Proposed CEOS Disaster Risk Management Flood Demonstrator

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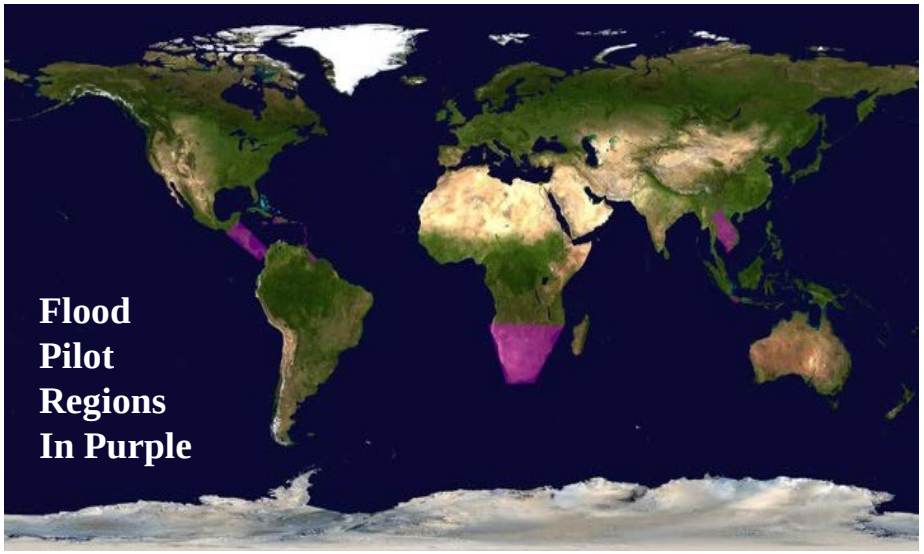
Outline

- **Flood Pilot Accomplishments (5 pages)**
- **Flood Demonstrator Overview (5 pages)**
  - **Transition from Hazard Identification to Risk Assessment**
  - **Spatial Scaling between Regional and Global**
  - **Mapping Flooded Areas Where it Matters Most**
- **Leveraging GEO-DARMA Regional Risk Assessments and Connections With End Users**
- **Flood Demonstrator Team**
- **CEOS Data Request**
- **Questions/Discussion**

CEOS DRM Flood Pilot Goals

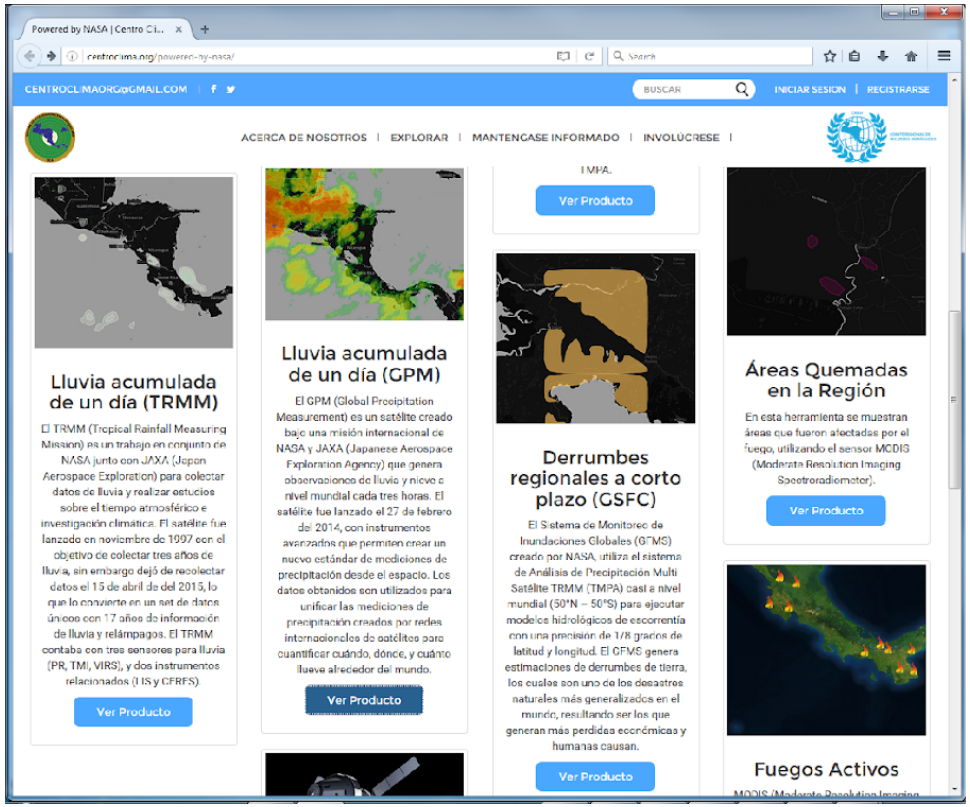
- **Goal:** demonstrate effective application of EO to the full cycle of flood management at all scales by:
  - **Objective A:** Integrating information from existing NRT global flood monitoring / modeling systems into a Global Flood Dashboard;
  - **Objective B:** Delivering EO-based flood mitigation, warning, and response products and services through regional end-to-end pilots
  - **Objective C:** Encouraging at least base-level in-country capacity to access EO and integrate it into their operational systems and flood management practices



