

IAF EARTH OBSERVATION SYMPOSIUM (B1)  
Earth Observation Data Management Systems (4)

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FROM THE SKY TO THE CROWD: INTEGRATING GEOSPATIAL BIG DATA FOR  
DECISION-MAKING**Abstract**

Novel geospatial big data sources could serve as eyes in the sky and on the ground to provide situational awareness for decision makers. While traditional sources of human relevant data are static, such as census data, technological advances enables ways to improve our understanding of human activity and environmental risk during disasters. Real-time social data is increasing accessible as citizens intentionally contribute large volumes of data through applications. These novel data streams can be harnessed to improve situational awareness by extracting useful information during disasters.

Satellite remote sensing is a traditional source of data during disasters, but often there are gaps in coverage due to revisit constraints and atmospheric conditions that prevent persistent situational awareness. Increasingly, small satellites are improving coverage times and drones are becoming common during crisis. With the influx of data, manual processing is time consuming and technical challenges need to be addressed to provide automated processing to extract features of interest.

Data from citizen science applications provide an intentional collection for environmental monitoring through crowdsourcing measurements. Citizen science projects are often topic specific so extensive data mining to find data relevant to a topic is unnecessary. Projects can be set up before a crisis occurs by engaging the participation of citizens and becoming familiar with the applications. Social data collected by the crowd serves not just to provide data about the environment, but it also gives a context about human activity in the area of interest.

Data integration can provide improved situational awareness during emergencies and act as a method of validation. Heterogeneous data from a variety of sources can be gathered on relevant topics and integrated to add value to environmental assessments. Data fusion often involves processing to standardize formats, measurement units, temporal periods, geographical projections, and file types. Even a basic visualization of spatial data that is standardized can communicate information in a way that can meet unique information needs and improve sensemaking during complex events. Validation of crowdsourced data can provide a critical evaluation to assess the reliability of the data during crisis. Analysts could use novel sources to incorporate time-sensitive and human relevant content in order to produce value-added data that is useful for crisis communication and decision-making.