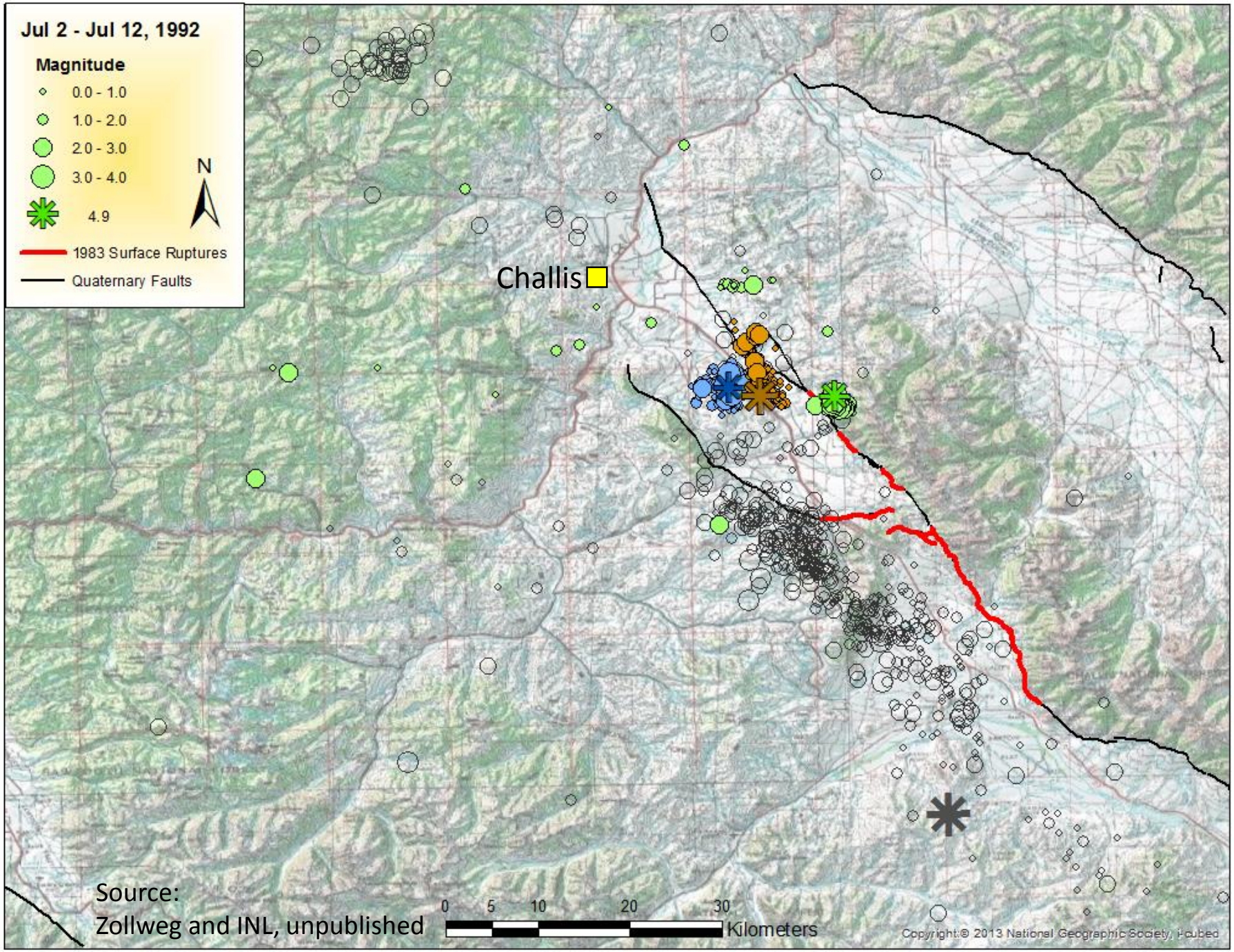
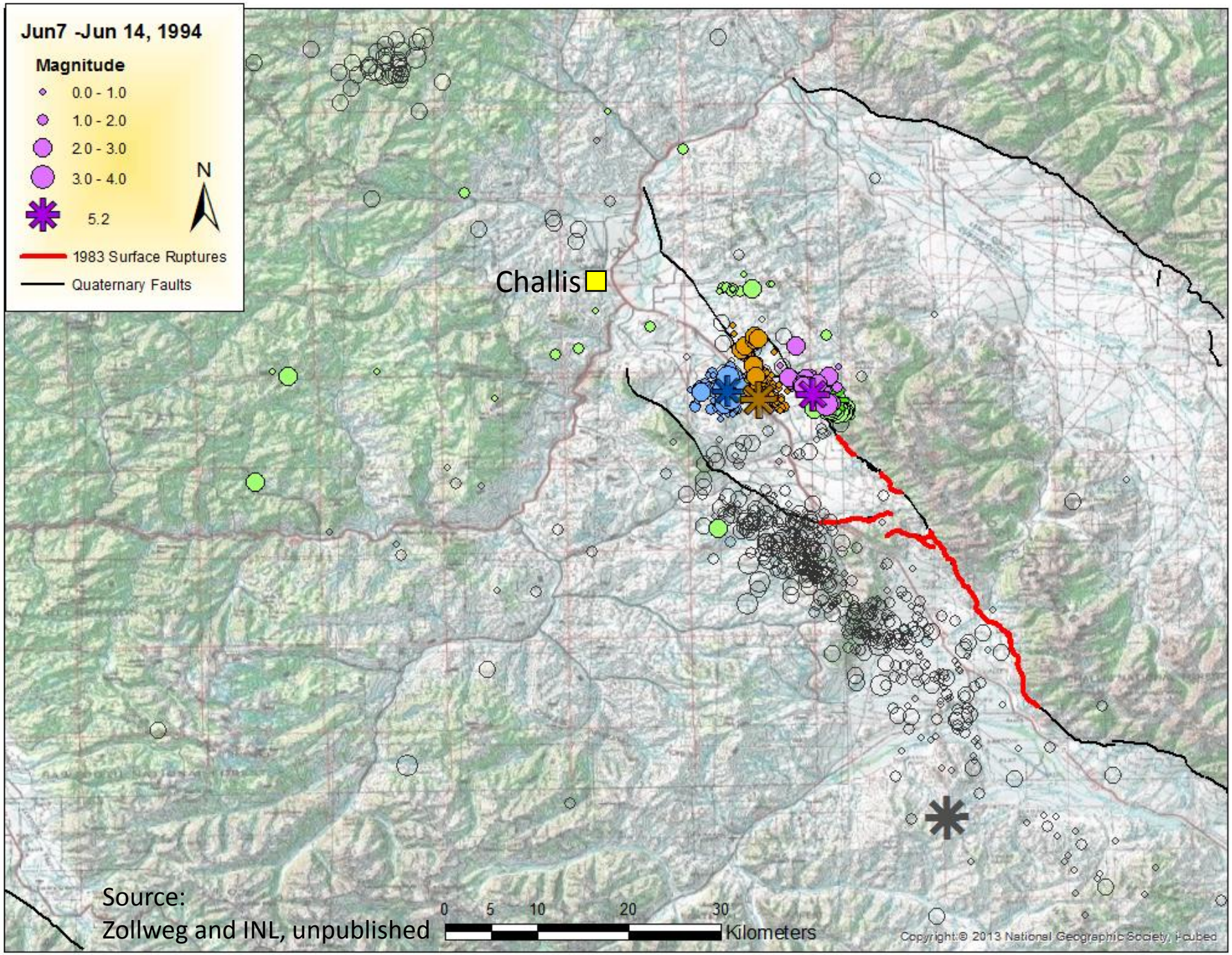


Source:
Payne et al., 2004



Payne et al. 2004


Jul 2 - Jul 12, 1992
Magnitude
0.0 - 1.0
1.0 - 2.0
2.0 - 3.0
3.0 - 4.0
4.9
N
1983 Surface Ruptures
Quaternary Faults
Challis
Source:
Zollweg and INL, unpublished
0 5 10 20 30
Kilometers
Copyright © 2013 National Geographic Society, i-cubed