Flood Pilot Accomplishment: Streamlined Near-Real-Time Data Access

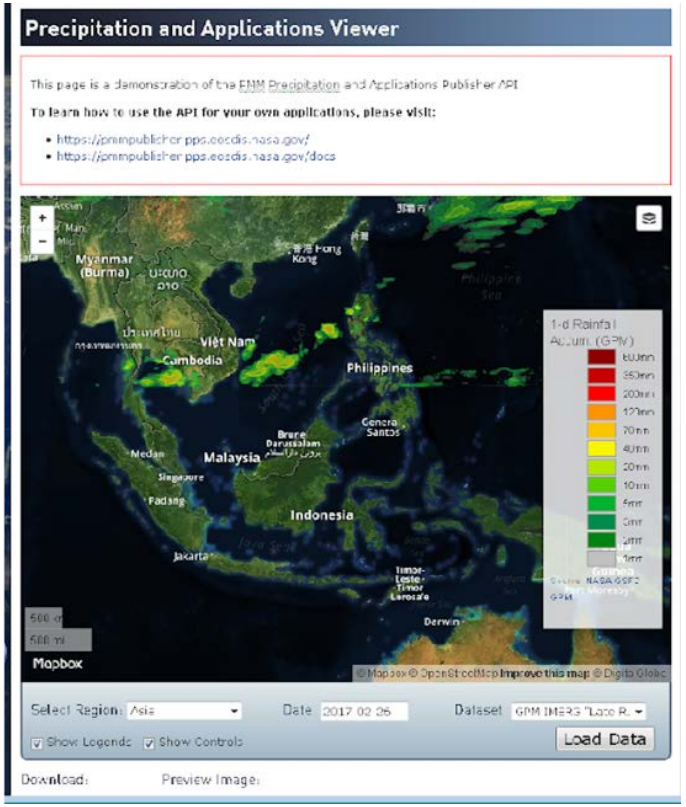
Central America

http://centroclima.org/powered-by-nasa/



Southeast Asia

https://pmm.nasa.gov/precip-apps

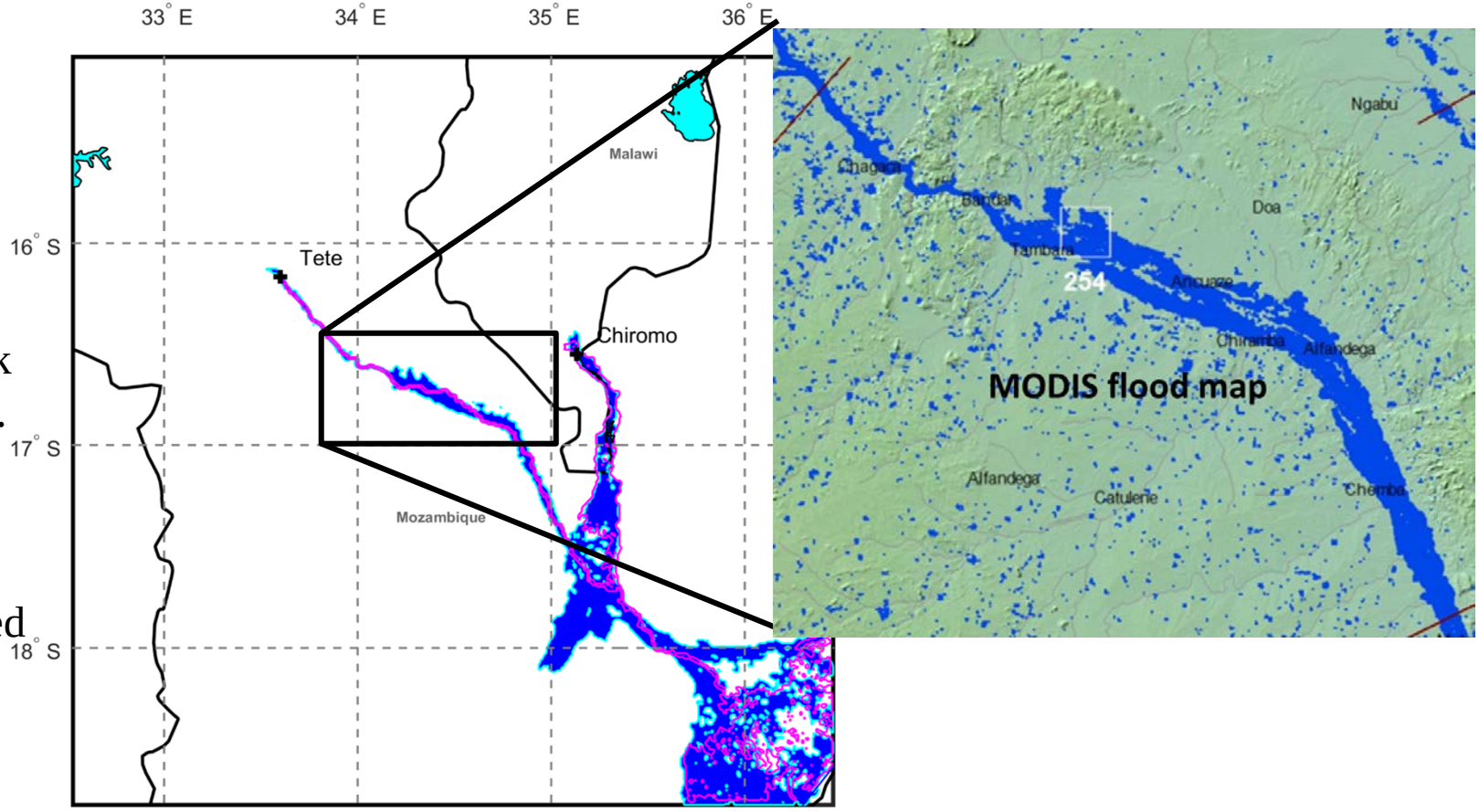


Also see the Southern Africa regional flood dashboard at http://matsu-namibiaflood.opensciencedatacloud.org/

