

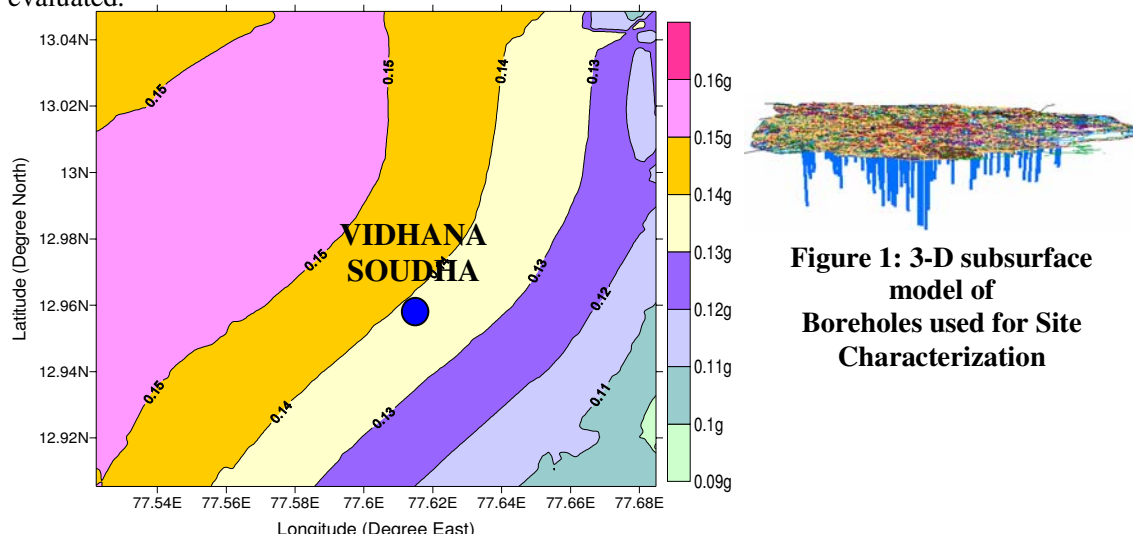
## Seismic Hazard and Microzonation Studies using Geographic Information System - A Case Study of Bangalore city

By Prof. Sitharam T.G\*, Anbazhagan P and Narendra Kumar J.N

Department of Civil Engineering, Indian Institute of Science, Bangalore-560012

\* Further information, sitharam@civil.iisc.ernet.in, Web url: <http://www.civil.iisc.ernet.in/~sitharam/>

Seismic hazard and microzonation of cities enable to characterize the potential seismic areas that need to be taken into account when designing new structures or retrofitting the existing ones. Study of seismic hazard and preparation of geotechnical microzonation maps has been attempted using Geographical Information System (GIS). GIS will provide an effective solution for integrating different layers of information thus providing a useful input for city planning and in particular input to earthquake resistant design of structures in an area. Seismic hazard is the study of expected earthquake ground motions at any point on the earth. Microzonation is the process of sub division of region in to number of zones based on the earthquake effects in the local scale. Seismic microzonation is the process of estimating response of soil layers under earthquake excitation and thus the variation of ground motion characteristic on the ground surface. For the seismic microzonation, geotechnical site characterization need to be assessed at local scale (micro level), which is further used to assess of the site response and liquefaction susceptibility of the sites. Seismotectonic atlas of the area having a radius of 350km around Bangalore has been prepared with all the seismogenic sources and historic earthquake events (a catalogue of about 1400 events since 1906). We have attempted to carryout the site characterization of Bangalore by collating conventional geotechnical boreholes data (about 900 borehole data with depth) and integrated in GIS. 3-D subsurface model of Bangalore prepared using GIS is shown in Figure 1. Further, Shear wave velocity survey based on geophysical method at about 60 locations in the city has been carried out in 220 square Kms area. Site response and local site effects have been evaluated using 1-dimensional ground response analysis. Spatial variability of soil overburden depths, ground surface Peak Ground Acceleration's(PGA), spectral acceleration for different frequencies, liquefaction susceptibility have been mapped in the 220 sq km area using GIS. ArcInfo software has been used for this purpose. These maps can be used for the city planning and risk & vulnerability studies. Figure 2 shows a map of peak ground acceleration at rock level for Bangalore city. Microtremor experiments were jointly carried out with NGRI scientists at about 55 locations in the city and the predominant frequency of the overburden soil columns were evaluated.



**Figure 2: Rock Level PGA Map of Bangalore**

**Figure 1: 3-D subsurface model of Boreholes used for Site Characterization**