

Likely Future Rates of Seismicity in Christchurch

Presentation to the Canterbury Earthquakes Royal
Commission

October 2011



Photo: P Stalder

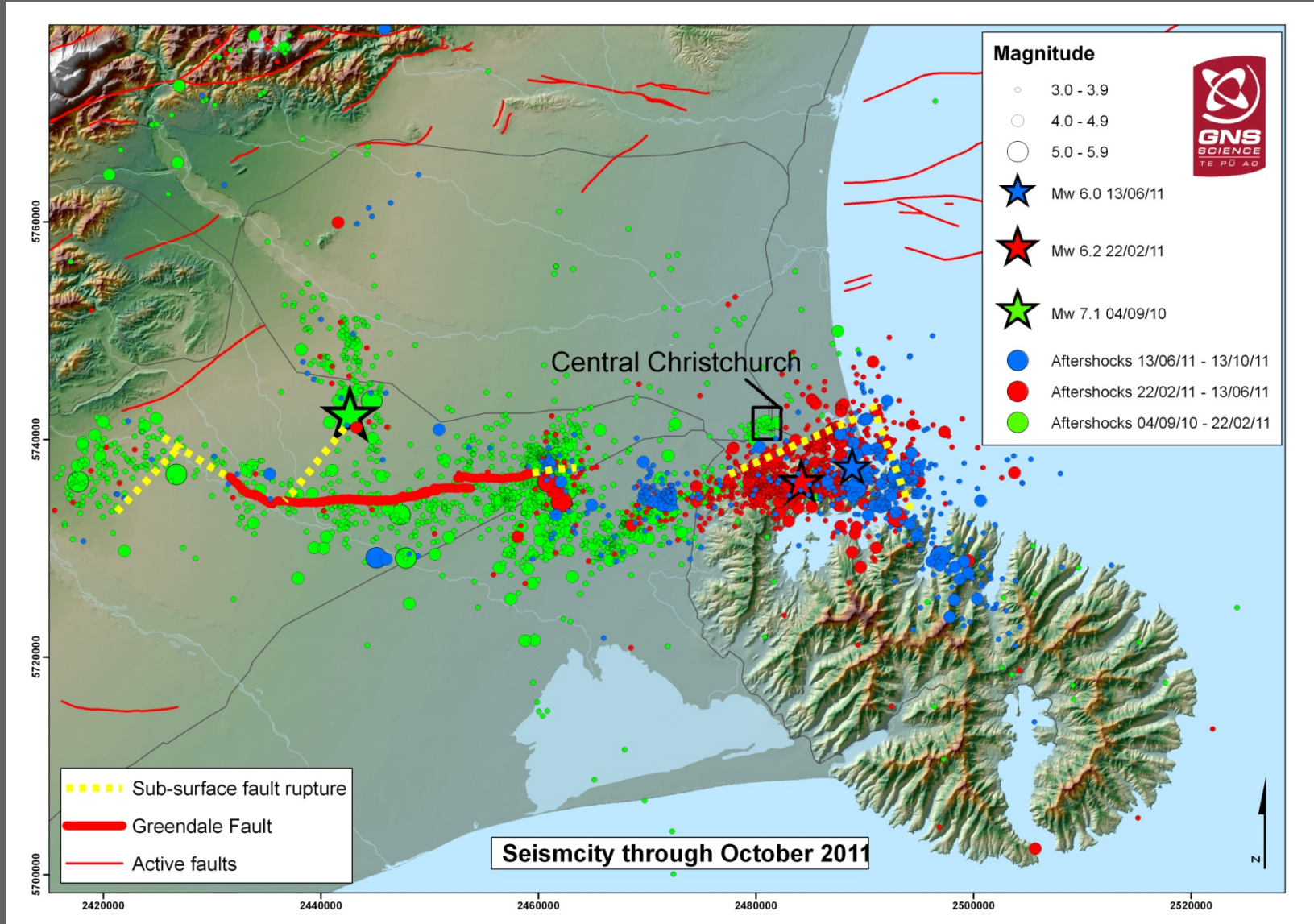
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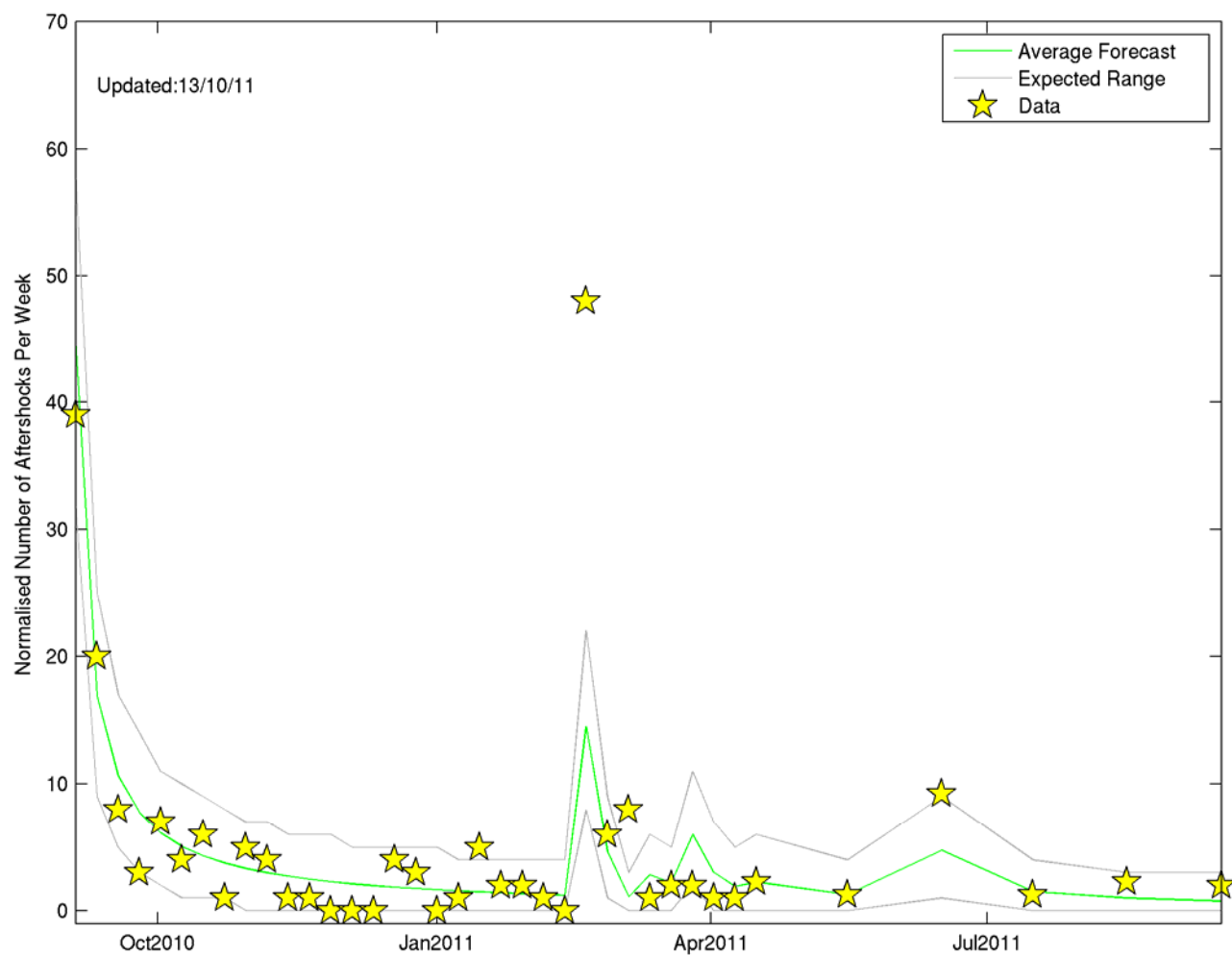
Programme