Jun7 -Jun 14, 1994
Magnitude
0.0 - 1.0
1.0 - 2.0
2.0 - 3.0
3.0 - 4.0
5.2
N
1983 Surface Ruptures
Quaternary Faults
Challis
Source:
Zollweg and INL, unpublished
0 5 10 20 30
Kilometers
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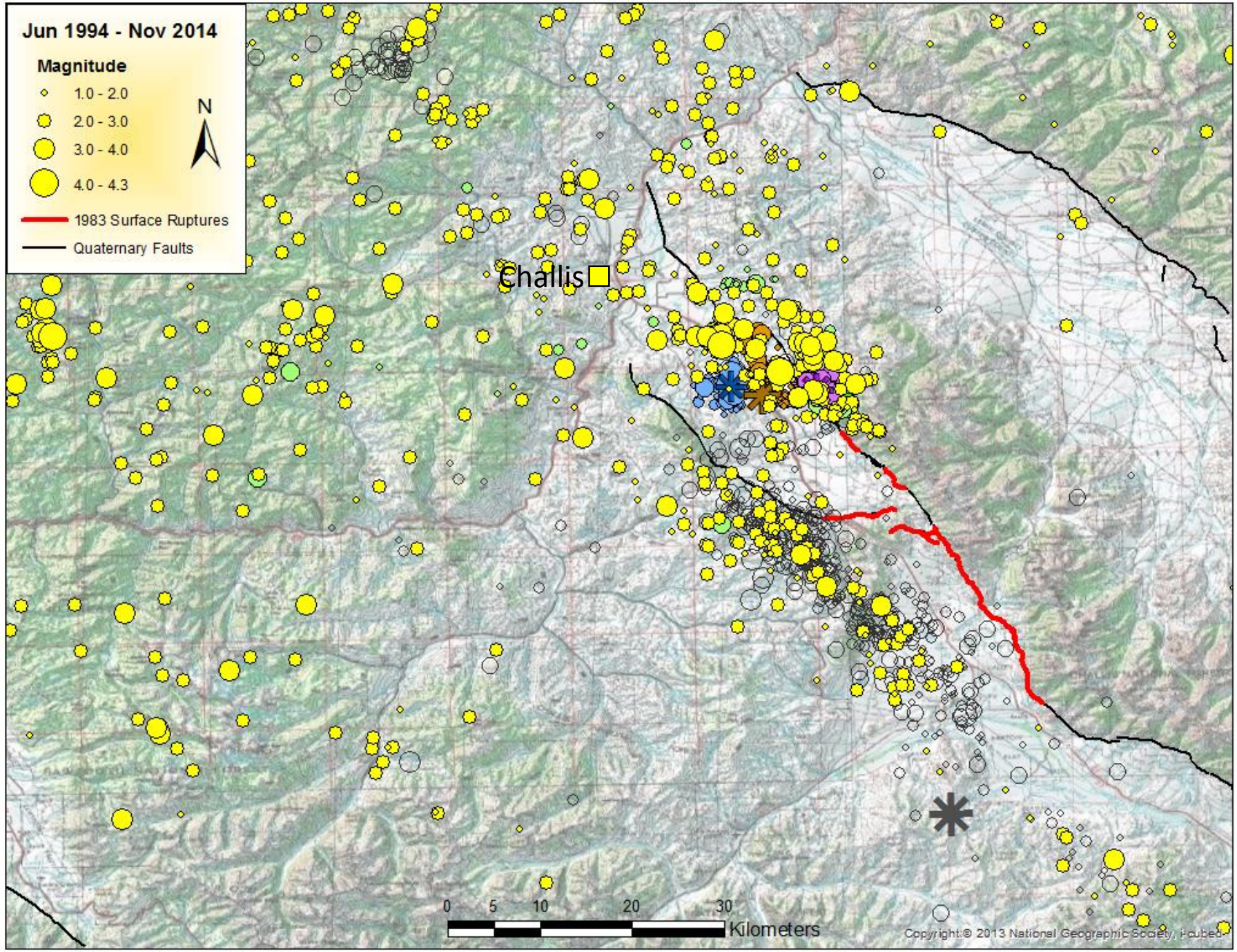
Jun 1994 - Nov 2014
Magnitude
1.0 - 2.0
