Real-Time Geospatial Infrastructure Modeling for Disaster Response and Rapid Recovery: NSF - Science, Engineering and Education for Sustainability (SEES) Research Study

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Hurricanes and earthquakes are two of the most destructive natural disasters that impact communities in the United States. Emergency response in the aftermath of a major event requires the immediate assembly and dissemination of information on the size, shape, scale and nature of the devastation caused by the natural disaster. Increasingly, accurate mapping data and GIS software are being used to plan, coordinate and respond to a disaster using airborne or satellite reconnaissance as the primary geospatial data source. Currently, however, the primary difficulty with geospatial response is that the mapping and situational data being collected are not immediately available, and there is often no quantitative change assessment of the geospatial data with respect to reference models (i.e., pre-event information) to efficiently determine significant areas of disaster event impact. Through a multi-year grant from the National Science Foundation Hazard SEES (Science, Engineering, and Education for Sustainability) program, we are developing of real-time geospatial infrastructure model for disaster response and rapid recovery. Our specific objectives are to develop methods for: (1) real-time georeferencing of geospatial data (along with an analysis of the obtainable accuracy): (2) rapidly (near real-time) quantitative determination of change post-event using pre-event geospatial data as a benchmark, and (3) dissemination of the detected change into actionable intelligence for emergency responders using infrastructure models and disaster response tools. The proposal will focus on the analysis of LiDAR (Light Detection and Ranging) data due to large amount of pre-event (benchmark) LiDAR data available for urban areas and earthquake hazard zones and because of the unique ability of LiDAR to directly measure high-resolution 3D change.