Filling the Gaps in Remote Sensing Data using Social Media

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ONR NATO Workshop
Brussels October 8, 2013
Exciting Time for Geography

Never in History

- Known so much about the Earth
- Unprecedented access to data
- Society so much at risk
My Passions

• Environmental hazards
  • Constant threat
  • Natural, man made and technological

• Remote sensing and simulations
  • Observe and forecast

• Geoinformatics
  • The rate at which geospatial data are generated exceeds our ability to analyze them
  • Techniques for the analysis of large, dynamic, and geographically distributed spatiotemporal data
My Passions

- **Environmental hazards**
  - Constant threat
  - Natural, man made and technological
  - Main theme of my research

- **Remote sensing and simulations**
  - Observe and forecast
  - Main data source of my research

- **Geoinformatics**
  - The rate at which geospatial data are generated exceeds our ability to analyze them
  - Techniques for the analysis of large, dynamic, and geographically distributed spatiotemporal data
  - Main computational algorithms for my research
Research Goals

- Disaster Relief and Humanitarian Assistance
- Real time analysis
- Data $\Rightarrow$ Knowledge
Remote Sensing Disaster Assessment

- De-facto standard in observing the Earth and its environment
- Real time high-resolution data
- Crucial during disasters
- International cooperation (e.g. International Charter for Space and Disasters)
March 2011 Japanese Earthquake


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Remote Sensing Challenges

- Revisiting Time

- Atmospheric Transparency
Solution

- Filling the Gaps in Remote Sensing Data Using Social Media
  - Data Fusion Problem
  - Remote Sensing: high spatial resolution, low temporal resolution
  - Social Media: low spatial resolution, high temporal resolution

- Augment initial satellite observations with ground information
Social Media, DEM and Remote Sensing for Floods

Goal

Generate flood hazard maps for the 2011 Memphis floods

Transportation Assessment after Sandy using Social Media
Analysis of Sandy

Fema Flood Map
Damage Assessment

![Damage assessment map](image)
Road Assessment
Floods in Calgary

- Largest floods to date
- Remote sensing data before but not after
Water Classification
Temporal Estimation of the Floods

(a) June 21  (b) June 22  (c) June 23

(d) June 24  (e) June 25  (f) June 26
Why limiting to Social Media?

Non-authoritative Sources

- Pictures (e.g. Flickr)
- Videos (e.g. You Tube)
- Micro blogging (Tweets)
- Traffic Cameras
- Cell Phone Data
- News
- Power outage (e.g. NPP)
Conclusions

Summary

- Fill the gaps in remote sensing using social media
- Support HA/DR operations
- Real time analysis
- Identify when data are needed