

30th IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)  
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USING UNIVERSITY CUBESATS FOR EARTHQUAKE DETECTION AND DISASTER  
MANAGEMENT

**Abstract**

Earthquakes are an essential and unavoidable geological event that have been continuing since the formation of Earth and they are nature's way of reshaping our world. Unfortunately, they are also very devastating when they happen near cities and settlements. Especially near fault lines, earthquakes can cause extensive damage. Moreover, when there is an earthquake that has a greater scale than 6.0, the destruction can increase exponentially depending on the geographical conditions as well as on the civil structure at that particular area. The recent massive earthquakes in Turkey in the Middle Anatolian region have also shown how important it is to have all the means available for detecting earthquakes and managing its aftereffects with disaster recovery operations. Thus, the strategy will need to be threefold in dealing with this issue using space technology. This paper deals with these strategies using university made cubesats for earthquake detection, disaster mapping, and disaster recovery assistance. There are several studies to suggest that before the beginning of a major seismic event, there are certain fluctuations in certain bands of the electromagnetic spectrum at the upper levels of the atmosphere. It is suggested to place university made cubesats at certain altitudes at Low Earth Orbit at different locations using highly elliptic orbits to cover potential earthquake prone areas. Using certain electromagnetic sensors which have been calibrated to work with certain electromagnetic frequencies, the electromagnetic wave fluctuations at various atmospheric altitudes can be analyzed 24/7 and potential seismic activities can be mapped with these electromagnetic disturbances and then analyzed to observe the correspondence between these two events. The analysis may lead to potential detection of earthquakes slightly before the earthquake happens, which may be useful in disaster mitigation through an early warning system. Of course, the same cubesats can be equipped with high resolution cameras and IR cameras, which can also be used for disaster mitigation and for coordinating search teams for the disaster-prone areas making their functionality multifold. There have been several studies that suggest finding survivors using space technology and advanced remote sensing methods can be effective. In addition, a cubesat dedicated to a disaster can make sure the authorities are always aware of the devastation in the region so that proper help can be channelized. The paper will suggest that all of these operations can be done with minimum amount of budget using university funded cubesats.