Japan Disasters

DEVELOP

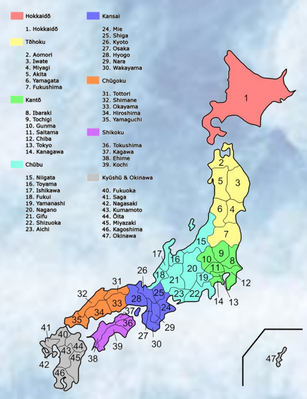
Using NASA EOS to Assess Damage from the Tohoku Earthquake and Tsunami

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OBJECTIVES

- Highlight NASA EOS capabilities relating to natural disasters
- Create images showing changes in vegetation
- Show where smoke trajectories from nuclear power plants traveled
- Analyze the economic impact of the disaster on Japan

STUDY AREA



Japan covers 377,915 square kilometers of land. Our study area focuses on the Tohoku region .Within this region, the most impacted prefectures were include Aomori, Iwate, Miyagi, and Fukushima.

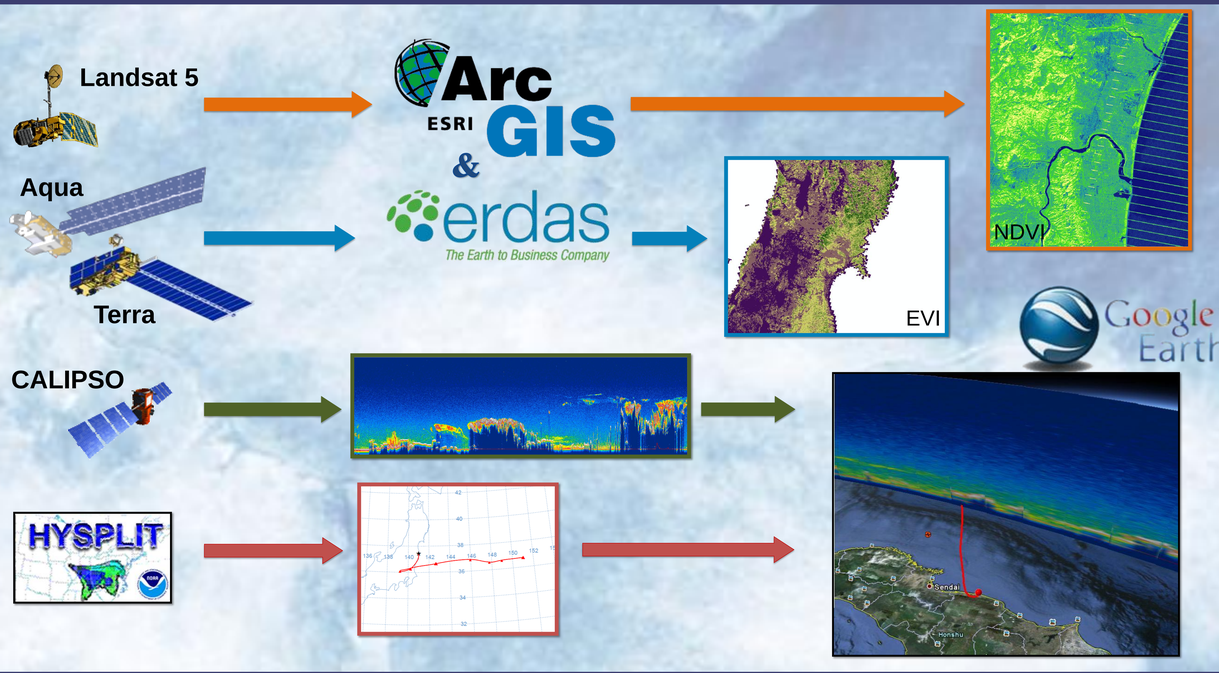
EARTH OBSERVATION SOURCES



ABSTRACT

On March 11, 2011 the Great Tohoku Earthquake occurred approximately 70 kilometers off the coast of Japan. This magnitude 9.0 earthquake was closely followed by a massive tsunami that reached 7 meters in height. Using NASA Earth Observation Systems (EOS), we will assess the damage to the area impacted by this disaster. Landsat 5 Thematic Mapper (TM) will be used to create normalized difference vegetation index (NDVI) maps and MODIS on Aqua and Terra will be used to produce enhanced vegetation index (EVI) maps. CALIPSO and HYSPLIT will also be used to track smoke released from the Fukushima Daiichi Nuclear Power Plant to assess where the radioactive steam traveled to. An analysis of the economic impact of this disaster will be conducted to help policy makers in the United States and in Japan. This research will highlight the ability of NASA EOS in providing support for disaster response around the world.

