

**CEOS DRM Thematic Pilots
Semestrial Report for DRM Flood Pilot**

Date: 2 September 2016	PIs: Stu Frye and Bob Kuligowski
<p>Collaborating organizations:</p> <ul style="list-style-type: none"> - <u>CEOS Agencies</u> - NASA, NOAA, USGS, CSA, ESA, JAXA, CNES, ASI, SANSa - <u>Local/National/Regional Agencies</u> - RCMRD, Namibia Department of Water Affairs, CIMH, Mekong River Commission, Kavango/Okavango River Commission - <u>Research Centers/Institutes</u> - CIMA, SERTIT, Deltares, JRC, ACRI, HRC, Luxembourg Institute of Science and Technology, Athena Global, IMWI - <u>International Organizations</u> – Red Cross/Red Crescent, UNESCO, WFP, World Bank GFDRR - <u>Universities</u> - University of Maryland, University of Colorado, University of Oklahoma, UCLA, University of West Indies 	
<p>Achievements:</p> <ul style="list-style-type: none"> - Converted GFMS flood products to GIS layers and distributed via ojo-streamer client—great feedback from FEMA - Completed collection of background Radarsat-2 pre-event imagery for the Caribbean and Central America for impact assessment studies - Installed Open GeoSocial API for publishing / visualizing flood modeling and monitoring products installed at DAI in Costa Rica and conducted a training workshop. System became operational in May: http://centroclima.org/powered-by-nasa/ - SERVIR grant secured to transition Namibia, Kenya, and South Africa from CREST flood model to EF5 - SERVIR grant secured to ensure continuity of SE Asia work with ADPC and Mekong River Commission - RASOR team analyzed future flood risk in Bandung based on subsidence mapping from comparing ALOS and CSK data - RASOR team also used Pleiades data to develop improved building and usage maps for Jakarta, Bandung, and Cilacap (Indonesia) and Gonaives (Haiti) 	
<p>Activities: The team continued to distribute EO data to partner organizations for both real-time flood monitoring and risk analysis, including Sri Lanka (May), Myanmar (June), Mexico (June), China (June), West Virginia, USA (July), Louisiana, USA (August), India (August) and Belize (August). Flood modeling work in Africa continues, including evaluating the impact of using stream networks from Landsat-8 in flood models and evaluating flood model forecasts for the Zambezi using EO-derived flood extent maps. Capacity building efforts included a 2-day disaster training course on disasters (including floods) for AmeriGEOSS participants conducted in Bogata in June and demonstration of the Open GeoSocial API interface on the ojo-streamer client to World Bank GFRR personnel and to the head of disaster management in Sri Lanka in July.</p>	
<p>Data accessed since March (#images /satellite)</p>	<p>Total data accessed to date (#images /satellite)</p>

<ul style="list-style-type: none"> - 0 ALOS-2 - 8 Landsat-8 - 11 EO-1 - 5 Sentinel-1A - 6 Radarsat-2 - 4 COSMO SkyMed - 9-12 Pleiades (includes a set of 4 strips corresponding to 7-9 individual images) 	<ul style="list-style-type: none"> - 40 ALOS-2 - 78 Landsat-8 - 81 EO-1 - 52 Sentinel-1A - 123 Radarsat-2 - 107 COSMO-SkyMed - 9-12 Pleiades (includes a set of 4 strips corresponding to 7-9 individual images) 	
<p>Products: (delivered this quarter)</p> <ol style="list-style-type: none"> 1. GFMS flood products from flooding in China (June), West Virginia, USA (July), and Louisiana, USA (August) 2. Optical imagery for Sri Lanka (May), Myanmar (June), Mexico (June), India (August), Belize (August) 	<p>User (by product)</p> <ol style="list-style-type: none"> 1. FEMA 2. University of Serena (Chile) 3. ICIMOD and Army Corps of Engineers 4. ISRO and International Water Management Institute 	<p>User or practitioner endorsement/opinion/outcomes</p> <ul style="list-style-type: none"> • Strong FEMA endorsement of API-distributed GIS layers of flood products “This is absolutely the direction we want to head”. (C. Vaughan)
<p>List any publications directly stemming from pilot work</p> <ul style="list-style-type: none"> - Jones, B., and S. Frye, 2016: International Charter / CEOS Flood Pilot (oral presentation). NASA Flood Response Workshop. - Kuligowski, R. J., and S. Frye, 2016: The CEOS Working Group on Disasters Flood Thematic Pilot (poster). NASA Flood Response Workshop. - Rudari, R., S. Frye, and B. Kuligowski, 2016: CEOS Disaster Risk Management Flood Pilot (oral presentation). 2016 Understanding Risk Forum. - Schumann G. J-P., Frye S., Wells G., Adler R., Brakenridge R., Bolten J., Murray J., Slayback D., Green D., Wu H., Kirschbaum D., Howard T., Flamig Z., Clark R., Chini M., Matgen.P., Stough T., B. Jones, 2016: Unlocking the Full Potential of Earth Observation during the 2016 Texas Flood Disaster. <i>Water Resources Research</i>, 52(5), 3288-3293. - Schumann, G. J-P and K. M. Andreadis (2016). A method to assess localized impact of better floodplain topography on flood risk prediction, <i>Advances in Meteorology</i>, 6408319. - Tolomei, C., S. Salvi, A. Lugari, J. Beckers, M. Huber, G. Pezzo, and L. Rossi, 2016: Multitemporal InSAR data to develop natural hazard scenarios for the Bandung area (Western Java, Indonesia) (oral presentation). ESA Living Planet Symposium 2016. - Wu, H. and Adler, R., “Evaluation of Quantitative Precipitation Estimations (QPE) and Hydrological Modeling at the Iowa Flood Studies Focal Basins.”, 2016 <i>Journal of Hydrometeorology</i>, in review. 		