Flood Pilot Accomplishment: Better Flood Parameter Observations for Better Forecasts

Pink outline: Simulation based on HydroSHEDS stream network & river widths.

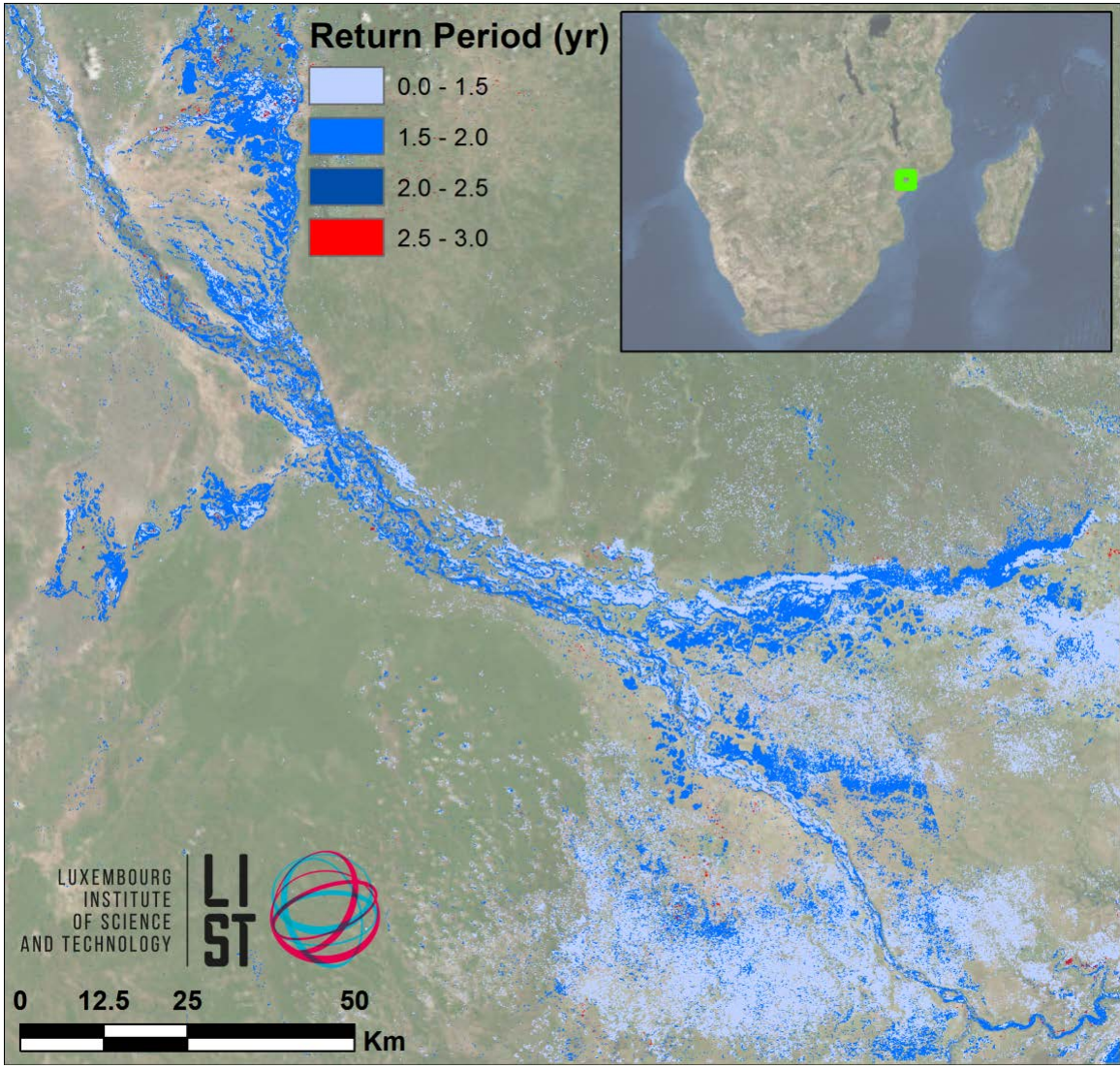
Blue area: Simulation based on Landsat-derived stream networks & river widths.



