Geomorphic impacts of the April 25, 2015 earthquake in Nepal: Preliminary assessments
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1. THE EVENT
A magnitude Mw 7.8 earthquake struck Central Nepal on April 25, 2015 at 11:41 am (local time), followed by another Mw 7.4 one on May 12, 2015 at 12:30 pm (local time). The first rupture took place along the Main Frontal Thrust, a main structure interface between Indian and Eurasian plates; it has occurred at a depth varying from 10 km (USGS) to 29 km (Geoscope) corresponding to a relative slip of 4-5 m. It was a foreseeable disaster, with continuous seismic monitoring (Seismology Laboratory of Kathmandu) and preparedness actions such as infrastructure strengthening, development of early warning systems, plans for evacuation and recovery (thanks to the NGET NGO), still it was very dangerous.

About 3% Nepal population was affected (~9 M people), both in the mountains and Kathmandu valley (~2.5 M people). ~9000 people lost their lives. The economic damage—about $10 billion—is almost half of the country’s GDP.

Aggravating factors are many folds. (1) In the Kathmandu valley, the Quaternary lacustrine substrate amplified the vibrations, hence substantially damaged the buildings. (2) After a dry winter, snowfalls and rainfalls were abundant during March and April, hence increasing the pore pressure and the potential instability of slopes and/or snow cover. (3) During the last decades, the construction of earthy, fragile roads accentuated, slope steepness. (4) Very short time left between the earthquake and the onset of the next Indian monsoon rains.

2. GEOMORPHIC IMPACTS

Though many fatalities are due to buildings collapses, a large part of them are also related to slope processes: snow avalanches, rock falls (including very large blocks), debris avalanches and landslides.

The village of Langtang was totally buried under a rock-snow avalanche that came from a glacial moraine hundreds of meters above, on the Langtang Lirung peak (7227 m); apparently the debris were taken away from the moraines and carried downward by the avalanche.

WHAT'S NEXT?

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