



## Technical Appendix: USGS Numerical Aftershock Analysis for the Magnitude 7.8 Gorkha earthquake in Nepal April 25, 2015 (as of June 25, 2015)

This numerical analysis presents the technical material used to create the “USGS Aftershock Advisory for the Magnitude 7.8 Gorkha earthquake in Nepal April 25, 2015 (as of June 25, 2015).”

### *Method and Parameters:*

These calculations were done with the Epidemic Type Aftershock Sequence model (ETAS, Ogata, 1988) with parameters fit to the earthquakes with  $M \geq 4.6$  through June 24, 2015:  $\mu=0$ ,  $K=0.004$ ,  $c=0.02$  days,  $\alpha=0.97$ ,  $p=1.32$  and  $b=1$  and simulating earthquakes with  $M \geq 2$ . The method of Reasenberg and Jones (Science, 1989) used for the first 3 advisories is now difficult to apply to this sequence due to the large aftershock with  $M7.3$ . The principle difference in the results is that the expected number of aftershocks is now more accurately estimated.

### *Numerical Expectations and Probabilities:*

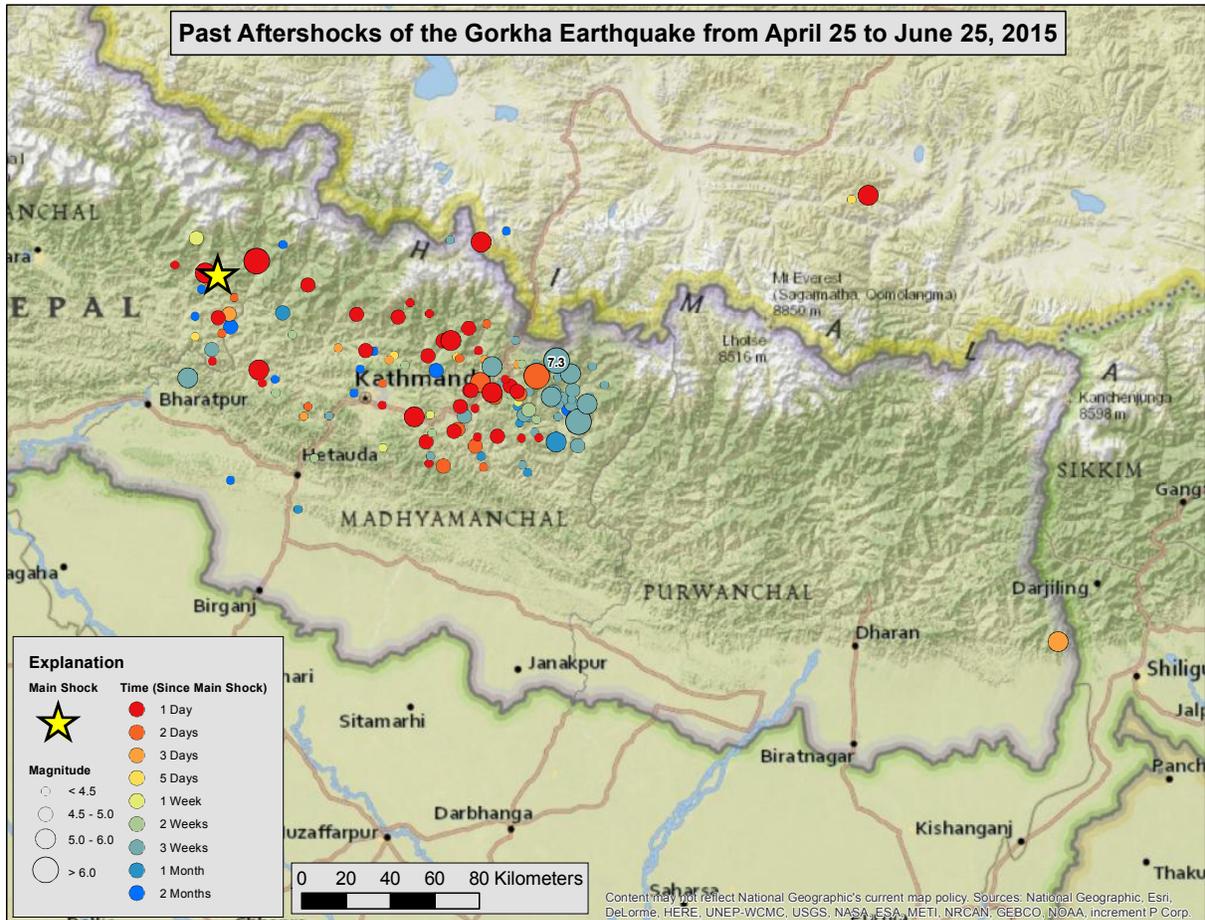
Note: This analysis for a 1-year time period is a reminder to be prepared for earthquakes and may be useful for planning recovery and rebuilding projects. While aftershocks can occur at any time during the next year, they are more likely to occur earlier in this time period and so actions to prevent further damage or injuries are better done sooner than later.

Time Window for Analysis	Magnitude (M) range of aftershocks considered	Most likely number of aftershocks (95% confidence)	Probability of one or more aftershocks
1 Year starting at June 25, 2015 to the end of June 24, 2016	M5.0 to M6.0	0 to 7	80%
	M6.0 to M7.0	0 to 2	17%
	M7.0 to M7.8	*	2%
	$M \geq 7.8$	*	0.4%

\* earthquake possible but with a low probability.

In comparison, prior to the recent  $M7.8$  mainshock, this region has experienced about 1 magnitude 5 or greater earthquake per year over the last 20 years.

The expected location of the aftershocks will be in the zone of activity and at its perimeter with a few located further away. Currently almost all aftershocks are occurring in a zone extending approximately 200 km away from the mainshock epicenter with a few occurring up to 400 km to the east and southeast. These locations are shown on the map below and are subject to change as new data are collected and analyzed.



This information is preliminary and subject to change as more data becomes available. This is the final scheduled update but further updates will be made if new data, such as a large aftershock, suggests that an update will be useful.

The text version of this information is available at:

<http://earthquake.usgs.gov/earthquakes/eventproducts/us20002926/aftershock-advisory.pdf>

For more information on the Gorkha earthquake, including updates to this analysis visit:

<http://earthquake.usgs.gov/earthquakes/eventpage/us20002926>

Or, to get the most recent version of this analysis use:

<http://earthquake.usgs.gov/earthquakes/eventproducts/us20002926/aftershock-statistics.pdf>