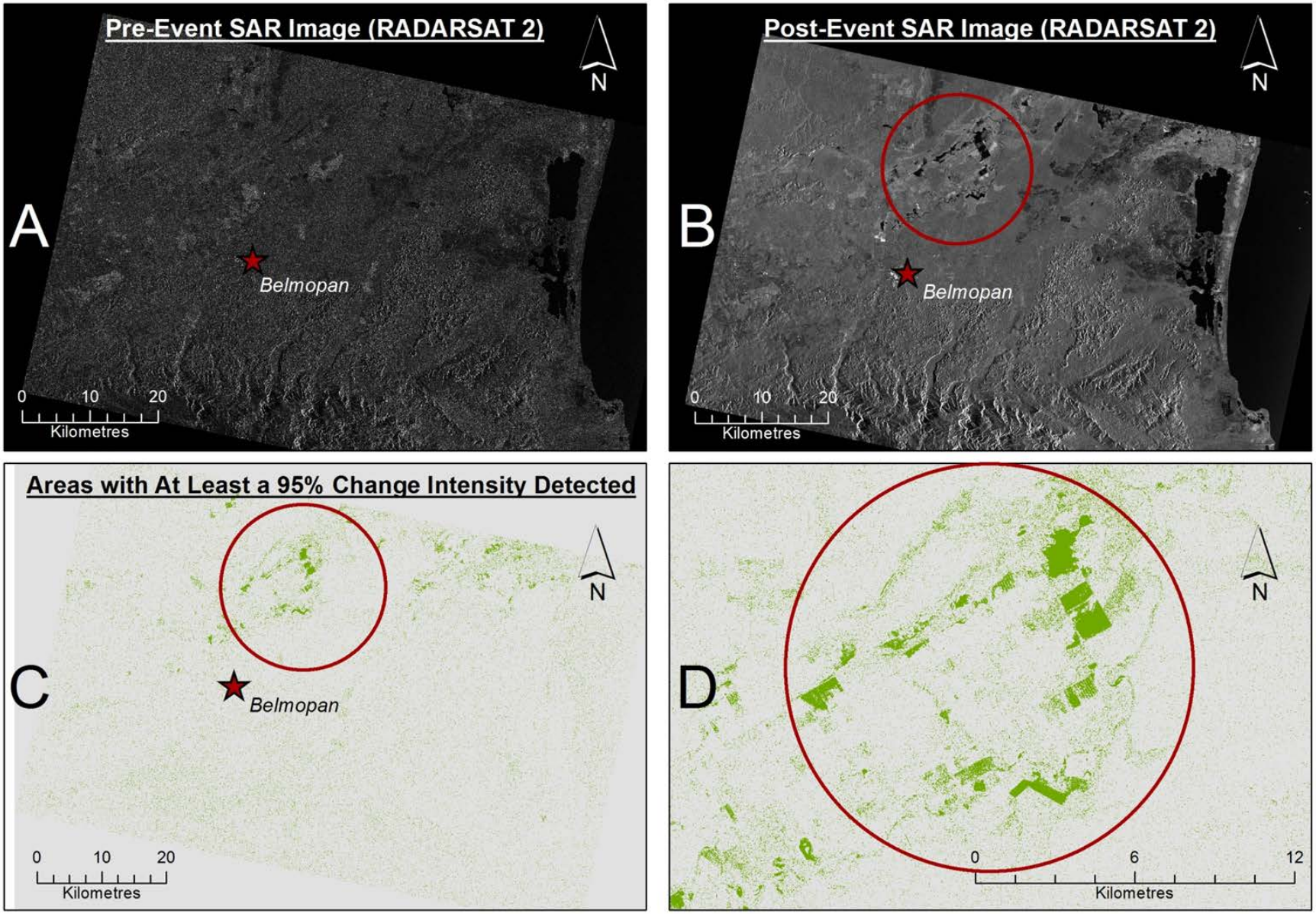
More realistic and complete stream networks from EO data leads to improved flood model simulations in regions with few gauges (Credit: G. Schumann, UCLA)

