GEOSS AIP-5 Disaster Management Accomplishments

Presented at the January 2013 OGC TC EDMWG meeting in Redlands

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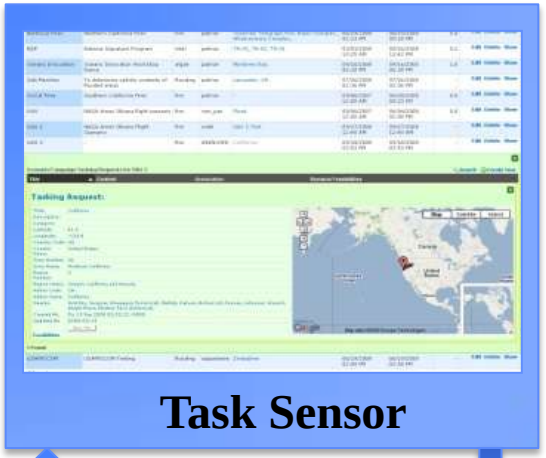
14 January 2013

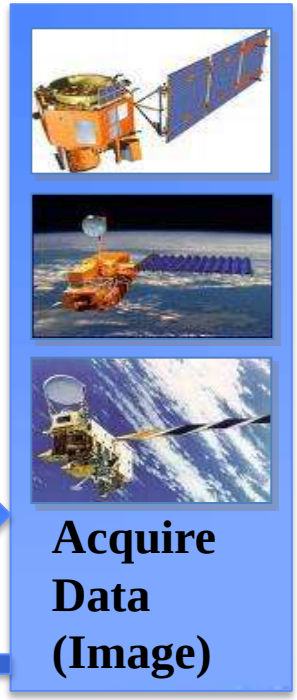
AIP-5 Contributions

- Within Disaster Management Working Group (DMWG)
  - Targeted satellite images of disasters occurring during AIP-5 timeframe
  - Customized autonomous processing of disaster maps in CEOS-GEO disaster pilot regions
  - Development of full-resolution tiled KML overlays of disaster maps
  - Exercise of OpenID/OAuth web services security API
  - Introduction of Open Street Map (OSM) field validation approach for correcting data product mis-classifications
  - Improvements to product publication, subscription, and notification functionality and revision to disaster use case descriptions to update operations concept for improved pub/sub activities
- Coordination with other AIP-5 Working Groups
  - Use of OSM for water mapping with Water WG
  - Harmonization of CEOS disaster architecture with AIP-5 Architecture WG
  - Training/support for uptake of satellite data with Capacity Building WG
  - Demonstration for use of high resolution imagery in drought analysis with Agriculture WG
  - Exploration of OpenID/OAuth API and digital rights management functions with the Data Sharing WG

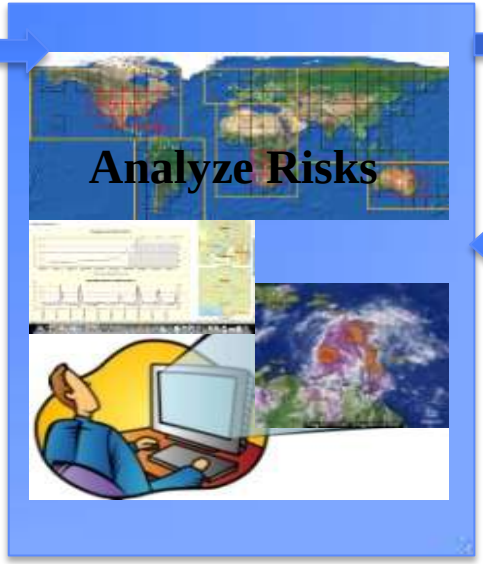
AIP-5 DMWG Results/Accomplishments

- MODIS, EO-1, and Radarsat-2 coverage for hurricanes Ernesto, Isaac, and Sandy for Jamaica, Barbados, St Lucia, British Virgin Islands
- Coverage for flooding in Panama, earthquake in Guatemala, algal bloom in El Salvador, wildfires in Belize, landslides in Trinidad
- 34 Radarsat-2 and 19 EO-1 images targeted and delivered plus daily coverage with MODIS
- Worked with CSA and MacDonald-Dettwiler to begin development of a REST-ful tasking interface between the Campaign Manager (geobpms.geobliki.com) and the Radarsat-2 image ordering system
- AIP-5 DMWG results depicted in GEO Plenary Presentation and demo capture video at https://vimeo.com/53589630
- DMWG Engineering Report posted on 4 January 2013 at http://twiki.geoviqua.org/twiki/pub/AIP5/DMScenarios/121031_AIP_DM_SBA_ER_1.0.doc

