



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Hassan Ahmed	Project Number S0701
Project Title Permanent Uplift of the Mentawai Islands and the Megathrust Earthquake Cycle	
Abstract Objectives/Goals The Sunda megathrust fault off the west coast of Sumatra, Indonesia has experienced big earthquakes in recent history. The section of the megathrust south of these ruptures, beneath the Mentawai Islands, could rupture in the coming decades. The purpose of this project is to study the topography of the Mentawai Islands and create a map of clear uplifted terraces. By mapping the distribution of terraces, I hope to identify the uplift caused by previous earthquakes. I formulated the hypothesis that if the terraces observed on the islands are caused by permanent uplift due to the earthquakes, then there should be apparent stair steps from the edges towards the center of the islands. Methods/Materials The main data set used for this project is the Shuttle Radar Topography Mission (SRTM) data of the Mentawai Islands. This is a set of elevation measurements called a Digital Elevation Model (DEM). I used a Geographic Information System called ArcMap to process the SRTM data to make color contour maps, slope maps, and hillshade maps. After studying these images very closely, I mapped key features like flat surfaces and scarps. Results I did not observe the stair steps of uplifted terraces, so there may be some other cause of the terraces I mapped. I conclude that there is not rapid uplift of the islands that is linked to each megathrust earthquake. Conclusions/Discussion Stair steps of uplifted terraces were not observed, and so there may be some other cause of the uplifted terraces I mapped. This leads to the conclusion that there is not rapid uplift of the islands that is linked to each megathrust earthquake. Instead, it may be that uplift that occurs during each megathrust earthquake is recovered by the sinking of the islands in between each earthquake.	
Summary Statement The purpose of this project is to study the topography of the Mentawai Islands and see if any long term uplifting that might be tied to permanent uplift during great megathrust earthquakes is observed.	
Help Received Used lab equipment at the California Institute of Technology under the supervision of Dr. Richard Briggs.	