2.0 - 3.0
3.0 - 4.0
4.0 - 4.3
1983 Surface Ruptures
Quaternary Faults
N
Challis
0 5 10 20 30
Kilometers
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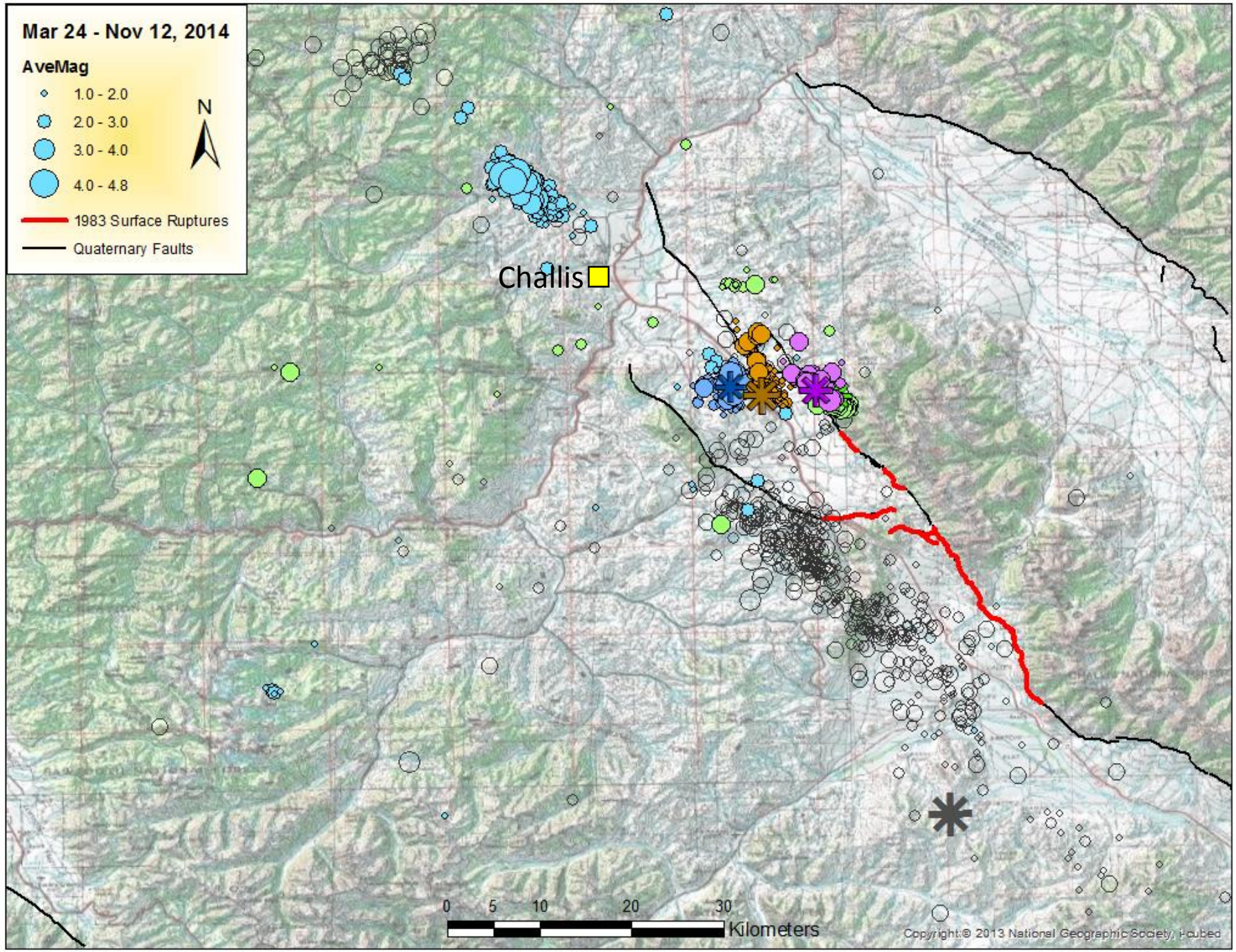
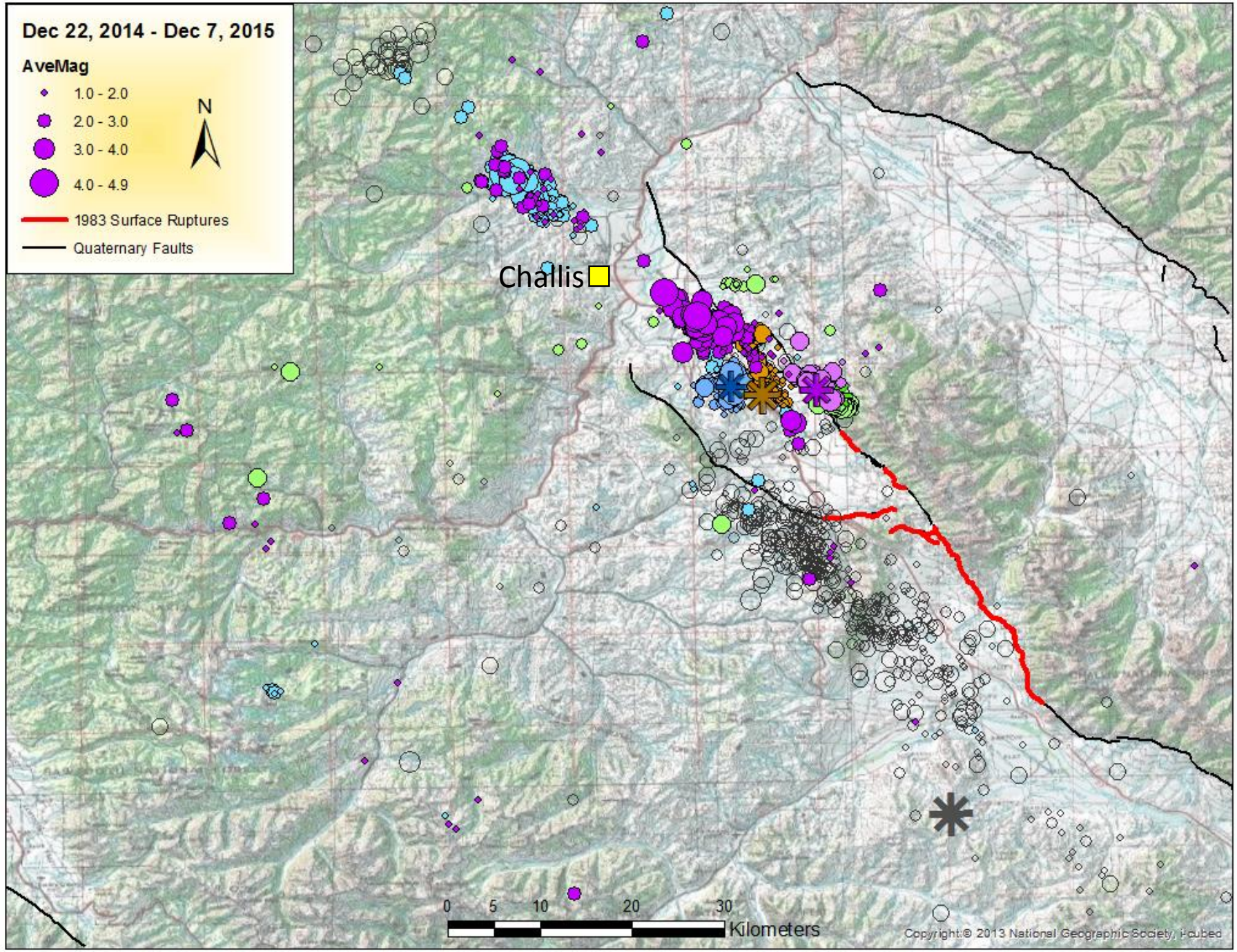
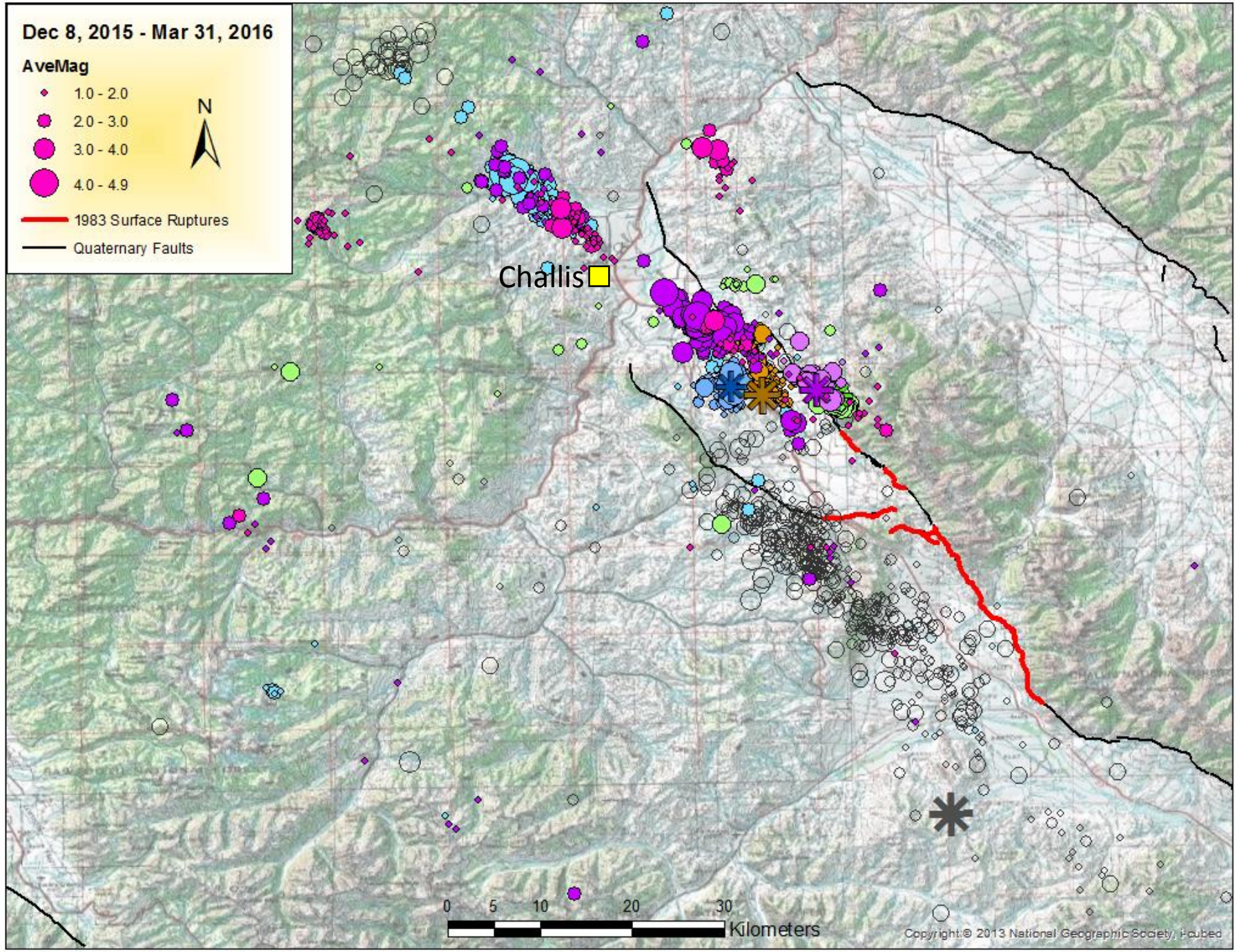
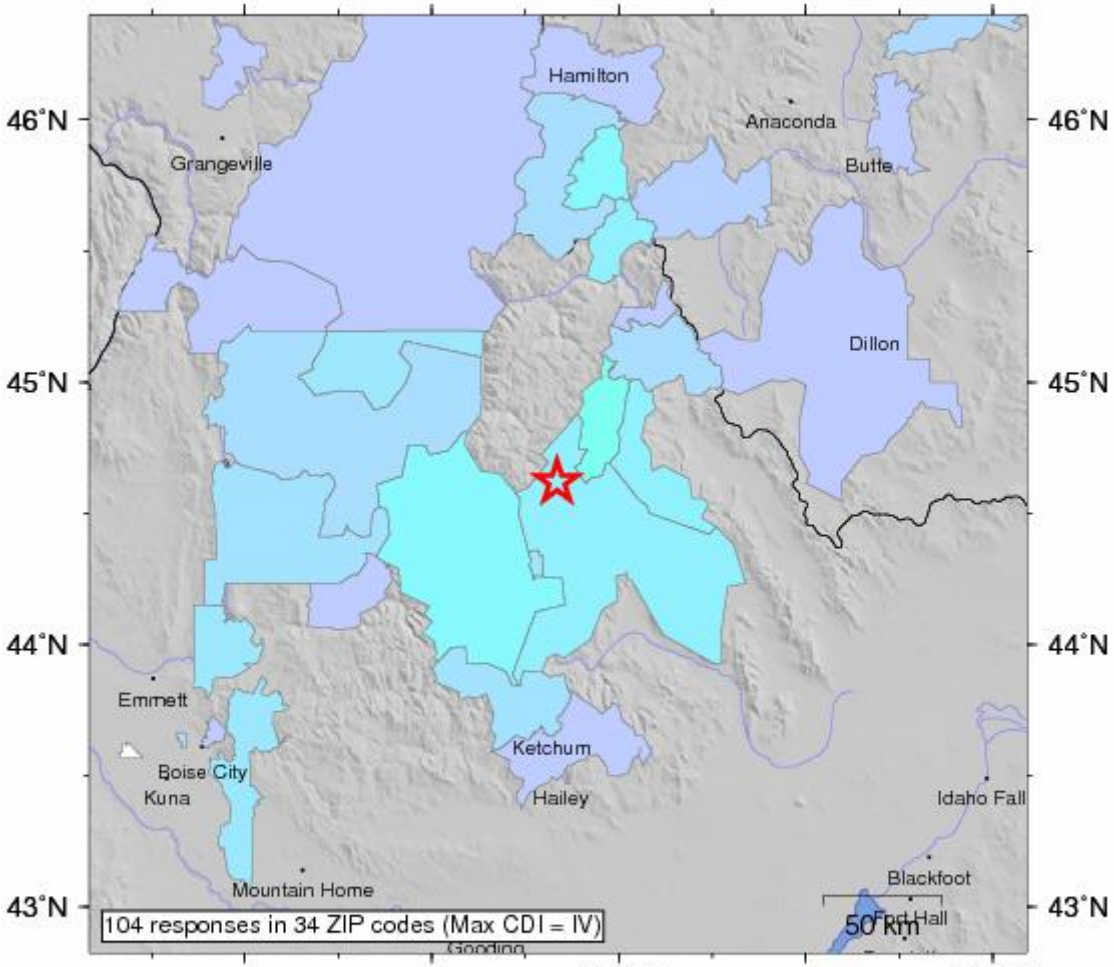