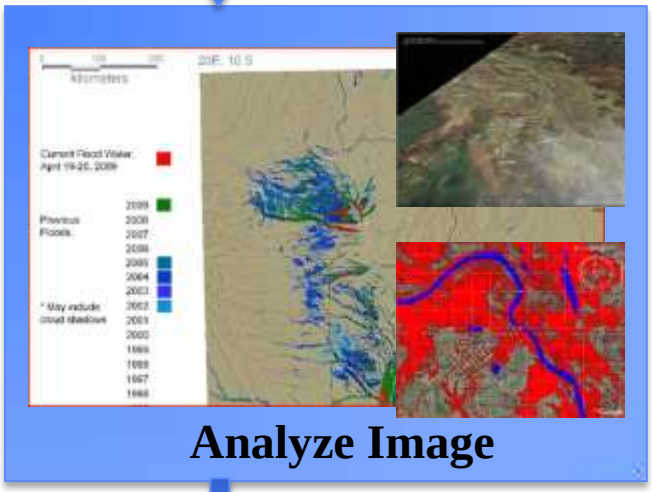


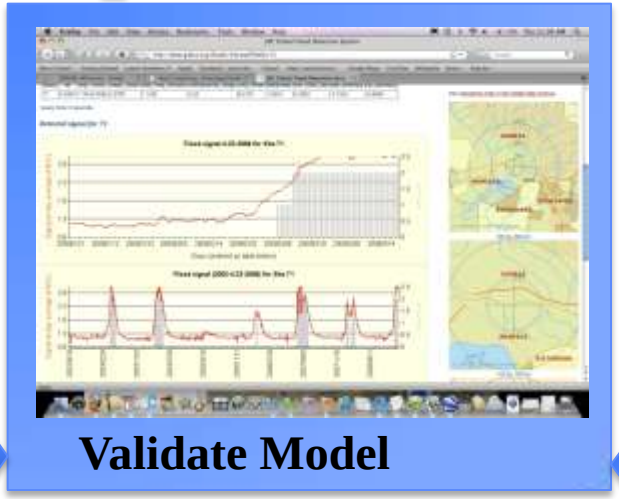


Initiate Request