1. ~~The Canterbury earthquake sequence~~
2. ~~Active faults and historical earthquakes in the Canterbury region~~
3. Likely future rates of seismicity in Christchurch
4. Implications for building design motions
5. National implications and conclusions
6. Questions and panel discussion

Seismicity September 2010 – October 2011



Aftershock Decay Rate

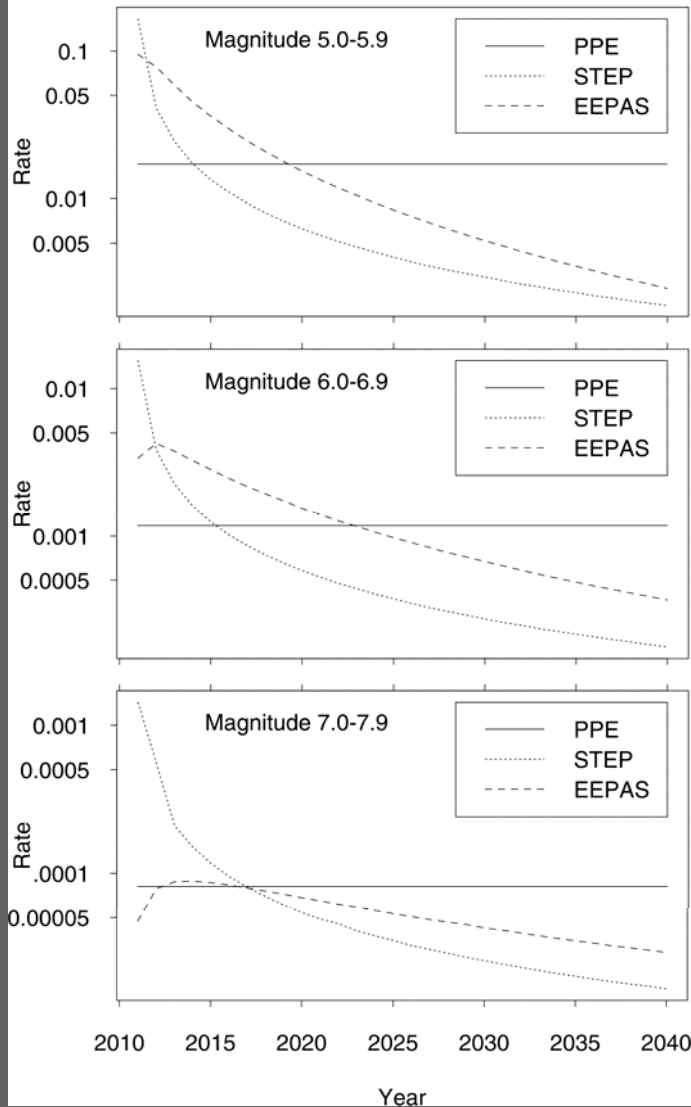


Likelihood of Aftershocks as at 15/9/2011

Magnitude Range	+1 Year			+1 Month		
	Average expectation	Range	Probability	Average expectation	Range	Probability
5.0-5.4	1.5	[0-4]	78%	0.2	[0-1]	21%
5.5-5.9	0.5	[0-2]	37%	0.06	[0-1]	6%
6.0-6.4	0.1	[0-1]	10%	0.02	[0-1]	2%
6.5-6.9	0.04	[0-1]	4%	0.006	[0-1]	<1%
7.0-7.9	0.02	[0-1]	2%	0.003	[0-1]	<1%

Seismicity Rates

Rates at 172.65 E., 43.55 S.



