

Framework for Enhanced End-to-End Capabilities in Disaster Management: Research, Applications, Technology and Operations

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Satellite-based observations of Earth and numerical modeling are leading to new levels of scientific understanding of complex geophysical processes that often lead to natural disasters. Geospatial information products in disaster management increasingly are addressing the operational requirements of decision support systems used by policy makers, emergency managers and responders from international and federal to regional and local jurisdictions. A framework is presented that addresses elements of science research and applications, technology and operations for disaster management. The discussion is based on recognizing information product providers in sectors ranging from government to industry, and operational users and stakeholders in mitigation planning and emergency response. Their diverse requirements are presented. Barriers to meeting these requirements are addressed in terms of needed investments across the four aforementioned elements. Examples indicate that the Earth science research community must continue to demonstrate the potential of observing systems and data for operational decision-making that impacts the ability to reduce losses to life and property. Tools to produce information products through integration, assimilation, modeling and realistic computational simulations must continue to be developed, while addressing issues of data access continuity, completeness, interoperability and validation. Assimilation of science, model outputs and data into decision support tools and systems through applications, validation and performance benchmarking is a critical step. This forms the basis for comprehensive risk assessments and better-informed mitigation planning, disaster assessment and response prioritization. Cost-effective approaches are necessary, with the participation of the commercial sector in distinct elements of an overall architecture, as the resources available are limited. International partnerships and cross-agency relationships can be expected to increasingly enable civil space agencies to develop a broad range of integrated observations and shared data sets that respond to the needs of the global science, operational and policy communities while addressing key questions in the research community. Select hazards as a result of solid Earth processes are used as examples or for scenarios of transitioning satellite remote sensing research to enhanced operational capability, including the integration with airborne and ground-based monitoring.