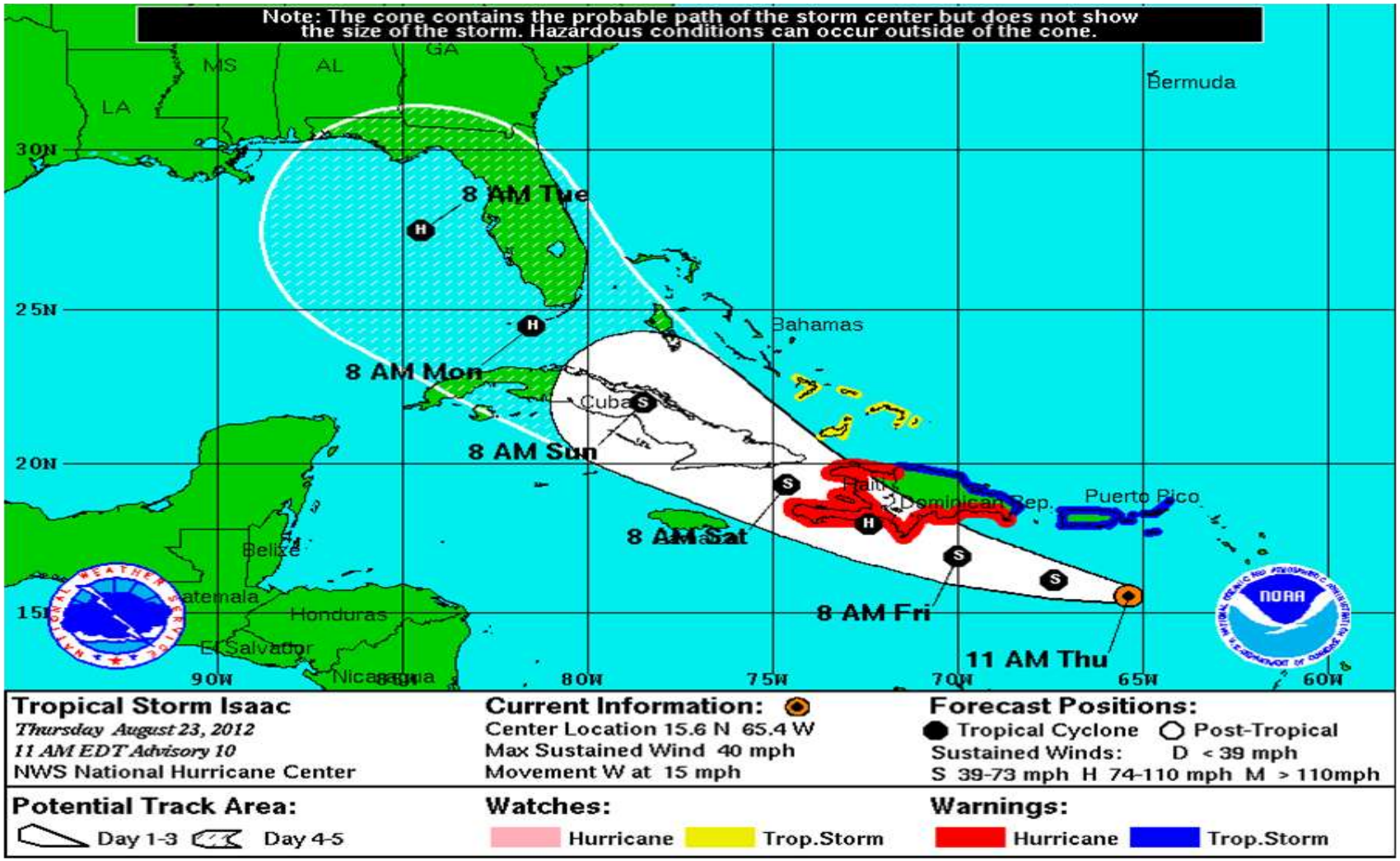


NASA Disaster Sensor Web Concept

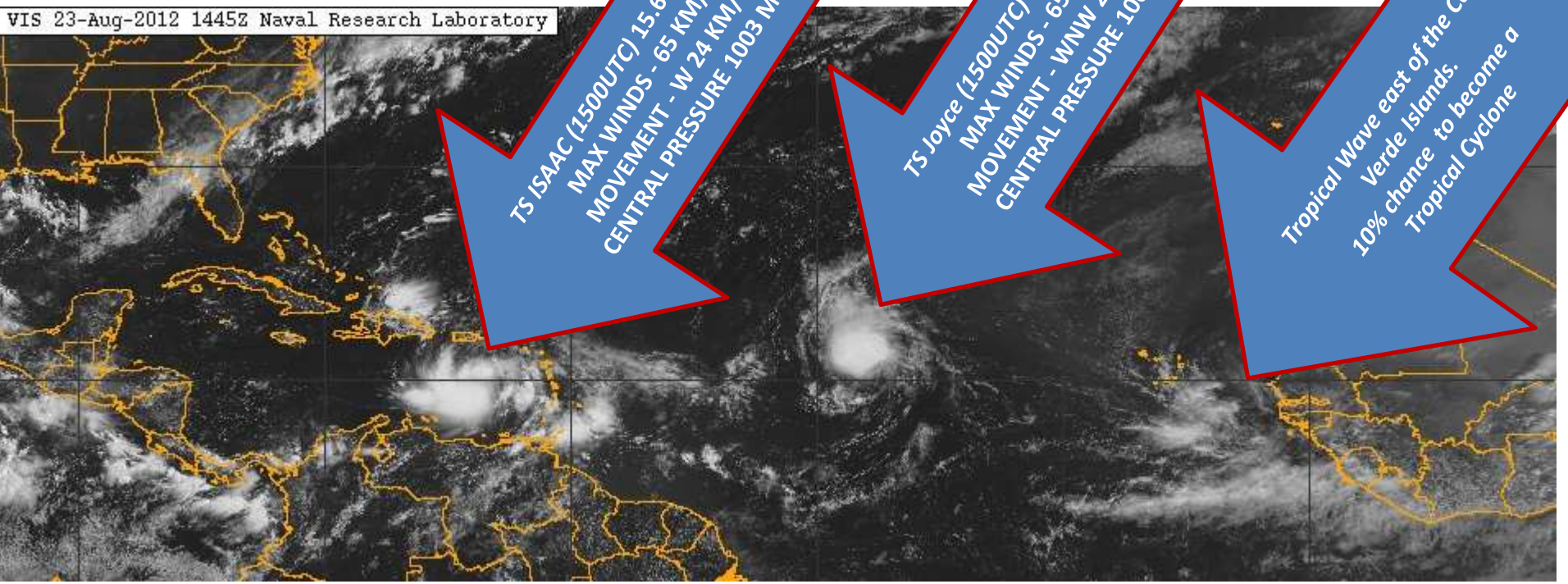