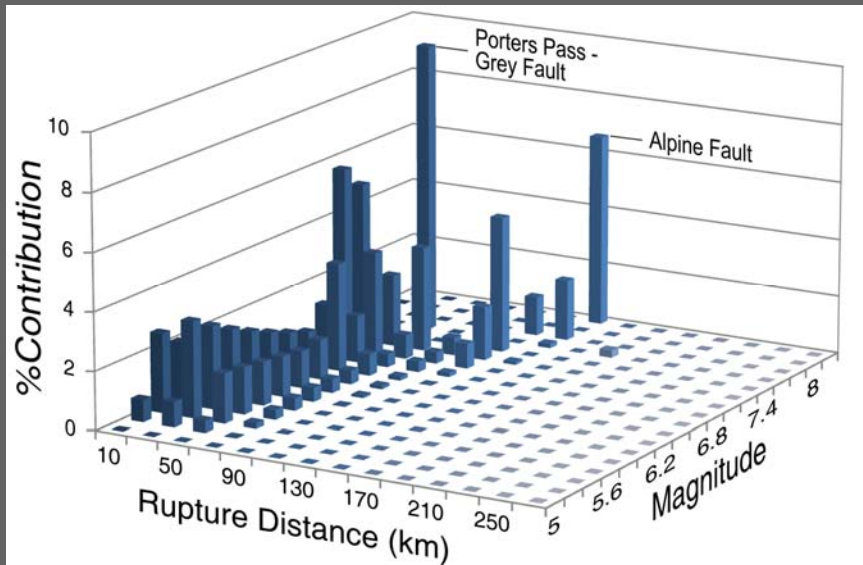
- STEP – short-term aftershock model
- EEPAS – triggered earthquakes
- PPE – long-term, constant in time, based on past 60 years of earthquakes, including Canterbury sequence

In the first year STEP is 700x previous rate for M5–6, while PPE is 60x previous rate

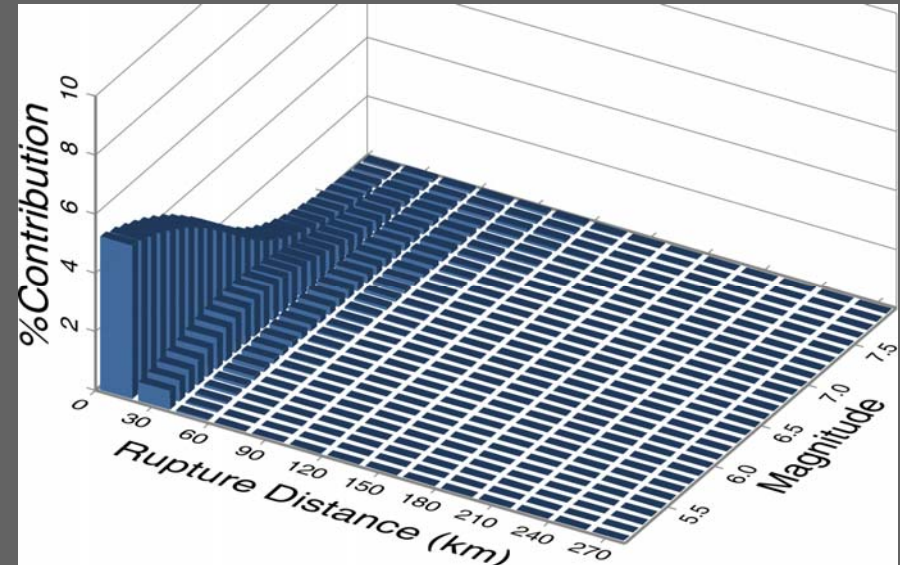
The estimated values for EEPAS and PPE are likely to change as research progresses

Where Does Christchurch's Seismic Hazard Come From?

