

BYE-BYE EQ2015,11:56AM

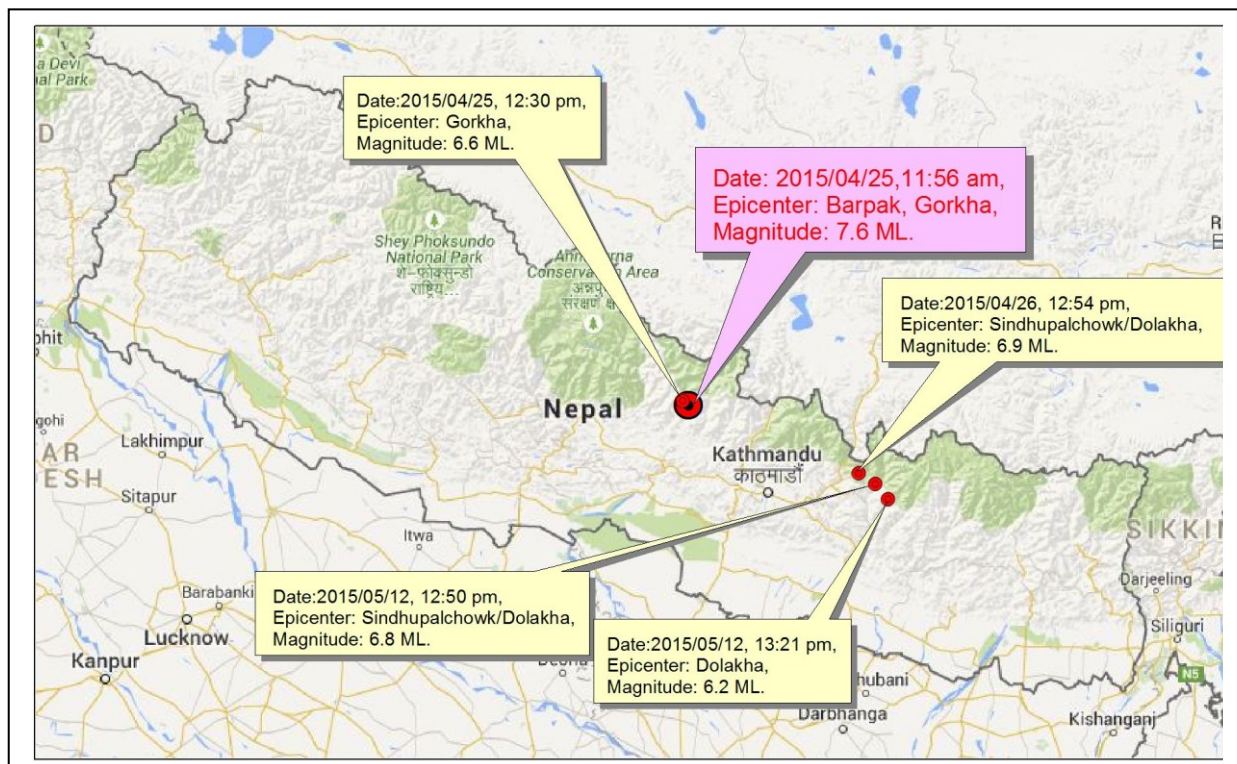
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A huge earthquake with the magnitude of 7.6 ML which occurred at 11:56 NST on 25th April 2015 shook Nepal killing more than 8,800 people, injuring more than 22,000 people, leaving hundreds of thousands of people homeless and leveling houses and centuries old architectural structures. The quake's epicenter was at Barpak village in Gorkha district, 80 kilometers northwest of Kathmandu, and it had a depth of only 15 kilometers, which is considered shallow in geological terms. The shallower the quake the more destructive power it carries. It also triggered an avalanche on Mt. Everest which is believed to have killed at least 10 climbers. It was the worst natural disaster to strike Nepal since the 1934 Nepal - Bihar Earthquake.

Repeated aftershocks for more than a month terrified Nepalese people and resulted landslides in Gorkha, Rasuwa, Sindhupalchok, Dolakha districts and some other places with casualties. Steep slopes in the area are also prone to avalanches like the one that the aftershock triggered on Mt. Everest .

A second major aftershock occurred on 12 May 2015 at 12:50 with a magnitude of 6.8. The epicenter was near the Chinese border between the capital of Kathmandu and Mt. Everest. More than hundred people were killed and thousands were injured by this aftershock. Hundreds of aftershocks greater than magnitude of 4 were felt since April 25, 2015.

1. WHY ARE WE AFFECTED:



The quake with a preliminary struck before noon and was most severely felt in the capital as well as the densely populated Kathmandu Valley. A major aftershock of magnitude 6.9 occurred on 26 April 2015 at 12:55 NST, with epicenter located about 17 km south of Kodari, Nepal and smaller aftershocks continued to ripple through the region for hours.

The devastation is more severe in the mountains near the epicenter, and in the surrounding districts.

Everyone knew Nepal lies in an earthquake prone zone. There have been a number of significant earthquakes in Nepal in the last centuries. April 25, 2015 earthquake is believed to be occurred as the result of the Northward under thrusting of Indian Plate beneath Eurasian Plate. A number of events of M6 or larger have had occurred over the past century. One, a M 6.9 earthquake in August 1988, with epicenter 240 km to the southeast of the April 25 event, caused close to 1500 deaths. The largest, an

M 8.3 event known as the 1934 Nepal - Bihar earthquake, struck at 2.30PM on 15 January 1934 in a similar location to the 1988 event. It severely damaged Kathmandu valley, and is thought to have caused around 10,600 deaths.