Flood Pilot Accomplishment: Better Estimates of Flood Severity

- LIST flood hazard maps determine flood severity by comparing flood extent in a SAR image with computed extent / return period from simulated historic floods
- The UN World Food Programme has shown interest



Flood Pilot Accomplishment: Developing Local Capacity to Evaluate Flood Damage



CEOS Flood Demonstrator Formulation

- Created a formulation sub-group with flood pilot team members to examine results of previously listed consultations as well as new areas to demonstrate satellite data integration, in particular:
  - Scalability of user interface, to move from global views to local views seamlessly;
  - Moving from hazard to risk, identifying ways in which EO data can improve other aspects of the risk equation (exposure, vulnerability) and improving display of risk information;
  - Increasing user uptake of demonstrated methodologies in three specific geographic areas, working directly with end users.
- Sub-group to report to WG Disasters meeting March 2018 in Brussels on Status of Flood Demonstrator implementation plan

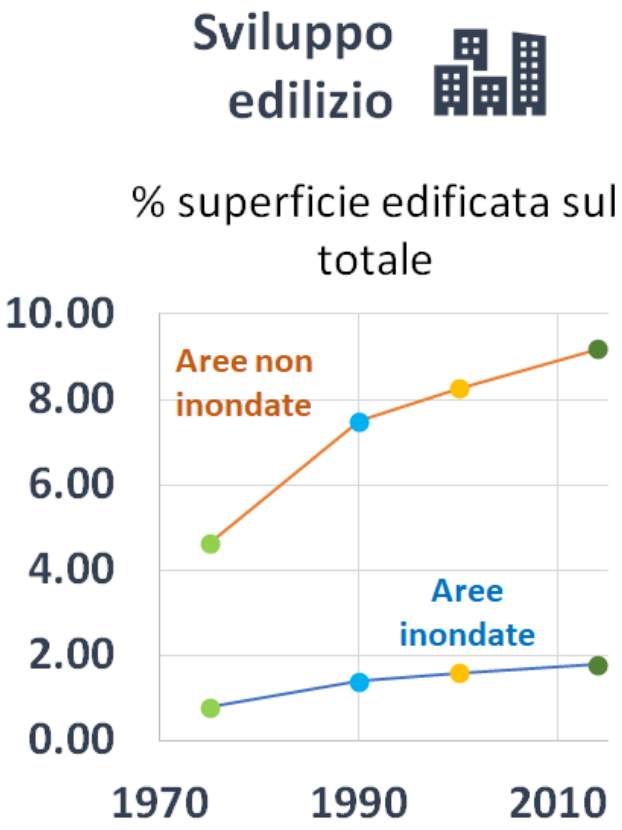
Proposed CEOS DRM Flood Demonstrator

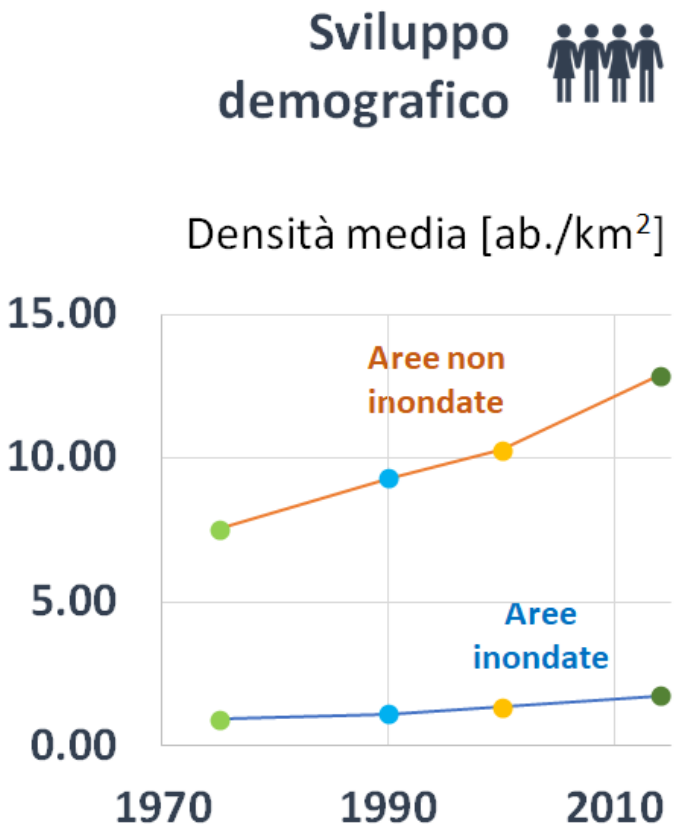
Goal: Build on and extend the successes of the Flood Pilot in three focus areas:

1. Transition from Hazard Identification to Risk Quantification
   - Proactive identification of areas of flood risk is the critical next step for improving Disaster Risk Reduction
   - Archival EO data will be used along with flood models to quantify risk based on historic flooding
2. Spatial Scaling for Users between Regional and Global
   - Build upon the existing flood portals to create an integrated flood data portal that serves both global and regional users
   - Provide access to both archive and near-real-time EO data products
3. Mapping Flooded Areas where it Matters the Most
   - Urban areas carry significant populations and significant flood risks
   - Improvements in spatial resolution are now making it possible to accurately map flood risk in urban areas

From Hazard Identification to Risk Assessment

- Specific question is how to best quantify flood risks in ways that are actionable by end users
- End users will only trust risk maps if they can be validated against model forecasts and monitoring data on multiple scales