Mar 24 - Nov 12, 2014
AveMag
1.0 - 2.0
2.0 - 3.0
3.0 - 4.0
4.0 - 4.8
1983 Surface Ruptures
Quaternary Faults
N
Challis
0 5 10 20 30
Kilometers
Copyright © 2013 National Geographic Society, i-cubed


Dec 22, 2014 - Dec 7, 2015
AveMag
1.0 - 2.0
2.0 - 3.0
3.0 - 4.0
4.0 - 4.9
1983 Surface Ruptures
Quaternary Faults
N
Challis
0 5 10 20 30
Kilometers
Copyright © 2013 National Geographic Society, i-cubed


Dec 8, 2015 - Mar 31, 2016
AveMag
1.0 - 2.0
2.0 - 3.0
3.0 - 4.0
4.0 - 4.9
1983 Surface Ruptures
Quaternary Faults
N
Challis
0 5 10 20 30
Kilometers
Copyright © 2013 National Geographic Society, i-cubed

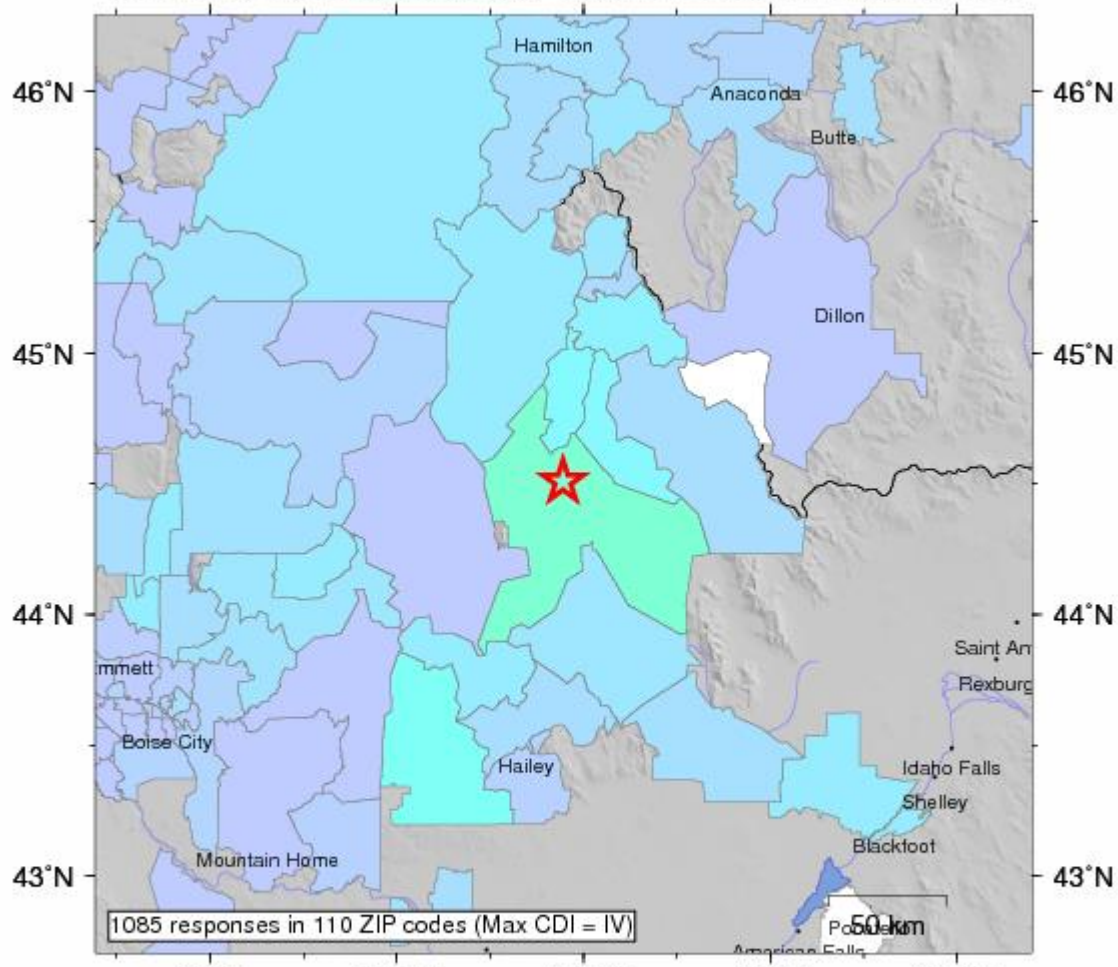
USGS Community Internet Intensity Map
SOUTHERN IDAHO
Apr 12 2014 06:04:39 PM local 44.62N 114.33W M4.8 Depth: 3 km ID:usc000pi6d



INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+
SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy

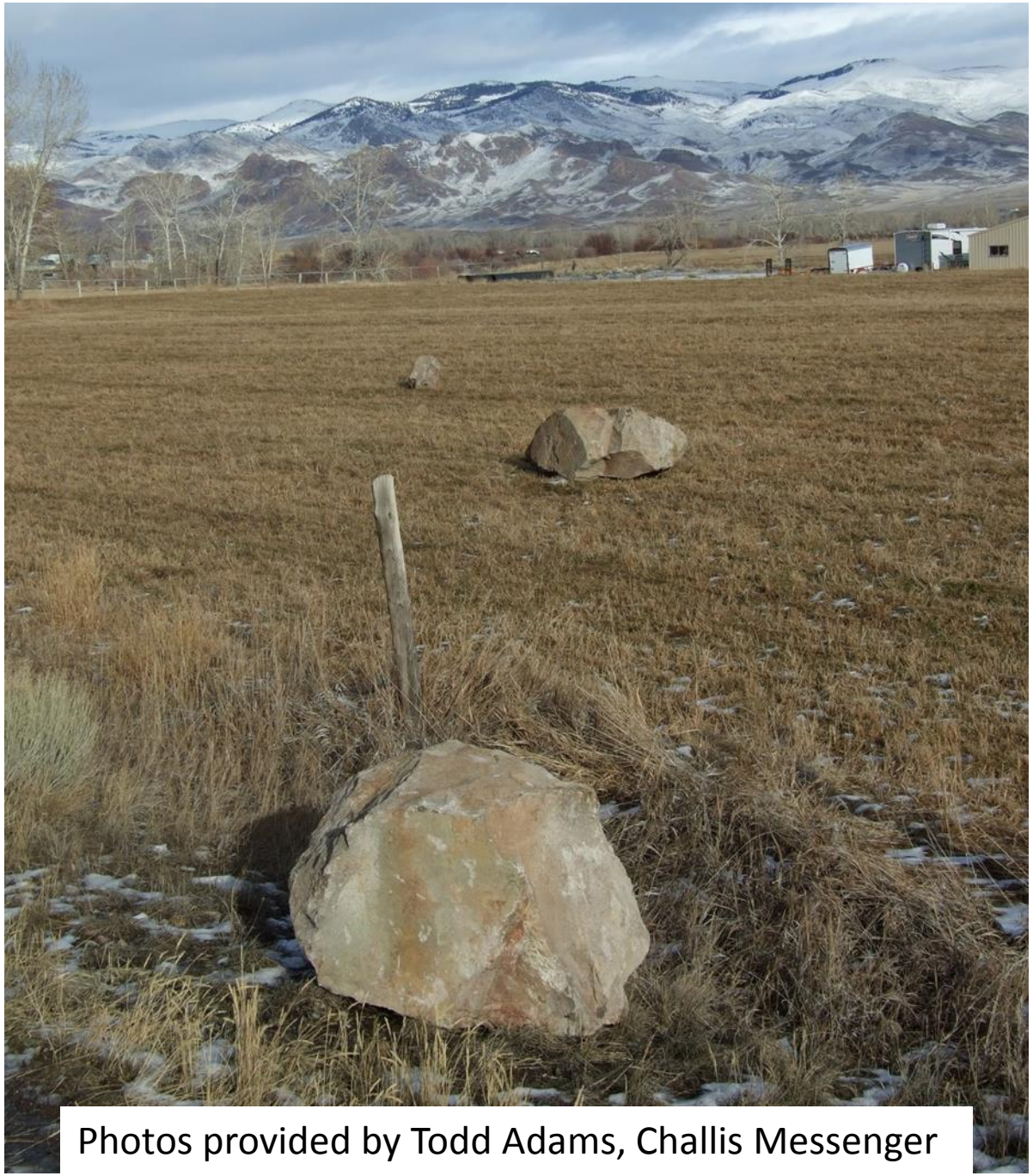
Processed: Wed Jan 28 18:06:28 2015

USGS Community Internet Intensity Map
SOUTHERN IDAHO
Jan 3 2015 10:44:03 AM local 44.5074N 114.112W M5.0 Depth: 8 km ID:usc000tbfq

