Real-time generation of Shake Map through "Earthquake early warning system for Northern India"

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Abstract – A real time shake map can be a very important and helpful tool for disaster management authorities to do rapid response and for search and rescue operations. It is also a valuable tool for quick loss estimation, rehabilitation planning, post-earthquake engineering and scientific analysis.

In India, Indian Institute of Technology, Roorkee (IITR) is running a project "Development of Earthquake Early Warning (EEW) System for Northern India" to issue an alert of impending earthquake to public. 84 accelerometers are installed in the highly seismogenic window of about 100 Km by 40 Km in one of the state of India, Uttarakhand between Uttarkashi and Joshimath. These sensors are continuously transmitting ground motion data to the central server at EEW lab in IITR using private networks. On the basis of threshold value of various EEW parameters, warning is issued to public.

Central servers also record complete strong ground motion time histories transmitted from sensors instrumented in the field. This data is processed to remove noise. Peak ground acceleration, peak ground velocity, peak ground displacement and intensity at each transmitted station is found. Any earthquake may provide time histories at maximum seventy or so locations whereas some earthquakes may provide time histories at smaller number of locations due to various reasons. For generation of a good quality shake map this number of locations is not sufficient. In this work, various spatial interpolation techniques are examined and most suitable one was implemented to get the best shake map. To create the shake map, a platform called Generic Mapping Tool (GMT) is used. GMT produces a map document and this document file can be visualized by ghost script. The map is uploaded automatically on the website easni.com and any disaster management authority of earthquake hit area can use this shake map for its search, rescue and response operations. The website easni.com is the website for EEW system for Northern India.

This paper presents details of few shake maps of earthquakes recorded by the EEW system. These shake map give clear view of peak ground acceleration, velocity, displacement and instrumental intensity in the earthquake hit region.

Keyword- Shake Map, Earthquake Early Warning (EEW) System, Generic Mapping Tool (GMT), Ghostscript.