**Semestrial Report for CEOS DRM Flood Pilot**

**August 2015**

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| **Pilot Name: Flood****Objective or sub-objective:** Model flood events, predict extent, monitor flood wave, compare to river gauges, inter-compare all measurements to improve timing and distribution of flood water distribution modeling. |
| **Date:** August 2015 | **PI:** Bob Kuligowski / Stu Frye |
| **Collaborating organizations:*** CEOS Agencies - NASA, NOAA, USGS, CSA, ESA, JAXA, CNES, ASI, SANSA
* Local/National/Regional Agencies - RCMRD, Namibia Department of Water Affairs, CIMH, Mekong River Commission, Kavango/Okavango River Commission
* Research Centers/Institutes - CIMA, SERTIT, Deltares, JRC, ACRI, HRC, Luxembourg Institute of Science and Technology, Athena Global
* International Organizations – Red Cross/Red Crescent, UNESCO, WFP, World Bank GFDRR
* Universities - University of Maryland, University of Colorado, University of Oklahoma, University of West Indies
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| **Achievements:*** Though not a Flood Pilot Regional Component area, provided real-time imagery (including targeted COSMO-SkyMed data) to numerous users involved in monitoring the May-June floods in Texas.
* INGV generated subsidence maps for the city of Bandung, West Java, Indonesia, from 2007 to 2015, using ALOS-1 and COSMO-SkyMed data.
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| **Activities**:Held training on the Ensemble Framework for Flash Flood Forecasting (EF5) model in Windhoek, Namibia and in Guatemala. Improved regionalized delivery of GPM and GFMS products. Coordinated inclusion of Open GeoSocial API Flood Monitoring software suite as disasters component within the Climatic Information Platform for Central America and the Dominican Republic as part of the Regional Climate Change Program (RCCP). Setup, installation and training in software to be conducted by NASA GSFC personnel supported by SERVIR and USAID in Costa Rica in October 2015. |
| **Data accessed this Period** (#images /satellite)* COSMO-SkyMed (15 over Texas; ~50 over Java, 78 stripmap images for INGV / RASOR subsidence work; 1 image over Dominica)
* RadarSat (104 over Haiti, 1 over Namibia, 3 over Malawi
* Sentinel-1 (15)
* No ALOS-2, SPOT, or Pleiades (access agreements in place; no suitable images available)
 | **Total data accessed to date** (#images /satellite)* COSMO-SkyMed (143)
* RadarSat (198)
* Sentinel-1 (15)
* No ALOS-2, SPOT, or Pleiades
* (INGV received 41 ALOS-1 SAR images under a JAXA scientific project outside the Pilot)
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| **Products:** (delivered this quarter)* May/June Texas floods: COSMO-SkyMed SAR flood areas (courtesy LIST) and EO-1 visible images; GFMS inundation forecasts.
* Nepal floods: GFMS rainfall and streamflow forecasts from July heavy rains plus flood mapping coverage to monitor unstable lakes in Himalayan foothills
* Subsidence maps: INGV subsidence maps for 2007-2011 and 2013-2015, projected subsidence maps
 | **User** (by product)* May /June Texas floods: FEMA, EPA, Texas Water Development Board, Texas Commission on Water Quality, Texas Emergency Operations Center, Governor’s Emergency Management Council (via UT-Austin).
* Nepal floods: Nepal Department of Hydrology and Meteorology, ICIMOD
* Subsidence maps: no user has received the data yet. INGV meeting with users in Indonesia planned in November 2015.