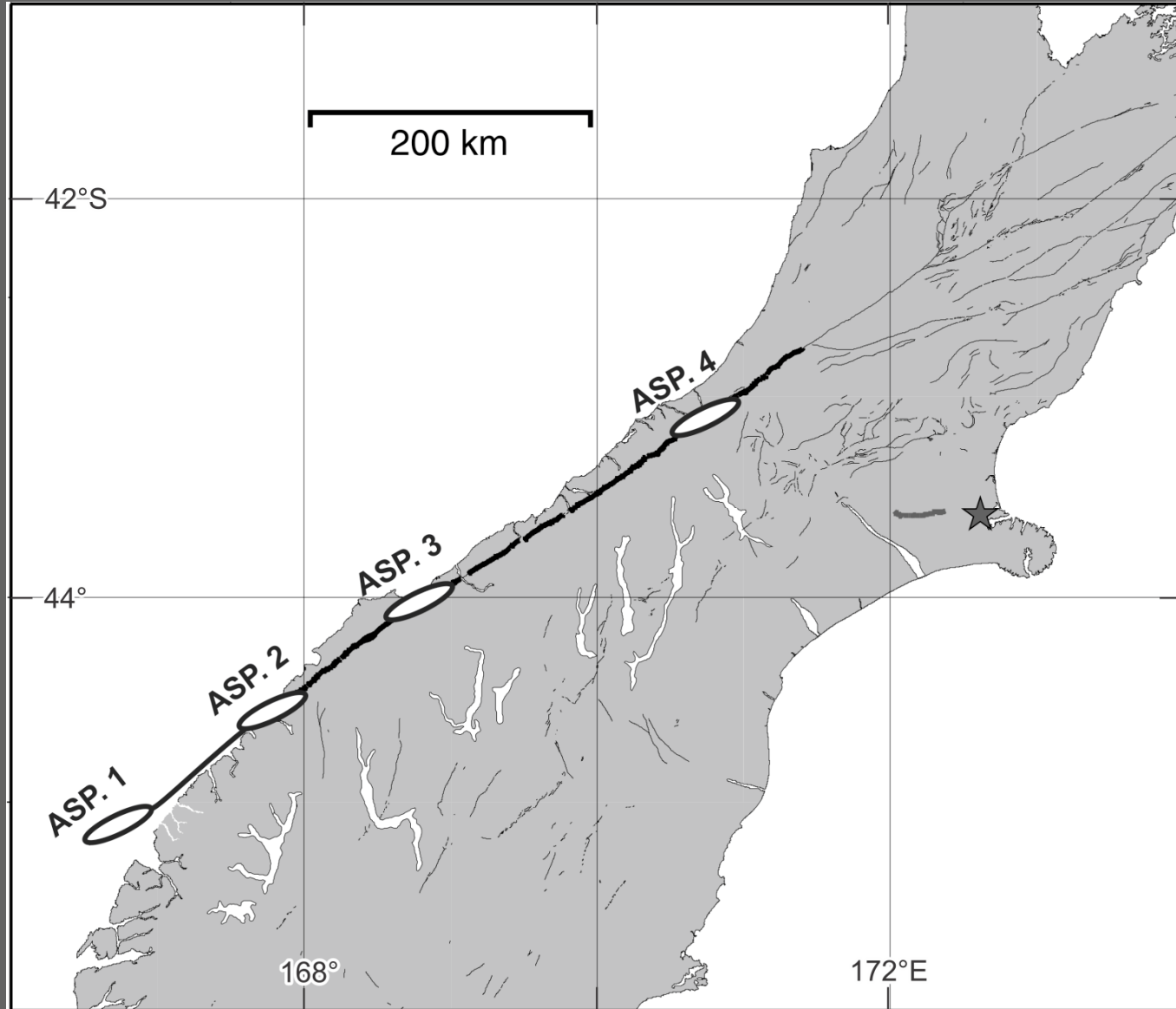
National Seismic Hazard Model



New Time-Varying Hazard Model

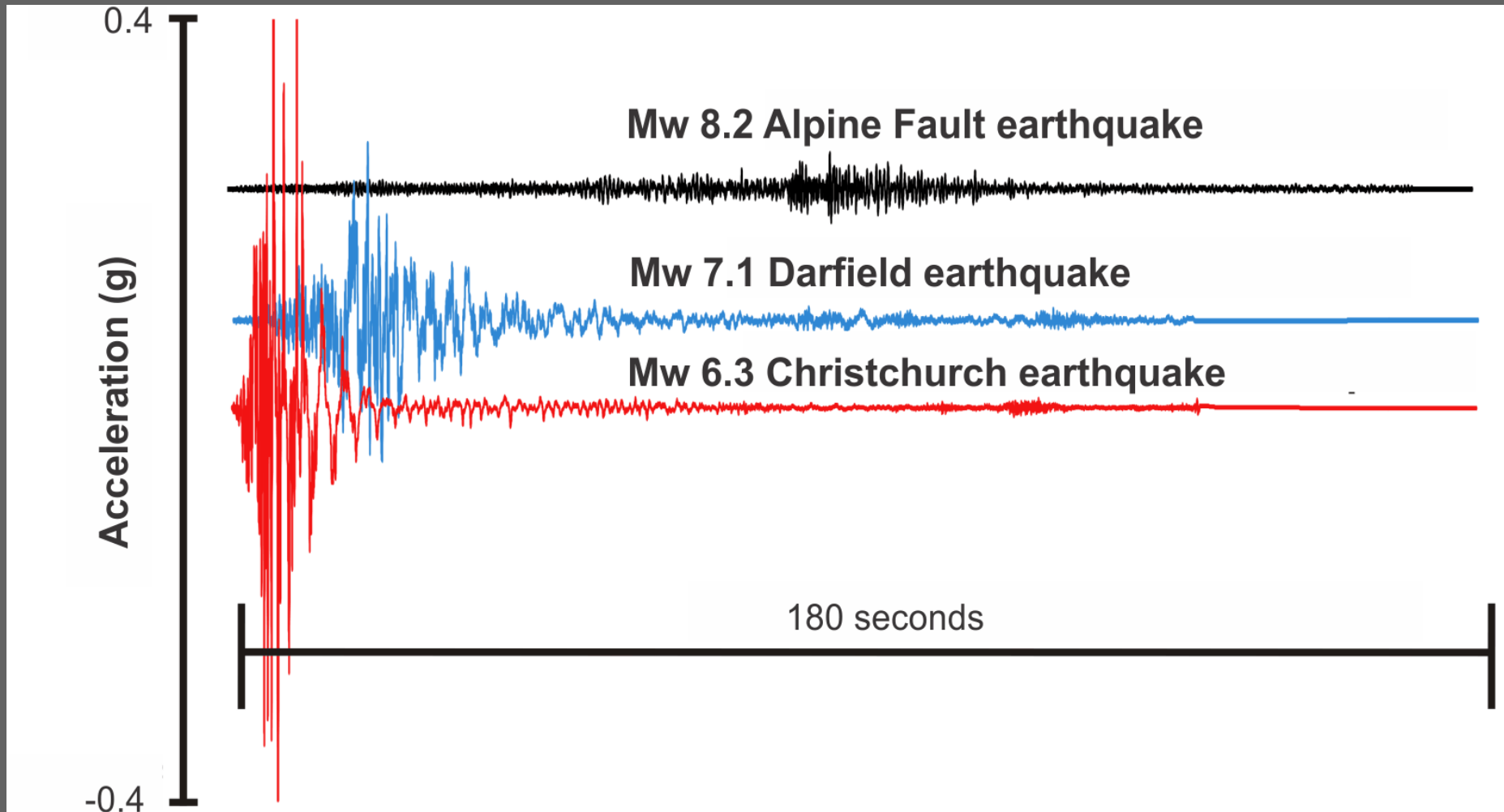


Preliminary Comparison of the Canterbury Earthquakes with Alpine Fault Shaking



Preliminary Comparison of the Canterbury Earthquakes with Alpine Fault Shaking

Lower accelerations; longer duration of shaking



Thank you !

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