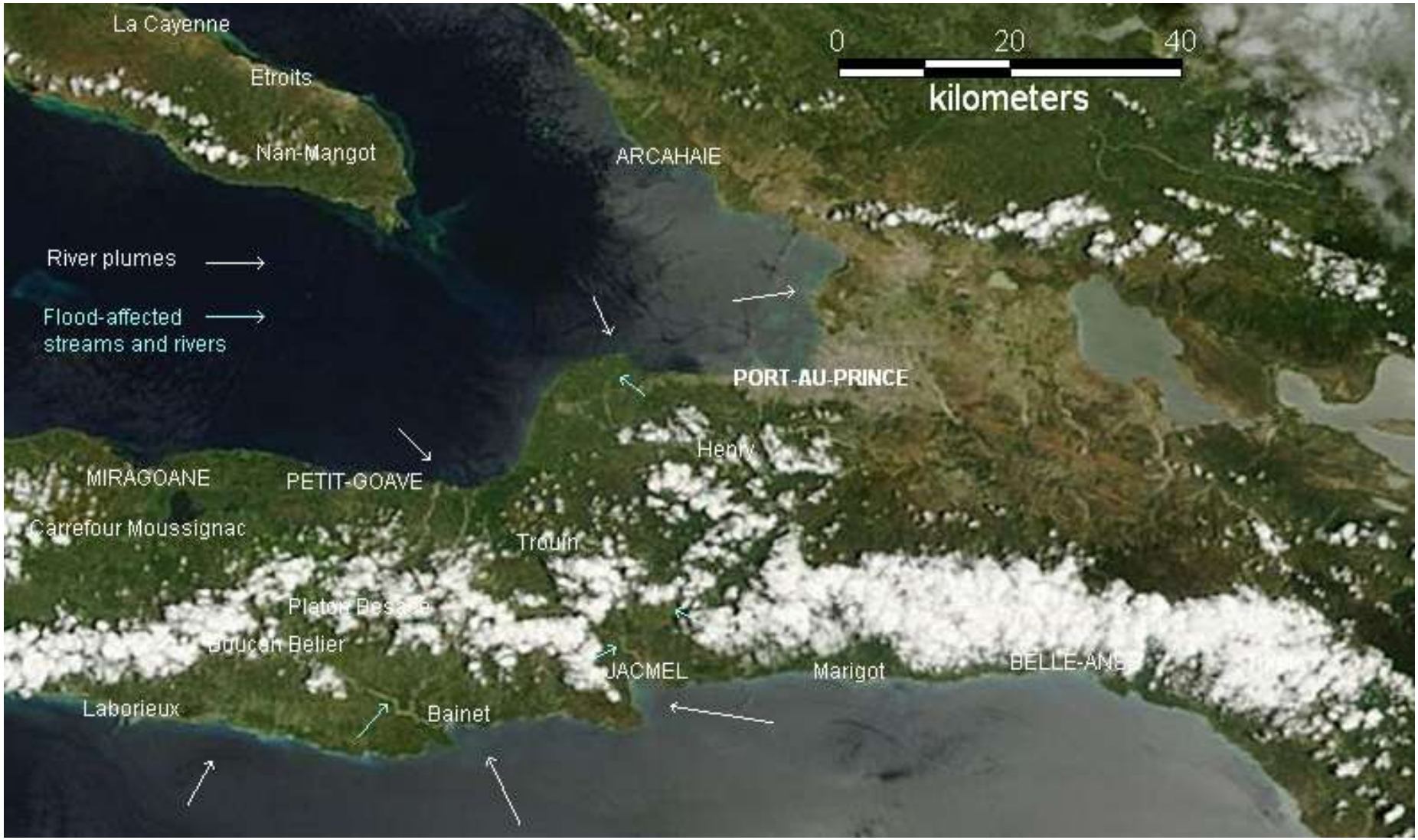
Triggering Scenario using NHC's Potential Track for Isaac