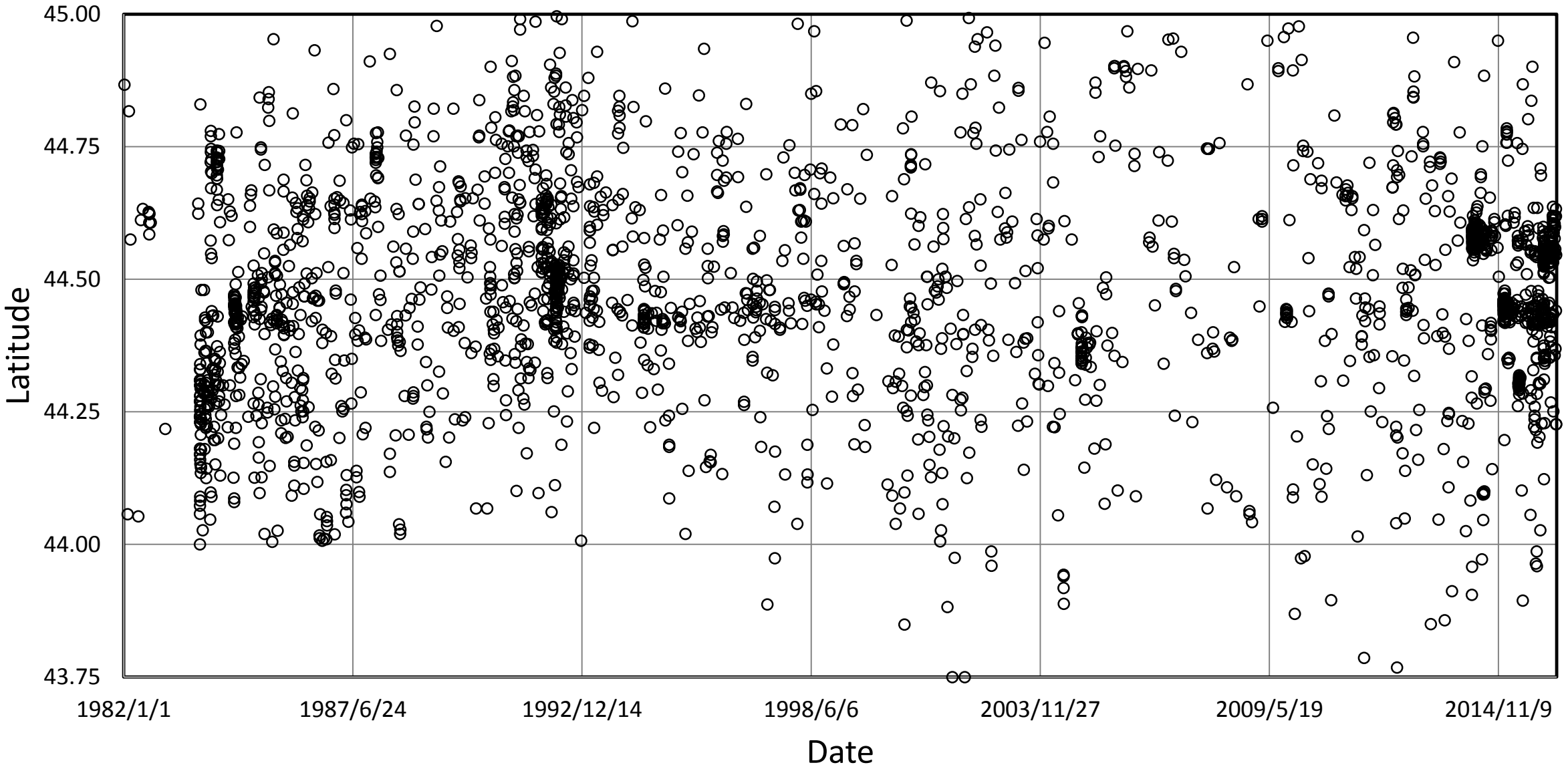


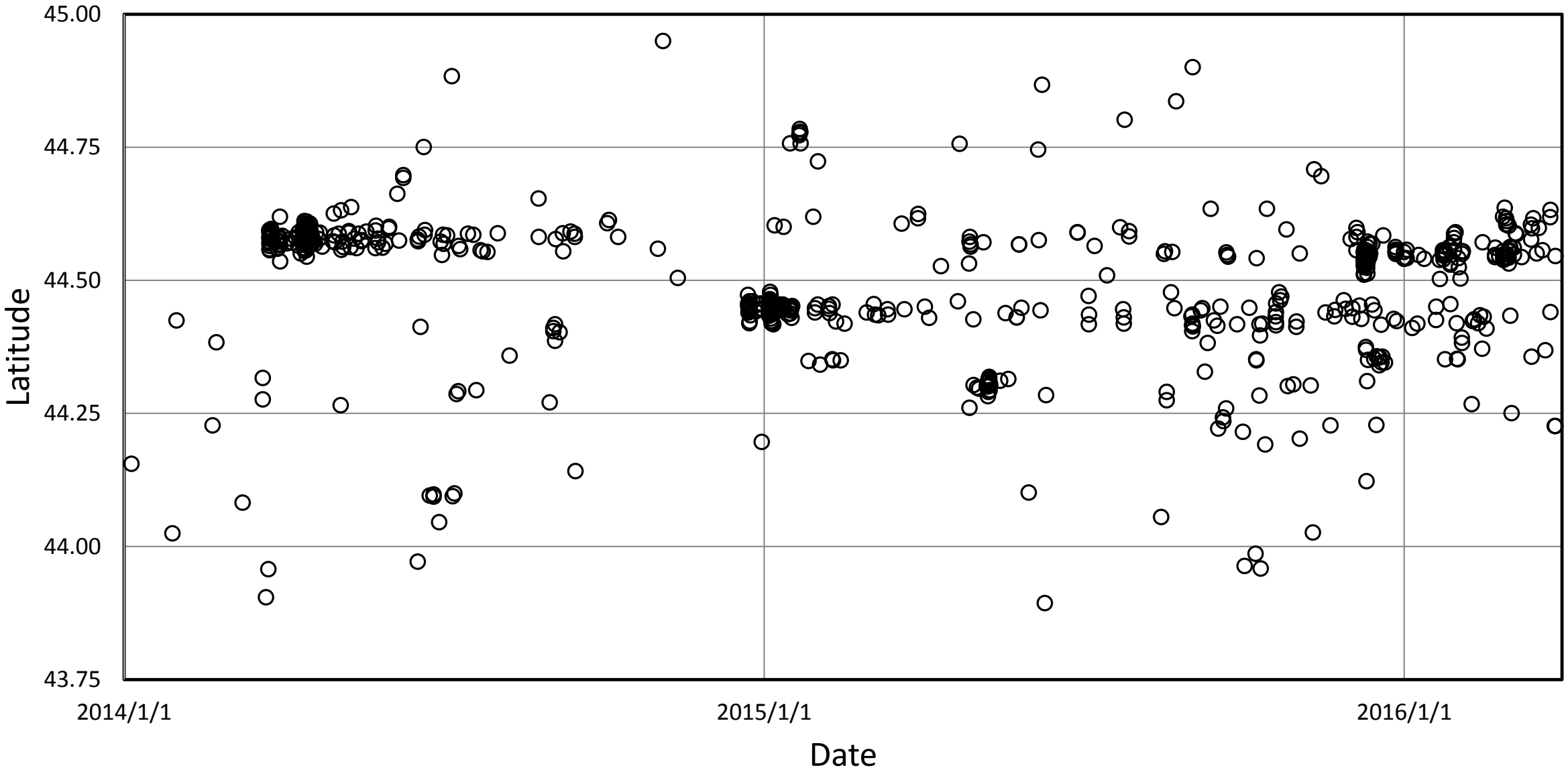
INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+
SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy