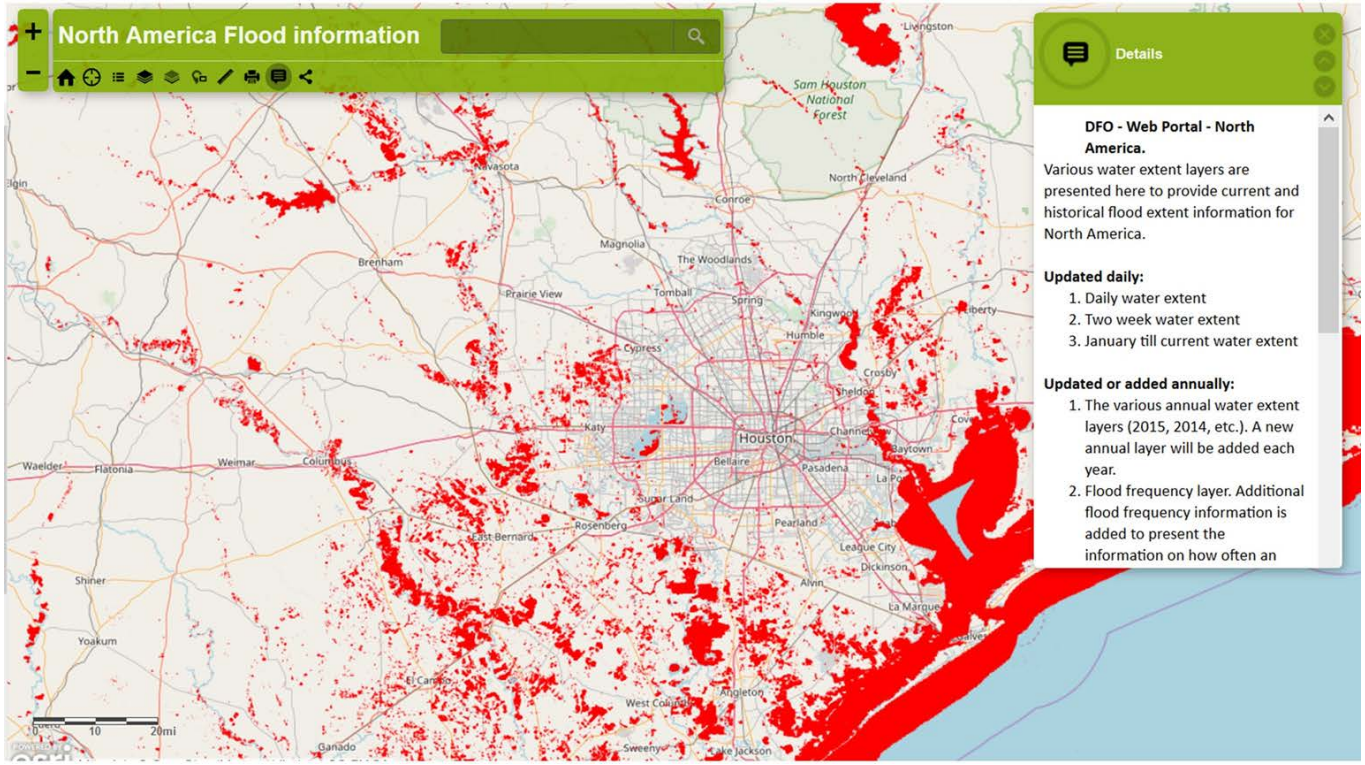




Evolution of flood risk change in the Murray-Darling basin: % of total built area and population density (both from satellite imagery: GHS Built & GHS Pop) within inundated and non-inundated area over time (credit: University of Bologna & Guy Schumann)

Spatial Scaling for Users - Regional and Global