23 Aug 1445 UTC VIS Composite from GOES

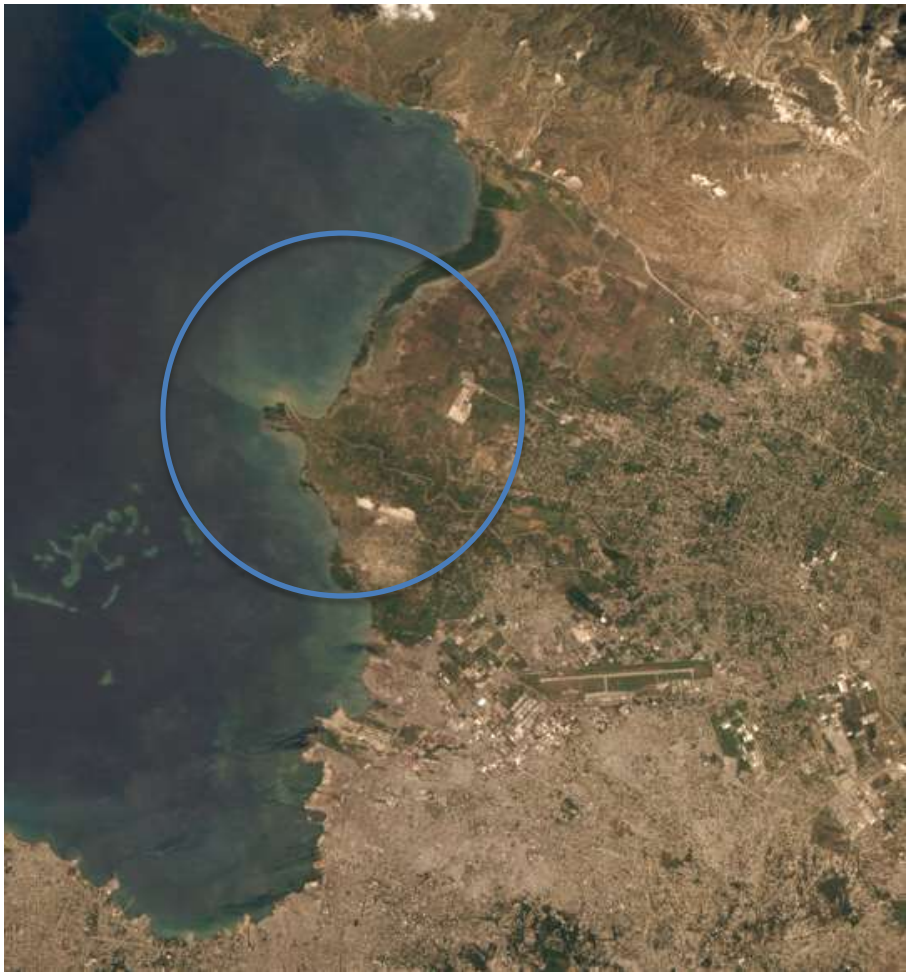


MODIS – Hurricane ISAAC aftermath



Daily optical satellite images are useful for large scale assessments of flooding and runoff conditions

EO-1 Port of Prince, Haiti Before and After Hurricane Isaac



August 18, 2012 EO-1 ALI pan-sharpened image (10m)

August 31, 2012 EO-1 ALI pan-sharpened image (10m)

High resolution optical triggered from daily detections can show detailed disaster features except where clouds are present

