**NASA DEVELOP National Program**

****Jet Propulsion Laboratory

**Fall 2013**

**Disasters Damage Assessment**

*Bridging the Gap Between Remote Sensing and GIS*

**Team Lead:** Judy Cheng (University of California, Los Angeles)

**Team Members:**

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**Applied Sciences National Applications Addressed:**

Disasters

**Study Area:**  Pasadena, California; Moore, Oklahoma

**Study Period:** April 2009 – May 2012

**Community Concerns**

* Natural disasters claim the lives of many people and cause economic losses that can total in the billions of dollars. For example, the 2009 L’Aquila Earthquake killed 309 people, left thousands injured and homeless, and cost roughly $11 billion U.S. dollars to date in losses and repairs.
* When a major disaster hits an urban area, a rapid, accurate and comprehensive assessment of damage is needed for timely rescue operations and loss estimation.

**Abstract**

The project focused on developing tools to expedite the validation process of damage proxy maps (DPM) derived from radar data before and after the occurrence of natural disasters. The DPM validation process involves the removal of false positives (non-structural and natural changes) and the verification of true positives (structural damages). When complete, the ArcGIS, Python scripts, and a web map developed by this project will automate raster-vector data conversion and facilitate volunteers’ rapid validation in the event of natural disasters, thus reducing the latency of accurate DPM delivery in the time of most critical need.

**Partners/Collaborators**

* US Geological Survey National Earthquake Information Center (USGS NEIC): David Wald
* Esri Disaster Response Program: Ryan Lanclos
* GISCorps of Urban and Regional Information Systems Association (URISA): Shoreh Elhami

**Benefit to End-User:**

* This project will standardize and automate the damage validation process, reducing the time from four days to just hours, allowing partners to respond to natural disasters with substantially reduced latency.
* The decision support tools developed in this project will be used as part of on-going ARIA projects at JPL and Caltech to improve the quality of future damage detection products and increase efficiency in validating products.

**Earth Observations & Parameters**

* NASA Gulfstream G3, UAVSAR – Urban area building damage detection
* COSMO SkyMed, X-band SAR – Urban area building damage detection
* Landsat 5, TM – Land classification
* Landsat 7, ETM+ - Land classification

**Ancillary Datasets Utilized**

* Local Government – building footprints
* Google Earth - optical imagery

**Software Utilized**

* Google Earth and Google Earth Engine - damage validation of study areas and classification of Landsat 7 imagery
* ArcGIS - Raster manipulation and analysis, automation of masking process with Model Builder and Python scripts
* ENVI - classification of Landsat 5 imagery