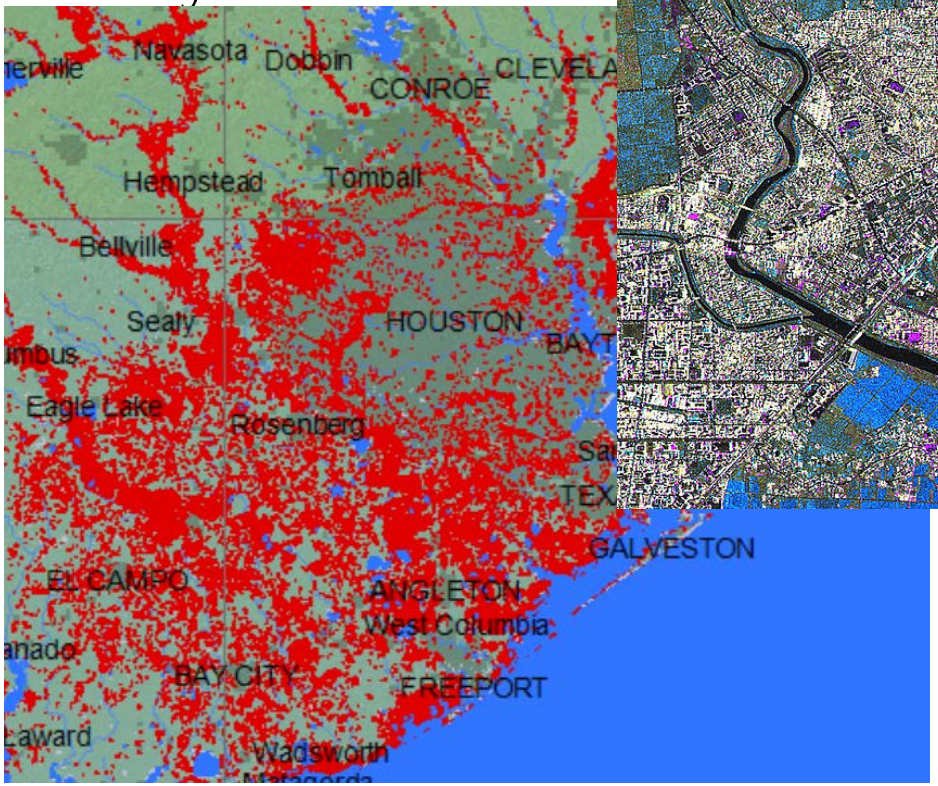
- Utilize regional flood dashboard concept developed in pilot to seamlessly integrate across national, regional, and global data sets to validate global systems on a local scale
- Include risk maps in addition to flood hazard and forecast maps that can be visualized on a map as well as downloaded by users