EO-1 North of Port of Prince, Haiti Before and After Hurricane Isaac

Zoom-in of August 18, 2012 EO-1 ALI image

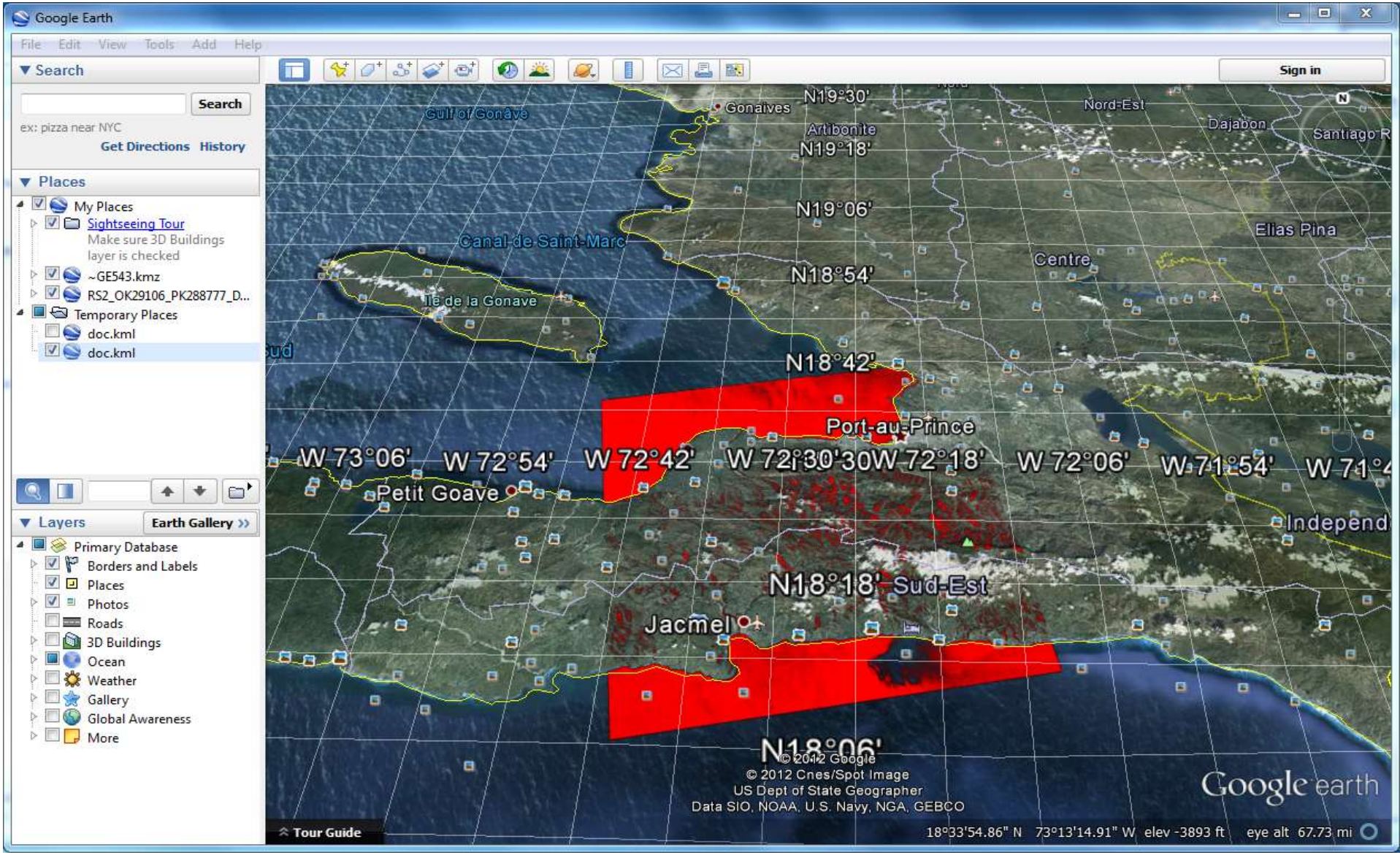
Zoom-in of August 31, 2012 EO-1 ALI image

Autonomous Web Coverage Processing Service hosted on cloud computing platform used to generate tiled doc.kml for geo-located high resolution product with minimum size