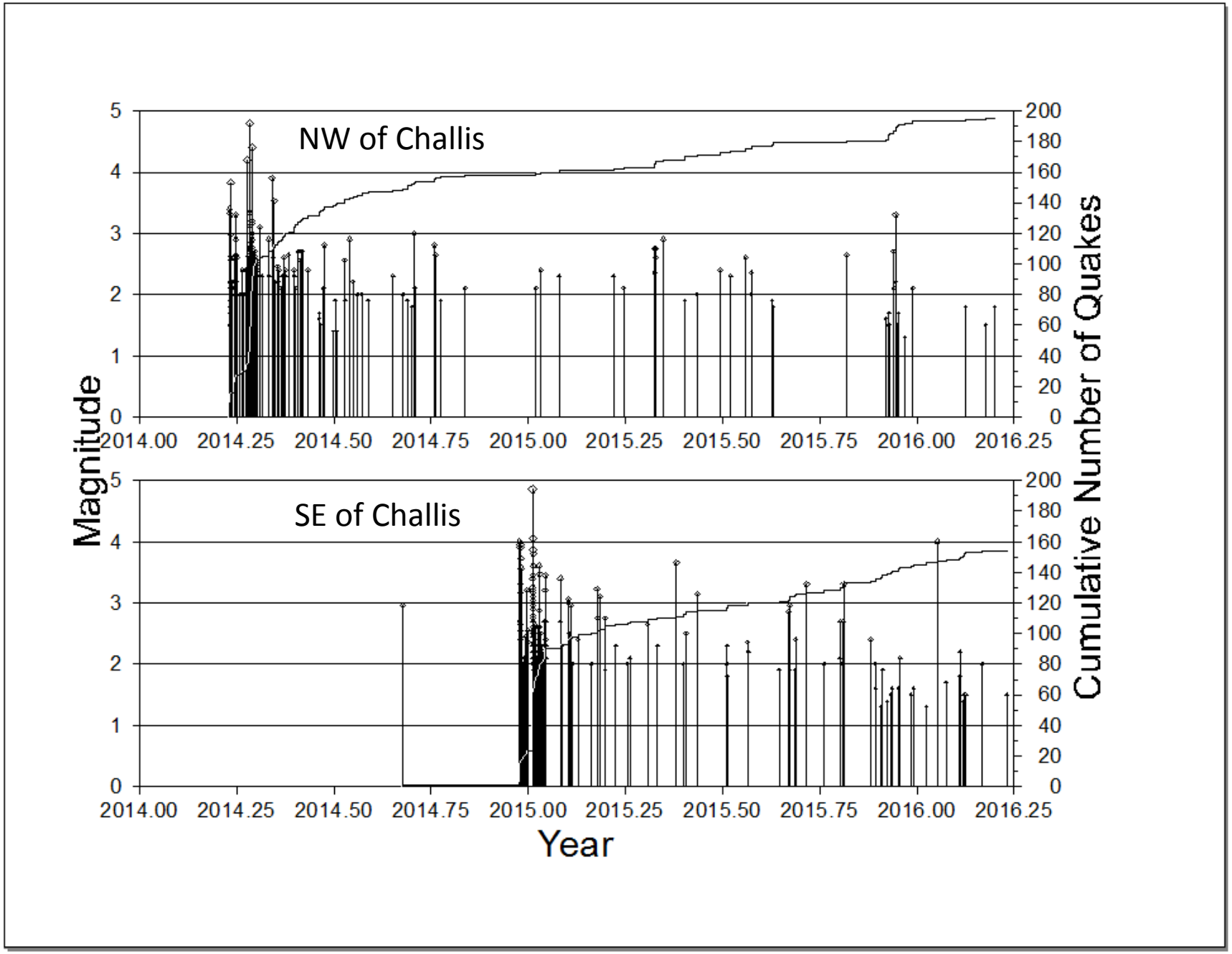
Processed: Sat Oct 24 20:18:39 2015



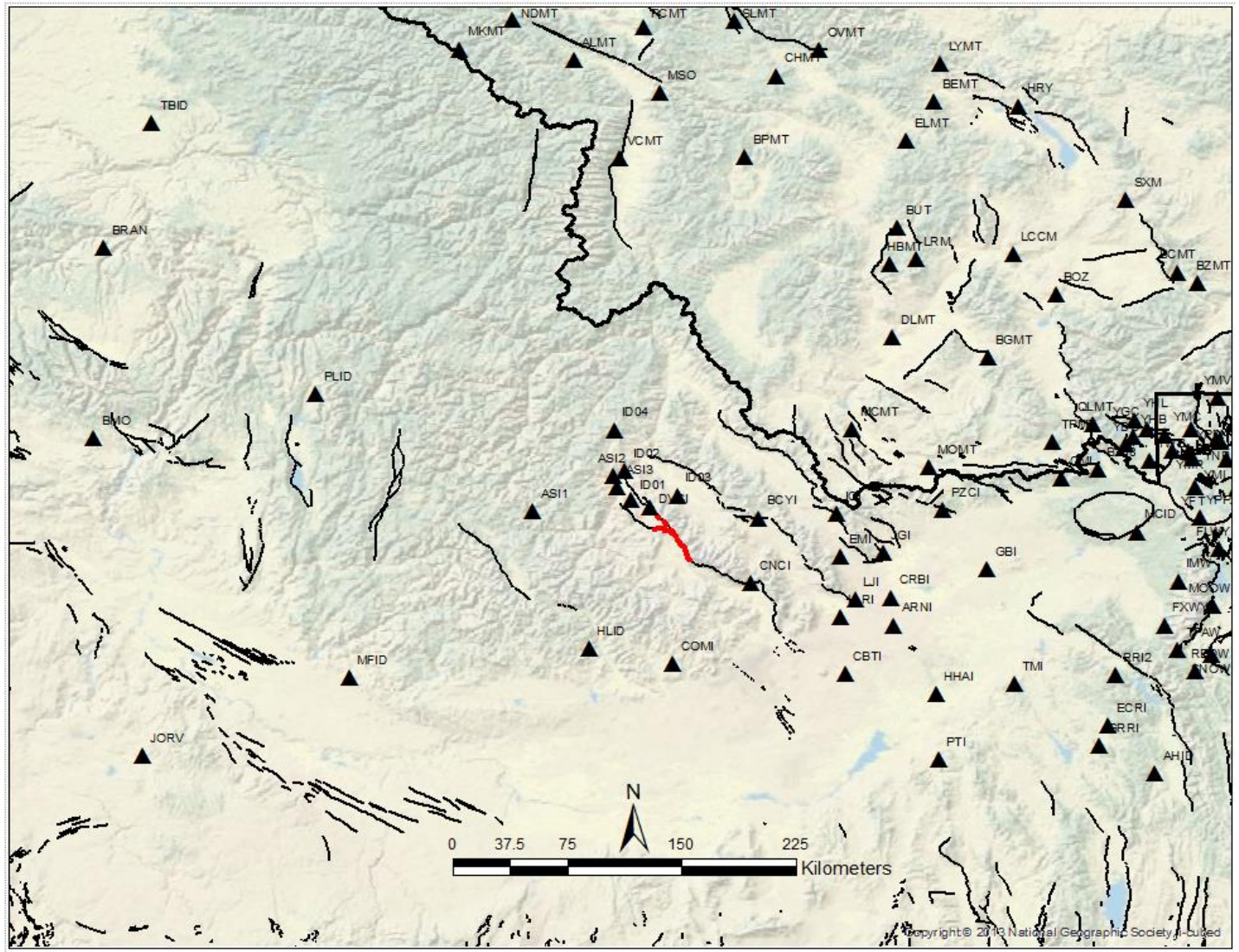
Photos provided by Todd Adams, Challis Messenger


Challis area Earthquakes versus Latitude 1982-March 2016
45.00
44.75
44.50
44.25
44.00
43.75
Latitude
1982/1/1
1987/6/24
1992/12/14
1998/6/6
2003/11/27
2009/5/19
2014/11/9
Date

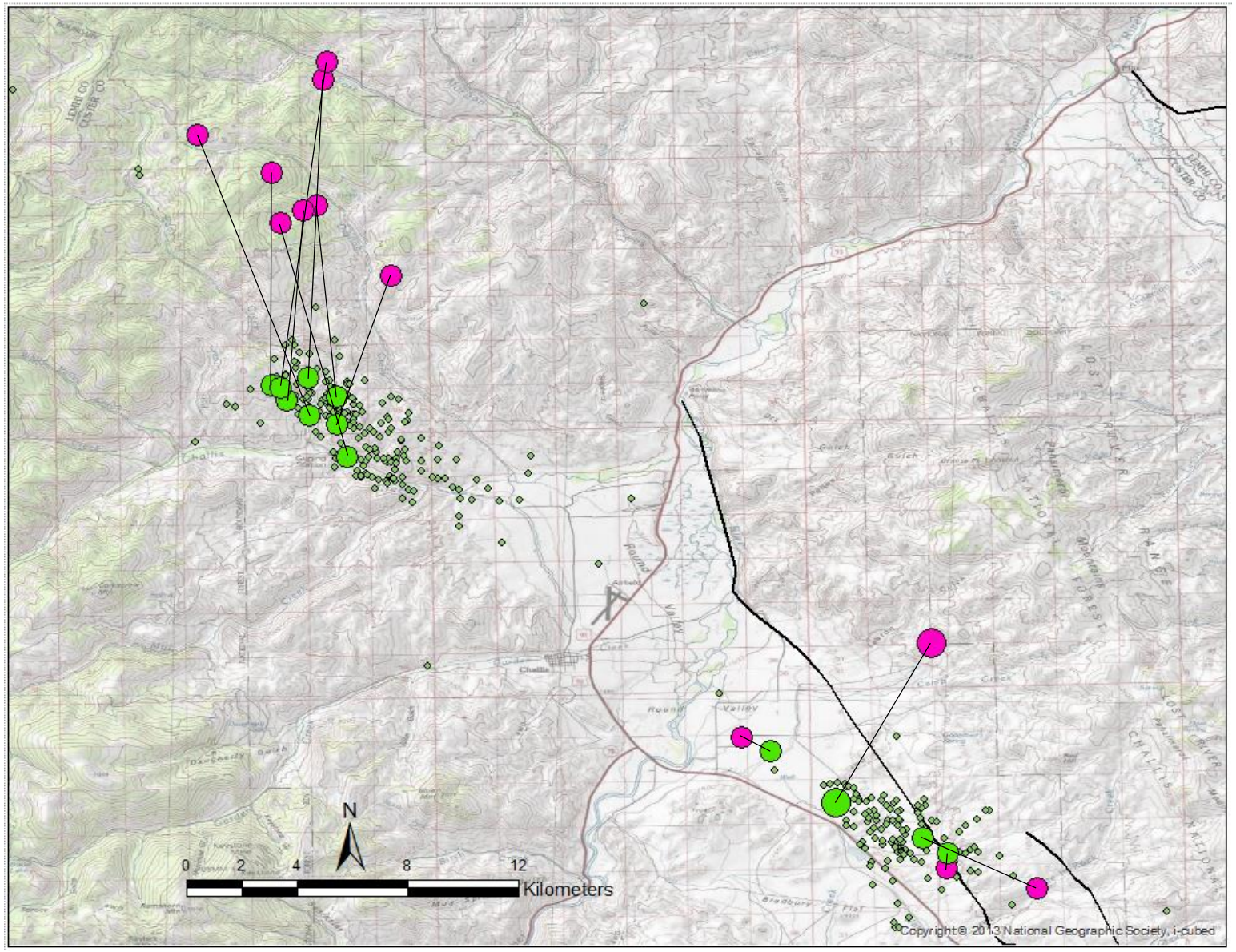

Challis area Earthquakes versus Latitude January 2014-March 2016
45.00
44.75
44.50
44.25
44.00
43.75
Latitude
2014/1/1
2015/1/1
2016/1/1
Date