List objective milestones and state progress to date (%)

- Objective A: Global Component 75%
 - 2014 Milestone: initial pilot Global Flood Dashboard website with linkages to major global projects and systems and archive flood products
 - 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; showcase at WCDRR
 - Status: Telecon with B. Koetz (ESA) to discuss concept of using GeoOpenSocial API to allow regional users to post and access products that could be hosted at Hydro-TEP or on Amazon Cloud. ESA is currently considering it and will provide a response in September.
 - 2016-17 Milestone: draft a plan for longer-term sustainability; provide functional linkages to additional user-selected polygons of interest beyond the three regional Pilot areas.
 - Status: In concert with GeoDARMA, reach out to UN World Bank, International Red Cross, and other potential partners to implement the Flood Pilot monitoring capabilities on a more permanent basis
- Objective B: Regional Pilots
 - Caribbean / Central American component 50%
 - 2014 Milestones:
 - Flood dashboard based on Namibia pilot adapted to Caribbean and Central American users
 - Status: Prototype Flood Dashboard completed: <http://matsu-flashflood.opensciencedatacloud.org/>
 - Flood monitoring (i.e., targeted EO data acquisitions)
 - Status: Targeted EO acquisitions in 2014 for Guatemala, Panama, Trinidad, Haiti, and Belize
 - Contributions of data to KAL Haiti data base
 - Status: Completed
 - 2015 Milestones:
 - Flood monitoring during 2015 season
 - Status:
 - Panama (June); EO-1 / MODIS / Landsat flood maps for CATHLAC
 - Dominica (August—TS Erika): COSMO-Sky-Med, Radarsat-2, and EO-1 data
 - Bahamas (October—H Joaquin); EO-1 images, GPM rainfall, GFMS flood predictions, flood maps from multiple sensors
 - RASOR risk management platform operational for flood risk and landslide risk analysis in Haiti
 - Status: nothing new to report since subsidence mapping described in March report
 - 10-year flood archive based on Deltares Flood Monitoring Programme
 - Status: on hold due to funding constraints.
 - 2016-17 Milestones:

- Flood monitoring during 2016 season
 - Status: Provided optical imagery (EO-1 and MODIS) and GFMS for Mexico (TS Danielle—June) and Belize (H Earl—August)
- Draft a plan for longer-term sustainability
 - Status: Intent is to transition much of this work into AmeriGEOSS, but details need to be worked out
- Southern Africa component 75%
 - 2014 Milestones:
 - Flood monitoring during early 2014
 - Status: Acquisitions from NASA and CSA under previous agreement within GEO task
 - Updates to flood dashboard
 - Status: Upgraded Flood Dashboard completed: <http://matsunamibiaflood.opensciencedatacloud.org/>
 - 2015 Milestones:
 - Flood monitoring during early 2015
 - Status: Radarsat-2 images provided for Namibia during flooding on 24 Feb; three Archive Radarsat-2 images of Malawi (early January—ordered in March) provided to LIST for Flood Hazard Mapping that were Disaster Charter acquisitions
 - 10-year flood archive over region based on Deltares Flood Monitoring Programme
 - Status: on hold due to funding constraints
 - 2016-17 Milestones:
 - Flood monitoring during 2016 season
 - Status: Quiet flood season thus far, so no support provided
 - Draft a plan for longer-term sustainability
 - Status: Intent is to transition much of this work into AfriGEOSS but details need to be worked out
- Southeast Asia component 80%
 - 2014 Milestones:
 - User consultations on new pilot products
 - Status: Open GeoSocial API flood forecasting and event mapping software installed at ICIMOD in 2015.
 - New SERVIR funding secured to install new flood products at ADPC (e.g., J. Bolten's NDVI differential product for the Mekong)
 - SERVIR grant for OpenGeoSocial API installation was not funded but hoping to leverage the above work
 - Test TRMM/GPM-based Global Flood Modeling System (GFMS) 1km resolution flood modeling product over the Lower Mekong Basin (contingent on river gauge data being obtained)
 - Status: On hold—unable to obtain gauge data for this application. SERVIR project may provide a way forward.
 - Flood Dashboard development based on Namibia pilot example

adapted to SE Asia users;

- Status: Completed <http://matsu-seasia.opensciencedatacloud.org/>; intent is to replace this instance with an Open GeoSocial API implementation hosted by ADPC
- 2015 Milestones:
 - Operational test bed for RASOR risk management system for test sites in Java
 - Status: RASOR team analyzed future flood risk in Bandung based on subsidence mapping from comparing ALOS and CSK data. Phase 2 proposal by RASOR team to fund extensions of 2007-11 / 2013-15 risk mapping work is currently under review by the EC
 - Integration of flood dashboard
 - Status: Current Dashboard may be replaced by OpenSocial API hosted by ADPC
 - Initial services for Mekong River Commission
 - Status: See above
 - 10-year flood archive over region based on Deltares Flood Monitoring Programme
 - Status: on hold due to funding constraints.
 - 1st new TRMM/GPM and other flood monitoring products
 - Status: iMERG precipitation products and GFMS Flood Nowcast being served under Open GeoSocial API at <http://ojo-streamer.herokuapp.com/>
- 2016-17 Milestones:
 - Flood monitoring during 2016 season
 - Status: Provided optical imagery for flooding in Sri Lanka (May), Myanmar (June), and India (August)
 - Draft a plan for longer-term sustainability
 - Status: Intent is to build this capacity into ADPC via the SERVIR Applied Science Grant but details need to be worked out

Issues identified and risk management approach

Data distribution among participating CEOS agencies remains highly uncoordinated and decentralized—this is an outstanding challenge for both current Pilot operations and longer-term sustainability