

Application of Remote Sensing, Digital Elevation and Earthquake Data to Seismic Hazards Mapping

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Carefully enhanced satellite image data such as Landsat Thematic Mapper, SPOT, and others, have been shown to be useful for location of tectonic landforms such as active and inactive faults, particularly in sparsely populated arid regions. There is now an increasing focus on seismic hazards, particularly in urban areas where the danger is greatest. Satellite image data are less useful in such areas because urban clutter can obscure the tectonic features which might otherwise be visible in such data. However, some of the image enhancement and analysis methods developed for remote sensing data are directly applicable to digital topographic data and other data sets. Furthermore, geographic information system approaches allow ready integration of remote sensing images with digital topographic data and seismic records. Visualization incorporating these data sets permits virtually any view of any area to be created for study. Analysis of these integrated and derived data sets can elucidate the relationships between seismicity and tectonic landforms, even in well developed urban areas. Such analysis can become a useful input to seismic risk assessments. We have begun applying these techniques to evaluate ability to further elucidate seismic risk in the Los Angeles area. In particular, in the Los Angeles area, better understanding of blind thrusts and other tectonic features subtle at the surface are of great importance in improving assessment of seismic risk. Using digital topographic data, displayed as 3 D images and with elevation exaggerated appropriately, subtle tectonic features can become much clearer. Subtle basin warps potentially indicative of blind thrusts are well expressed in such data. In some cases, such as the "Fontana Trend", areas of frequent low-level seismicity are shown to be associated with subtle landforms of probable tectonic origin when the digital topographic data is viewed simultaneously with seismic records. Observations such as these can be used to help target ground surveys and integrated with traditional seismic risk assessment methods to help improve measures of seismic risk.