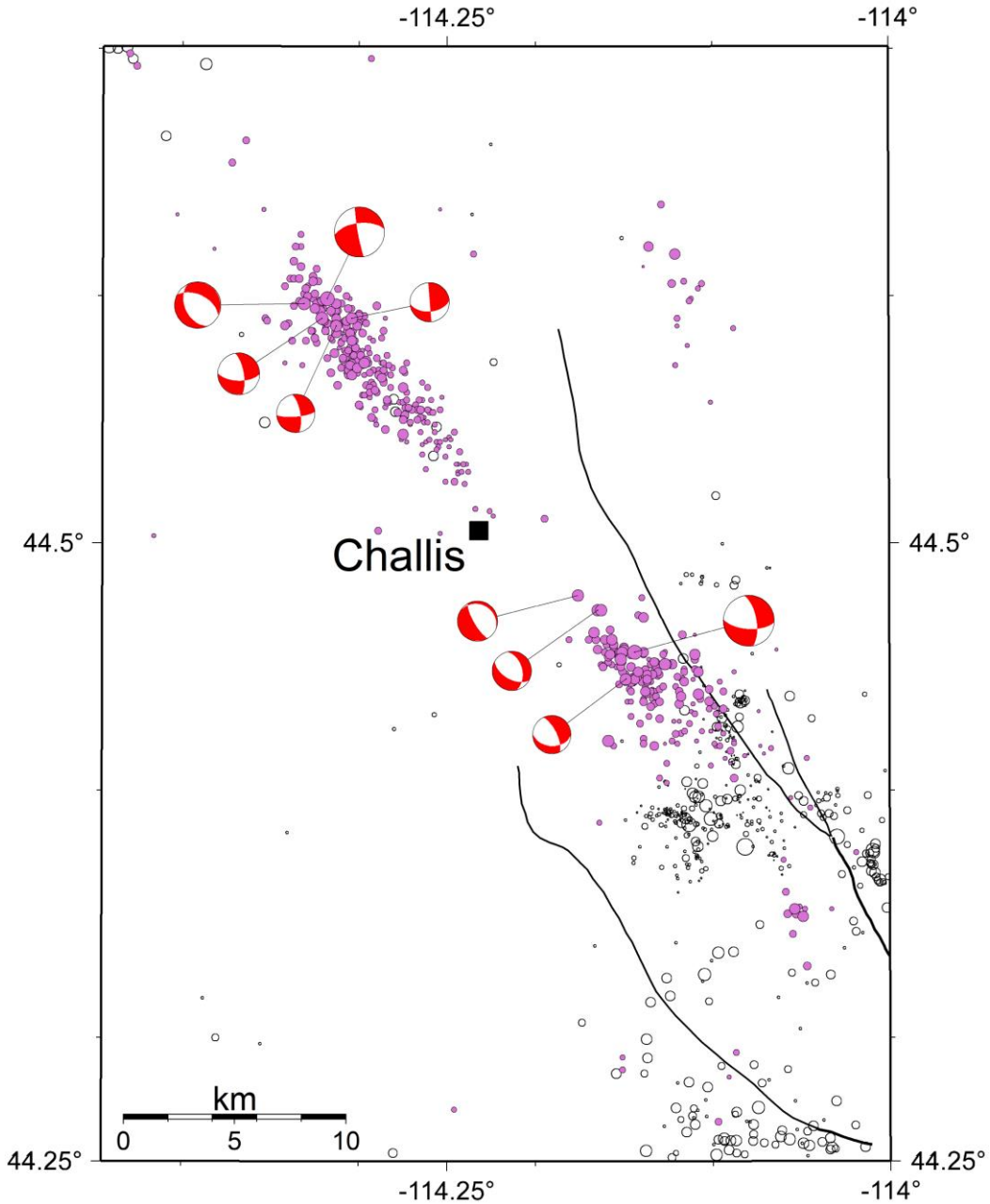

NW of Challis
SE of Challis
Magnitude
Cumulative Number of Quakes
Year
0
1
2
3
4
5
0
20
40
60
80
100
120
140
160
180
200
2014.00
2014.25
2014.50
2014.75
2015.00
2015.25
2015.50
2015.75
2016.00
2016.25