METHODOLOGY



CONCLUSIONS

- NASA Earth observation contributions to decision making in response to natural disasters are extremely useful, especially for the Japan 2011 earthquake and tsunami
- Coastal farmland was devastated, with loss easily quantified using remote sensing
- Steam and smoke from the Fukushima Daiichi power plant traveled out to sea throughout most of the disaster, but at times traveled inland
- Japan's economy will be effected by this disaster for years to come

ACKNOWLEDGEMENTS

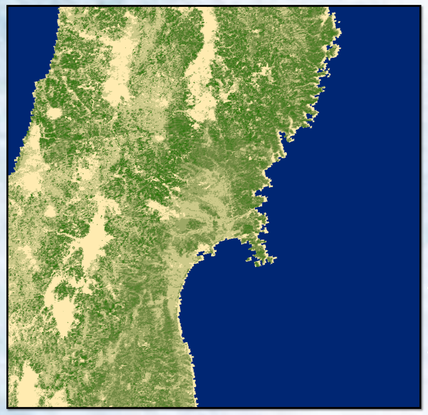
Jamie Favors & Lauren Childs
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TEAM MEMBERS



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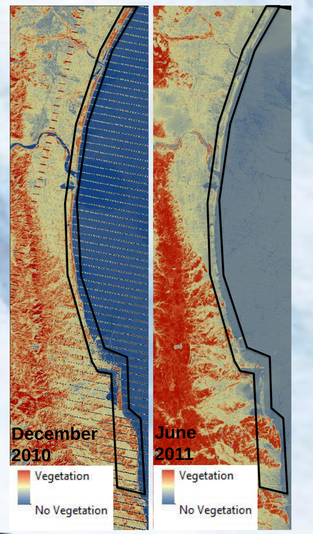
RESULTS

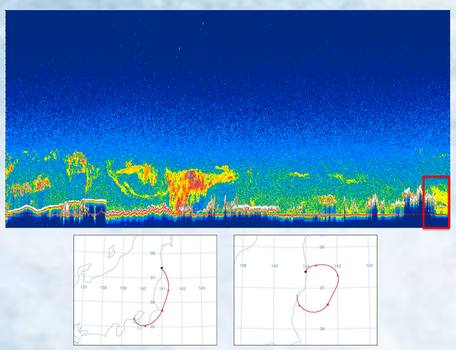


Enhanced Vegetation Index using MODIS

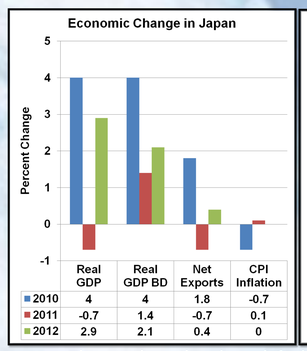
- The NDVI maps to the right show vegetation loss (displayed in red) along the coast of the Miyagi Prefecture in the Tohoku Region
- There is more vegetation in the after image because it is during Japan's summer
- Even with the abundance of vegetation in the after image, there is a stark contrast in the amount along the coastline

- The EVI map to the left shows vegetation in the Tohoku Region of Japan
- These maps were created to show vegetation change in the study area
- EVI maps can correct distortions caused by particles in the air and in most cases are more accurate than NDVI maps

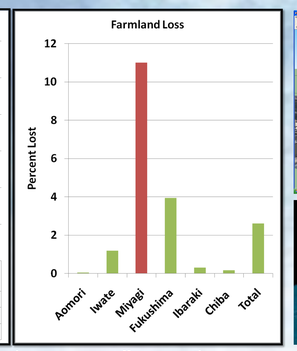




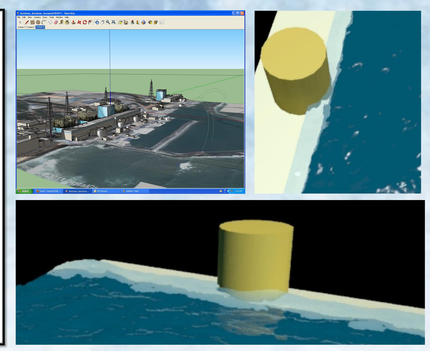
- HYSPLIT trajectories were run to see where steam and smoke from the Fukushima Daiichi Nuclear Power Plant traveled
- The box in red shows the study area around the power plant
- The majority of the trajectories traveled out over the Pacific ocean, but some of the trajectories traveled inland



	Real GDP	Real GDP BD	Net Exports	CPI Inflation
2010	4	4	1.8	-0.7
2011	-0.7	1.4	-0.7	0.1
2012	2.9	2.1	0.4	0



- The graph on the above left shows some effects on the Japanese economy due to the earthquake and tsunami
- The graph on the above right shows how much farmland was lost due to this disaster
- The section highlighted in red refers to the Prefecture shown in the NDVI maps that were created



- In the future, an animation will be created to show the tsunami occurring
- This animation of a tsunami wave will be used as a swipe tool to display before and after images of NDVI maps of the study area
- A model of the Fukushima Daiichi Power Plant will replace the yellow cylinder currently being used for testing