 | **User or practitioner endorsement/opinion/outcomes*** Texas floods: that “The imagery offered a detailed view of inundation impacting agriculture in rural areas, which is information that can be difficult to obtain from other sources. The imagery also helps to fill in the coverage gaps between stream gages that are monitored for current and forecast conditions.” (T. Howard and G. Wells, UT-Austin)
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| **List any publications directly stemming from pilot work*** Article submitted in March for an upcoming *CEOS Special Report on Data Applications* describing the Flood Pilot work in Southern Africa
* Doyle, C., J. Bolten, and J. Spruce, Flood Inundation Mapping in the Lower Mekong River Basin Using Multi-temporal MODIS Observations. *IEEE J. Sel. Topics Appl. Earth Observ. in Remote Sens.* (in review)
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| **List objective milestones and state progress to date (%)*** **Global Component (Objective A)**:
* 2014 Milestone: initial pilot Global Flood Dashboard website with linkages to major global projects and systems (e.g., Sensor Web, U. of Maryland Global Flood Mapping System, Dartmouth Flood Observatory) and archive flood products (e.g., MODIS, UNOSAT flood vectors)
* 2015 Milestone: functional linkages between the Global Flood Dashboard and the three regional flood component areas; indication of regions of interest based on reports of flooding (e.g., International Red Cross, Europe Media Monitor); showcase at World Conference on Disaster Risk Reduction
* Status: 50% complete: Global Flood Dashboard design completed and linkages defined. Still looking for hosting location and exploring four possible options:
	1. Host at GSFC using copy of the Namibia Flood Dashboard as the platform, but instead of regional retrievals from the global systems’ URLs like those displayed in Namibia, it would retrieve data for anywhere requested by the user;
	2. Host on the DEWETRA platform at CIMA with individual data products clickable on the left-hand-side and organized by event
	3. Implement Open GeoSocial API publishers for each of the global data servers;
	4. (Last resort) Set up a site on the Matsu cloud with static links to all of the individual pages serving global products
* **Caribbean Regional Component (under Objective B)**:
	+ 2014 Milestones:
		- Flood dashboard based on Namibia pilot adapted to Caribbean users
			* Status: Prototype Flood Dashboard completed: <http://matsu-flashflood.opensciencedatacloud.org/>
		- Flood monitoring (i.e., targeted EO data acquisitions)
			* Status: Any targeted EO acquisitions in 2014?
		- Contributions of data to KAL Haiti data base
			* Status: Completed
	+ 2015 Milestones:
		- Flood monitoring during 2015 season
			* Status: EO-1 / MODIS / Landsat flood maps for CATHLAC for June floods in Panama; COSMO-Sky-Med and Radarsat-2 data for coverage of Dominica after TS Erika in August
		- RASOR risk management platform operational for flood risk and landslide risk analysis in Haiti
			* Status: COSMO-SkyMed data (from KAL-Haiti database) to RASOR team for subsidence work and revised flood maps
		- 10-year flood archive based on Deltares Flood Monitoring Programme
			* Status: DELTARES has ceased efforts (lack of funding???)
	+ Overall Status: **50%** complete.
* **Southern Africa Component (under Objective B)**:
	+ 2014 Milestones:
		- Flood monitoring during early 2014
			* Status: No acquisitions due to delayed Pilot start
		- Training and capacity development (under Objective C)
			* Status: Completed—Open GeoSocial API training for RCMRD held 8-12 March 2015; SANSA hosted on-site training and capacity development for flood modeling using the newly-released SRTM-2 DEM held 23-27 March 2015
		- Windhoek workshop (under Objective C)
			* Status: Completed—trained forecasters and end users on how to run the Ensemble Framework for Flash Flood Forecasting (EF5) model in Windhoek, Namibia 28 March-3 April 2015
		- Updates to flood dashboard
			* Status: Upgraded Flood Dashboard completed: <http://matsu-flashflood.opensciencedatacloud.org/>
	+ 2015 Milestones:
		- Flood monitoring during early 2015
			* Status: RadarSat image provided for Namibia during flooding on 24 Feb; three Archive RadarSat images of Malawi (13 January—ordered in March) provided to LIST for a Flood Hazard Map
		- 10-year flood archive over region based on Deltares Flood Monitoring Programme
			* Status: DELTARES has ceased efforts (lack of funding???)
	+ Overall Status: **75%** complete.
* **SE Asia Component (under Objective B)**:
	+ 2014 Milestones:
		- User consultations on new pilot products
			* Status: meeting with ICIMOD held in September to coordinate installation of flood modeling and monitoring software suite.