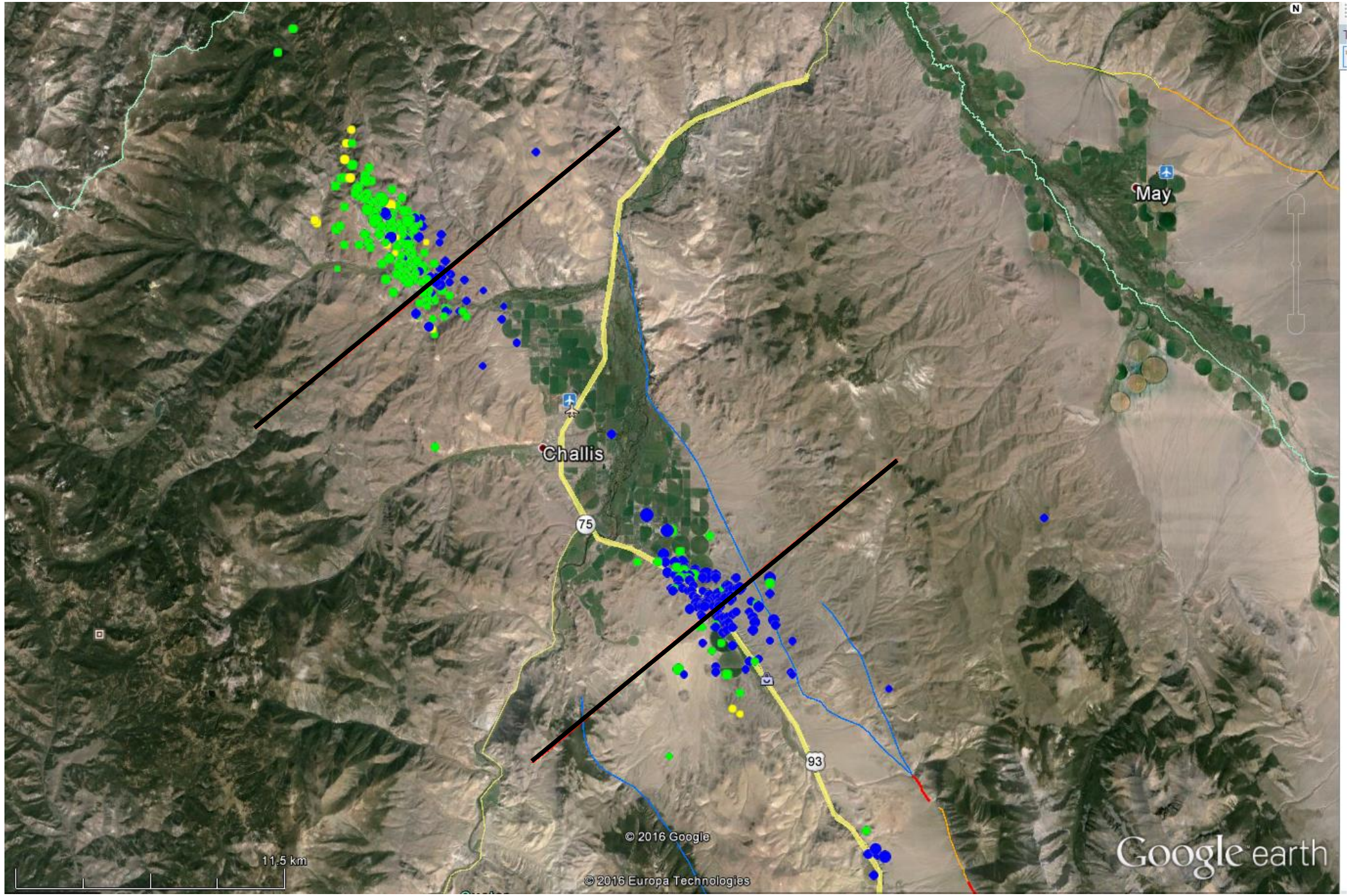
Seismograph Stations

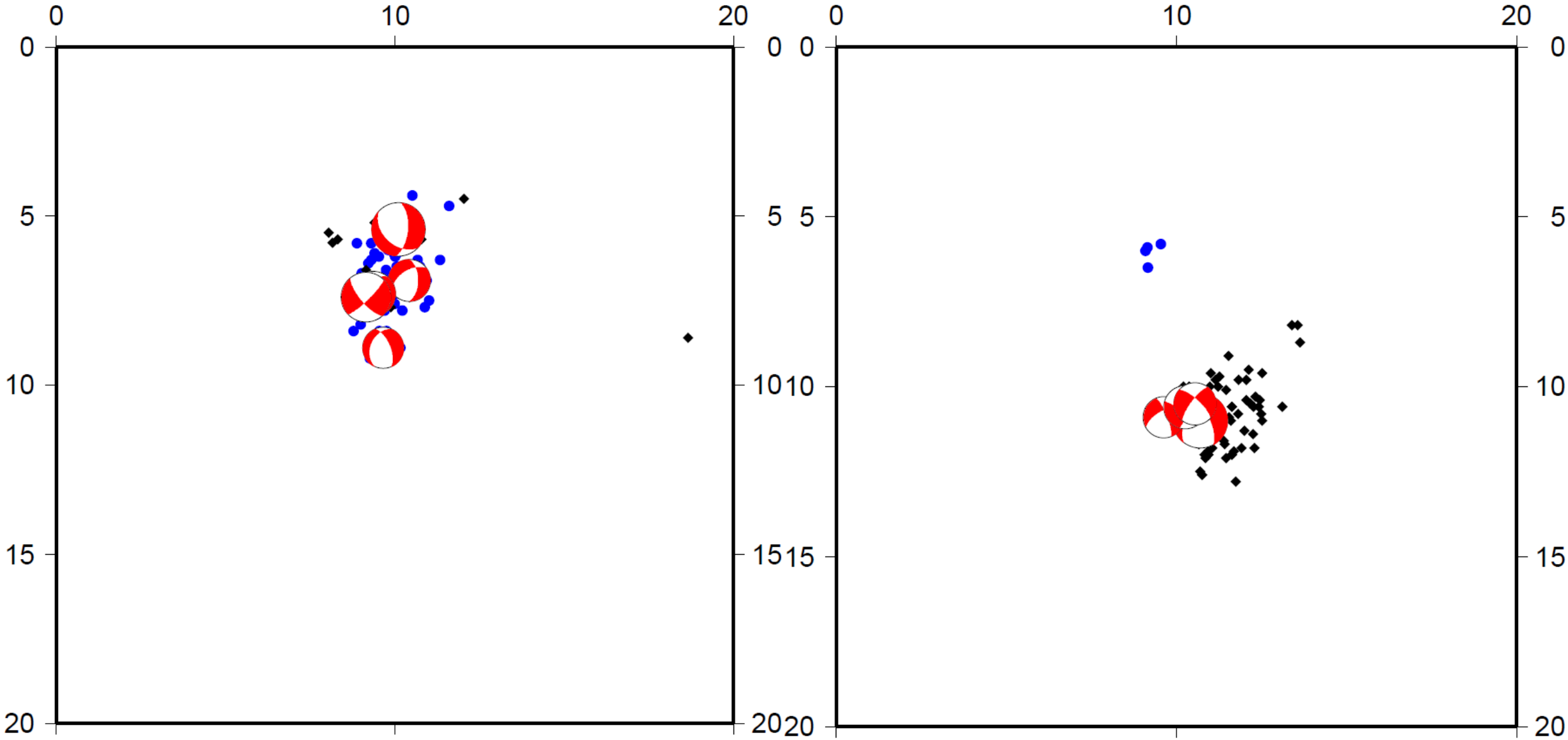


NEIC vs MBMG Earthquake Locations




-114.25°
-114°
44.5°
Challis
44.5°
km
0
5
10
44.25°
44.25°
-114.25°
-114°

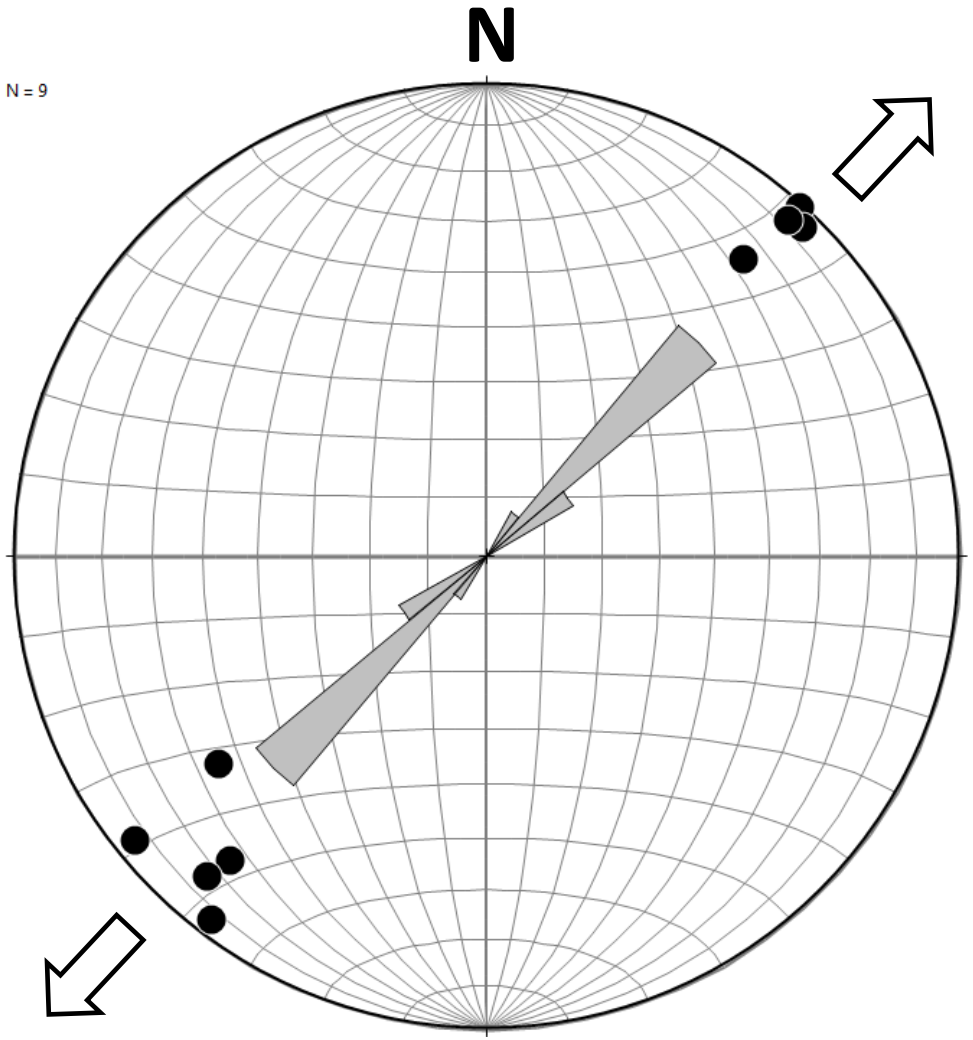

May
Challis
75
93
© 2016 Google
© 2016 Europa Technologies
11.5 km
Google earth



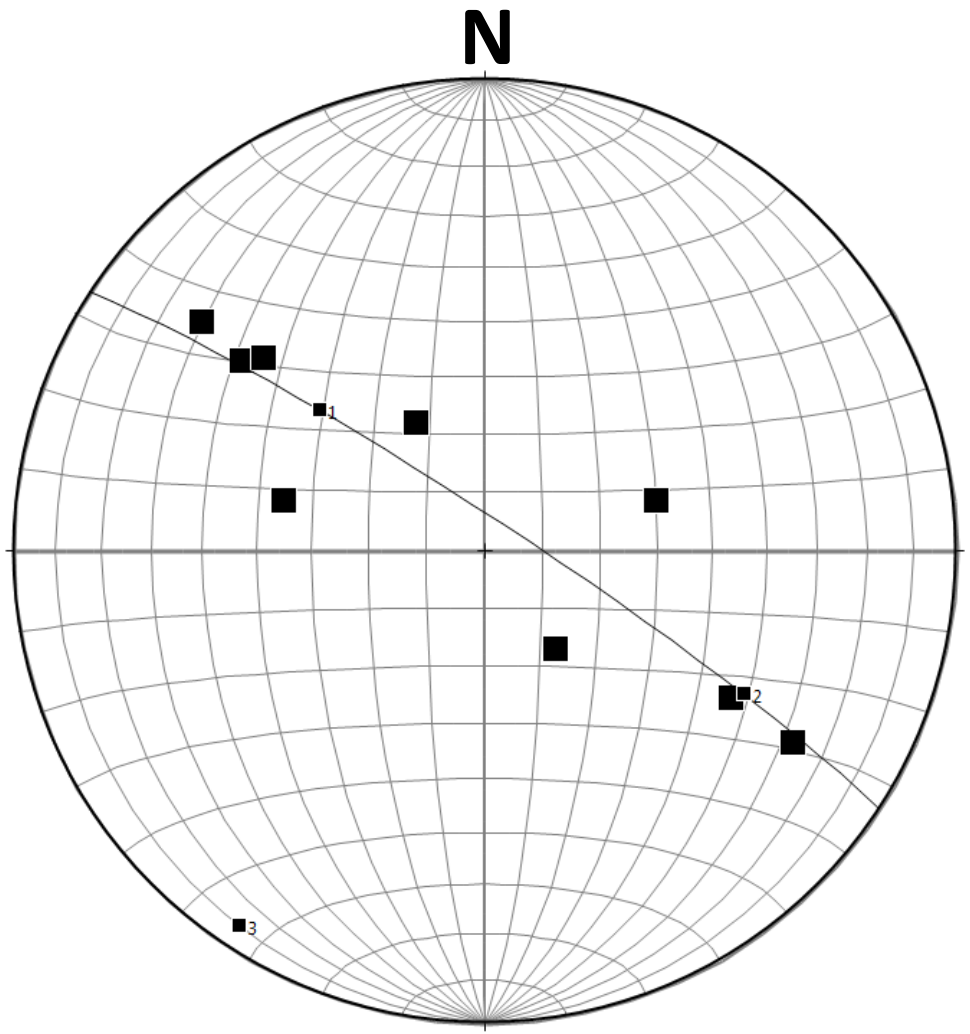
Hypocenters with calculated horizontal and vertical uncertainties ≤ 0.7 km

Stress axes from moment tensors

T axes



P axes



Conclusions

- Recent activity fits a pattern of continuing seismicity propagating NW from the 1983 Borah Peak earthquake.
- The causative faults are not obvious from the hypocenter distribution but more than one fault must be involved.
- NE-SW oriented extension is driving recent seismicity.
- Complex seismicity pattern may reflect behavior near the end of a Basin and Range fault.
- Central Idaho needs improved seismic monitoring infrastructure.

Acknowledgements

Kris Pankow and Dave Drobeck,
University of Utah Seismograph Stations
Suzette Payne, Idaho National Labs
Todd Adams, Challis Messenger