Millions of years ago, the Indian continent collided into Southern Tibet. The Indian continent is driven under Tibet, pushing lightweight sediments upwards and thus the formation of the Himalayas. Nepal is resting on these colliding tectonic plates: Eurasian(Tibetan) plate and Indian plate, which are still moving towards each other by 2 meters per century. This movement creates pressure within the Earth, which builds up and can only be released through earthquakes. Thus earthquakes happen very often in Nepal. Based on the seismic record since 1255, earthquakes of magnitude greater than 8 occurred on average once every 80 years.

The latest earthquake was not “unexpected”, everybody knew it was coming sooner or later, experts had warned of the danger to the people of Kathmandu for decades. Since Kathmandu and the surrounding valley sit on an ancient dried-up lake bed with very, very soft soil, and the soft soil amplified seismic motion, death toll in Nepal on that black Saturday was practically inevitable given the tectonics, the local geology that made the shaking worse and the lax discipline in the construction of buildings that could not withstand the shaking. The earthquake occurred to the northwest of Kathmandu at a relatively shallow depth of about 15 kms, which caused greater shaking at the surface lasted for about 2 minutes, but at magnitude 7.6, it released less energy than the 1934 quake.

Seismologists have done a preliminary analysis of April 25, 2015 earthquake. Subsequent ruptures along the fault set off the number of aftershocks. This means a lot of the tectonic tension beneath Central Nepal has now been released possibly postponing a mega-earthquake for now. However, according to the Geologists, we are not in a position to ignore the possibility for an even bigger one in western Nepal. And a M8.5 earthquake in western Nepal will shake Kathmandu up even more than the M7.6 on April 25, 2015.

Earthquakes have tectonic origins and we call them ‘natural disasters’, The trouble in Nepal is that there is not enough research on risks. Kathmandu is prone to severe shaking even during minor quakes because the city is built on clay and sediment of a previous lake, and is also prone to liquefaction.

2. CONTRIBUTION OF SURVEY DEPARTMENT:

According to scientists, the devastating earthquake and aftershocks as large as magnitude 6 that struck

on April 25, 2015 and on following days could have caused permanent changes of the Earth's surface. As part of the earthquake process, Earth's surface could have deformed as earthquake faults accumulate strain and slip or slowly creep over time. Survey Department(SD) use GPS to monitor this movement by measuring the precise position (within 5mm or less) of stations near active faults relative to each other. We compare the results with those of the previous observation results derived by occupying the same stations to determine the movement's magnitude and directions. By determining how the stations have moved we calculate ground deformation.

In the aftermath of earthquakes of April 25, 2015, Survey Department in it's capacity as National Mapping Agency carried out investigations based on Global Positioning System(GPS) field survey preliminarily in and around the capital city of Kathmandu in order to investigate the movement and change of elevation caused by the earthquake. Five stations surrounding Kathmandu valley: Nagarkot of Bhaktapur, Lakhe danda of Bungamati, Swayambhu of Kathmandu, Kumari of Nuwakot, Phulchoki hill of Lalitpur were selected as sample points. The analysis on surveyed data reveals that earthquake shifted Nagarkot by 1.82 m southwest, Phulchoki by 0.92m southwest. Likewise Bungamati, Swayambhu and Kumari shifted by 0.99 m south, 1.64 m southwest and 1.71 m southwest respectively. Regarding the Ellipsoidal elevation Nagarkot, Phulchoki, Bungamati, Swayambhu and Kumari found to be elevated by 1.158 m, 0.63 m, 0.77 m, 0.98 m and 1.093 m respectively.

The rigorous calculations were done linking with the observation data in 13 Continuously Operating Reference Stations (CORS) distributed in Hongkong, Lhasa, Bangalore, Hyderabad, Kazakastan, Oman, Mongolia. Thus calculated Post - earthquake coordinate values were compared with the Pre - earthquake corresponding coordinates compliant with International Terrestrial Reference Frame 2008 adopted by International GNSS Service (IGS). The primary result of the research was unveiled to the public in a Press meet.

The hundreds of aftershocks continued even after this unveiling of the result. The positions of National Geodetic Network have been suffered from the great earthquake. Therefore, a complete revival of the Network is a must. Survey Department must develop an immediate update to the reference positions of control points to publish a new set of recalculated coordinates. Since Nepal lies in the boundary of Indian and Tibetan plates, the accumulated strains and crustal deformations caused by plate subduction will more or less continue in future too. Thus, SD should introduce dynamic/semi-dynamic correction method to solve major problem with revision of

survey results, that is, how to manage relation between static geodetic datum and actually moving positions of reference points and how to reduce the total cost for revision in future.

SD has made the provision of allowing free download of Topographic data of the earthquake affected area which includes 17 districts and can be downloaded from <http://www.ngiip.gov.np>. The data on the web includes Transportation, Hydrography, VDC boundary and Place name. The data can be used freely for earthquake disaster analysis purpose only by the organization who are working for disaster rescue and mapping activities of the disaster occurred due to the recent earthquake of April 25, 2015.

The department has also published Post Disaster web map to support the relief efforts. Most of these maps are focused on the 11 most affected districts.

Apart from these, the department has also published an interactive web map at <http://www.ngiip.gov.np/EARTHQUAKE2072/Earthquake.html> where one can see the number of deaths, injured etc and the department is updating this interactive web map as far as possible.

Within less than a month, we have felt more than 250 incidents of earthquake of magnitude 4+. It is more than enough! So enough is enough. On behalf of all nepalese let us say BYE – BYE Earthquake 2015.

See you never again!

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