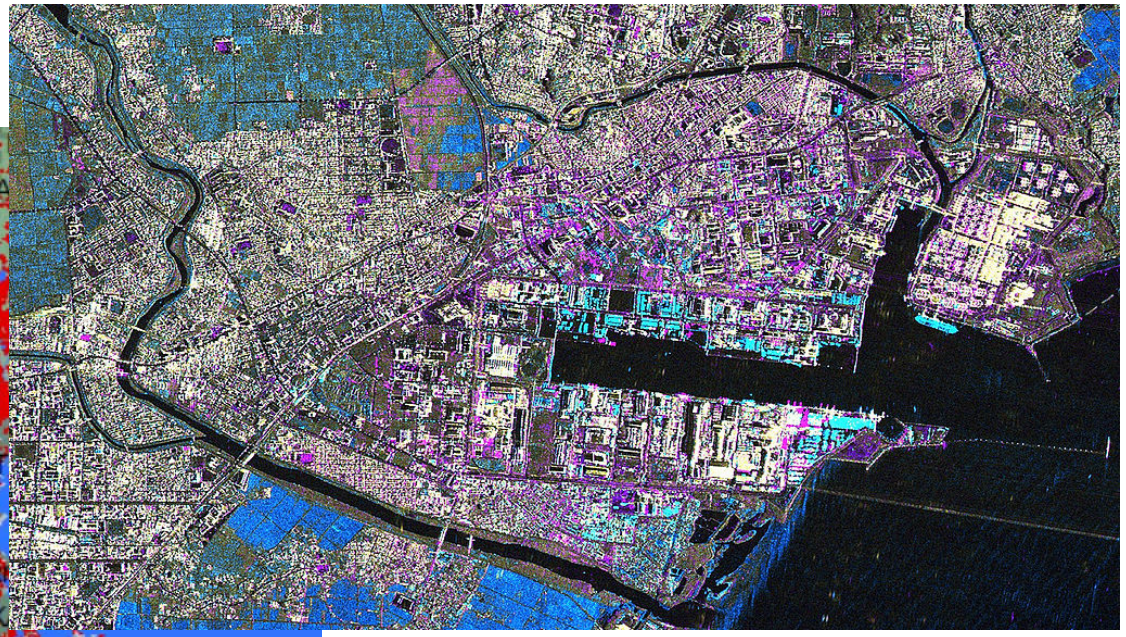
DFO's Web Map Service (WMS) allows users to display layers from local to global scale

Mapping Flooded Areas where it Matters the Most

- Leverage archive data and new images to improve urban flood mapping records
- Develop flood risk maps to include latest DEM, land use/land change, and population data layers



DFO's map showing flooded areas within and around the urban area of Houston during Harvey



TerraSAR-X image showing flood damages after the 2011 tsunami in the port of Sendai

- Integrate historical tsunami records in addition to precipitation induced flooding

Leveraging GEO-DARMA Risk Assessments and Interacting with End Users Across Efforts

- Explore Urban Flood Risks in Asia with GEO partners
  - In communication with UNESCAP and ADPC as end users in this region – will engage national and city-level agencies
  - Will leverage GEO-DARMA Asia Risk Assessments
- River Basin Risks in Africa
  - Working with RCMRD and CIMA Foundation end users to develop risk assessments for flooding along Africa river basins
  - Will leverage GEO-DARMA Africa Risk Assessments
- Latin America / Caribbean Flood Risk Development
  - Bring in AmeriGEOSS partners in this region through collaborating CEOS agencies (e.g., CONAE, INPE, etc.) to complete GEO-DARMA regional risk assessments and work with end users such as CDEMA, CIMH, and others

Flood Demonstrator Team

- Lead to be identified from a CEOS agency
- Contacted CNES and EU partners to gauge interest…still need to contact other WG Disasters members
- Volunteers willing to be members of the demonstrator team:
- Shawn Boyce (CIMH)
- Albert Kettner (U. of Colorado / Dartmouth Flood Observatory)
- Patrick Matgen (LIST)
- Roberto Rudari and Giorgio Boni (CIMA)
- Guy Schumann (RSS / U.of Colorado)
- Sandro Martinis (DLR)

Requested Data from CEOS Agencies
(In addition to Other Freely Available Data from NASA and ESA)

- Continued Access to Charter Data (optical and SAR)
- SAR (250 archive images/50 new acquisitions per year per agency)
  - Cosmo Sky-Med
  - Radarsat-2
  - SAOCOM
  - NISAR
- Optical Imagery:
  - Pleiades
  - Other Digital Globe/MDA and Planet partners
  - Drone data where available

Questions / Discussion

1. CEOS support for the Flood Demonstrator proposal?

2. Go forward to SIT-33?