A devastating Mw 8.0 earthquake occurred on 12th May 2008 in Wenchuan county near the western edge of the Chengdu basin in Sichuan Province, China. This was followed by thousands of strong aftershocks, for a period of more than a month, causing tremendous damage and loss in terms of human life and the widespread destruction of infrastructure. These effects were induced both by direct earthquake shaking and very large earthquake-triggered landslides. The Beichuan county town is a typical example. It situated in the Longmenshan fault zone and in a deeply incised valley surrounded by very steep slopes in mountainous terrain. The town was completely destroyed by the strong earthquake and mountain slope collapse.

Various measures of seismic intensity are used to assess the damage level induced by an earthquake; China uses the 12 degree Liedu scale. While the region was largely categorised as 7 - 8, the actual damage in Beichuan county town more closely resembled that of 12 Liedu degrees. Had it been known (in fact, it was known) that Beichuan county town was in a very dangerous location subject to 12 degree seismic intensity, it should have been relocated; the town and its tens of thousands of inhabitants might thus have been spared. For effective prevention of earthquake disaster and hazard management, the lesson to be learnt is that the current seismic intensity zonation is inadequate to characterise the local variations in damage that an earthquake may produce. Our field observations indicate that many areas along the Longmenshan fault zone were subjected to the same level of earthquake shock but experienced far less significant damage than Beichuan because their locations are not specifically prone to geohazards.

In this paper we present a study describing the GIS based modelling of an earthquake damage zone, using the Beichuan region of the Wenchuan earthquake zone as an example. The idea is to combine measurements of earthquake deformation, as derived from ALOS PALSAR InSAR data, with a geohazard inventory and environmental conditioning factors (such as slope, lithology, drainage and fracturing) derived from AVNIR-2 multi-spectral images and PRISM DEM. With high resolution VNIR multi-spectral imaging, L band PALSAR and high resolution DEM capacity onboard, ALOS has unique advantages for this type of terrain analysis. Within the same intensity zone, defined by co-seismic deformation, far more detailed damage zones will be definable using the local environmental factors via a GIS based multi-criteria approach. The final earthquake damage zone map will provide a basis from which to improve upon the relevant local building and engineering regulations. This case based study will also help establish a framework for refining the existing seismic intensity scale mapping system, from the regional scale to down to a local scale.

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First Choice Theme:
Geohazards: Earthquakes
Second Choice Theme:
Geohazards: Landslides