			* Meeting with ADPC delayed until 2015 at request of host agency
		- Test TRMM/GPM-based 1km Global Flood Modeling System products over the Lower Mekong Basin (contingent on river gauge data being obtained)
			* Status: On hold—unable to obtain gauge data so far
		- Flood Dashboard development based on Namibia pilot adapted to SE Asia users;
			* Status: Completed <http://matsu-seasia.opensciencedatacloud.org/>
	+ 2015 Milestones:
		- Operational test bed for RASOR risk management system for test sites in Java
			* Status: INGV / RASOR subsidence maps for 2007-11 and 2013-15 completed plus projected subsidence maps
		- Integration of flood dashboard
			* Status: Completed <http://matsu-seasia.opensciencedatacloud.org/> however, funding for completion of automation ceased so some products are not being updated on website
		- Initial services for Mekong River Commission
			* Status:
		- 10-year flood archive over region based on Deltares Flood Monitoring Programme
			* Status: DELTARES has ceased efforts (lack of funding???)
		- 1st new TRMM/GPM and other flood monitoring products
			* Status: iMERG products being delivered and incorporated into flood modeling systems
		- Overall Status: 50% complete.
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| **Issues identified and risk management approach*** Data access:
	+ Issue: access to some data is limited because of licensing issues
		- A non-CEOS agency (which had declined to join the Pilot) is acquiring data (mainly Radarsat-2) that the Pilots would like to use, but their licensing agreements are (unintentionally) making these data inaccessible to the Pilots and preventing the Pilots from demonstrating their (added) value. An alternative solution would be to have the CEOS agencies insist that all data delivered to their archives and thus be available to the Pilots.
	+ Recommendation: Engagement by CEOS to encourage such non-CEOS agencies to get involved in the Pilots. The Pilots would share their data with the other party and both parties would pool their funds to purchase imagery under renegotiated licensing agreements that would make the data available to both. An alternative solution would be to have the CEOS agencies insist that all data be delivered to their archives and thus be available to the Pilots.
	+ Anticipated benefit: The Pilot benefits by being able to provide map layers (not just the jpegs that others provide) to the users and thus demonstrate greater capability and benefit from EO data in flood management; such non-CEOS agencies benefit by having (free) access to the Pilot data quotas in addition to what they are purchasing and thus expanding their own capabilities, and also benefits from sharing expertise with the Flood Pilot to enhance their own capabilities.
* Data sharing:
	+ Issue: Lack of coordination among the Pilots in image acquisition may result in redundant requests (which will waste valuable quota space) or in one Pilot using their own quota space for a request that actually could be shared between Pilots
		- Example: INGV will need additional (descending) CSK data over Java to refine their subsidence mapping. The Flood Pilot has 84 images left for 2015 but will need to coordinate with the Seismic Hazards Pilot to ensure this need can be met.
	+ Proposed solution: create an on-line, map-based inventory (metadata and links) of all images acquired by all three Pilots to enable each Pilot to identify needed images already acquired by other Pilots. Also provide clearinghouse for pending data requests that are visible across all pilots.
	+ Anticipated Benefit: eliminated risk of redundant data requests by multiple Pilots; reduced risk of individual Pilots reaching their limits. Increased situational awareness of upcoming acquisitions.
* Pilot Management:
	+ Issue: Flood Pilot management coordinated support is becoming more critical to Pilot success for completion of activities and demonstration of on-going flood product delivery assurance after end of the Pilot. As the end of the pilot draws near, added coordination between donor agencies, CEOS agencies, and pilot members will be required to establish sustainment of pilot results: Stu Frye and dashboard efforts are supported by various competed grants from NASA, NOAA, and USGS, with funding for management support provided by ESA. Stu had to stop work earlier this year because of a funding gap, and Andrew’s support has been very helpful but significant extra effort is still required by the co-chairs (one relying on external funding, the other out-of-hide) and communication among the Pilot members has been less than optimal. One result is that many of the projects that comprise the Pilot did not have their efforts represented here.
	+ Proposed solution: Increased, dedicated support for Pilot management.
	+ Anticipated Benefit: More effective and consistent management of the Pilot, better communication / improved visibility of Pilot accomplishments; increased likelihood of successful completion.
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