Remote sensing based seismic site characterization using earthquake damage data

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Seismic site characterization maps are important for all stages of earthquake management, i.e. mitigation, preparedness, response and recovery. However, for many of the seismically active areas, seismic site characterization is rarely available, as it requires substantial investment in geological and geotechnical data acquisition and interpretation. This study evaluates a remote sensing based method to generate seismic site characterization map at 30 m spatial resolution. Geographic object based image analysis was applied to topographic attributes computed from an ASTER DEM to demarcate terrain units of mountains, piedmonts and basins. Classified terrain units were verified through a field based landform map resulting in an accuracy of 70%. To evaluate the importance of classified terrain units for seismic site characterization, and their role in earthquake induced building damage, the classified terrain units were compared with 2005 Kashmir earthquake damage data derived from field visits and SPOT-5 imagery. This shows that 81% of the less, moderate, and severe damage intensity zones correspond with mountains, piedmonts and basins, respectively. Classified terrain units were assigned VS^{30} to generate a seismic site characterization map. The methodology can be used for any land based seismic active region, to generate seismic site characterization maps at regional scale and use for earthquake damage prediction.