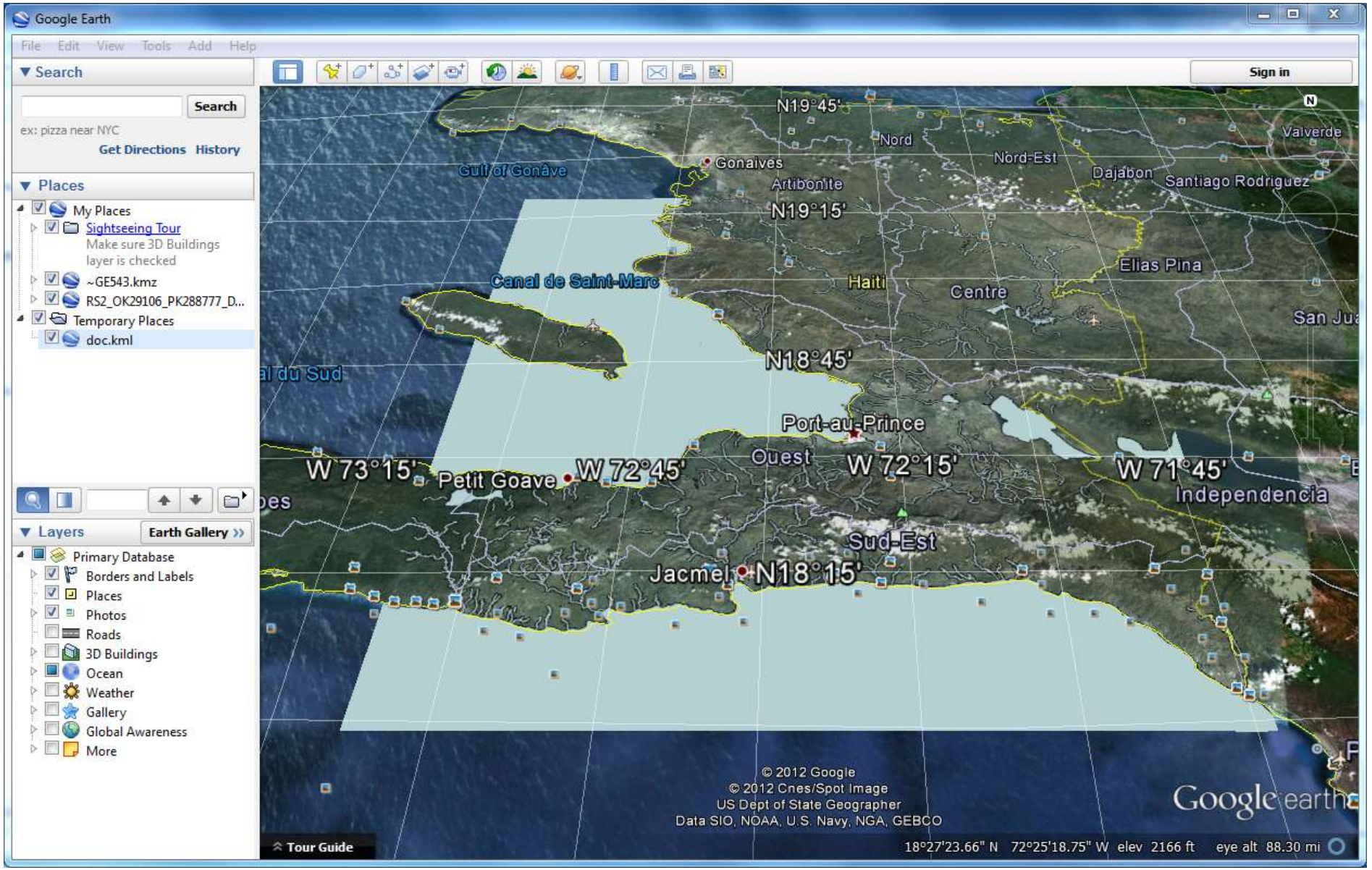
Radarsat-2 ISAAC Aftermath - Haiti Processing from 25 August 2012 Image

- Developed processing on radarsat.geobliki.com to extract water extent from Radarsat-2 image and show detected water as red layer in Google Earth (see next page)
- Extracted Open Street Map (OSM) baseline water levels as light blue layer for overlay on top of red detected water (red) layer (second page)
- Served both as tiled doc.kml layers (third page)
  - See the light blue overlay containing OSM normal water levels hiding normal water in red detection layer to show only what is flooded as red
  - High resolution image (less than 5 meter pixel size) needs validation to confirm truly flooded from false positives (reflectance from steep slopes) and false negatives (vegetated areas hiding flood water)
  - Validation can be crowd-sourced using OSM tools to gather corrections and publish corrected maps

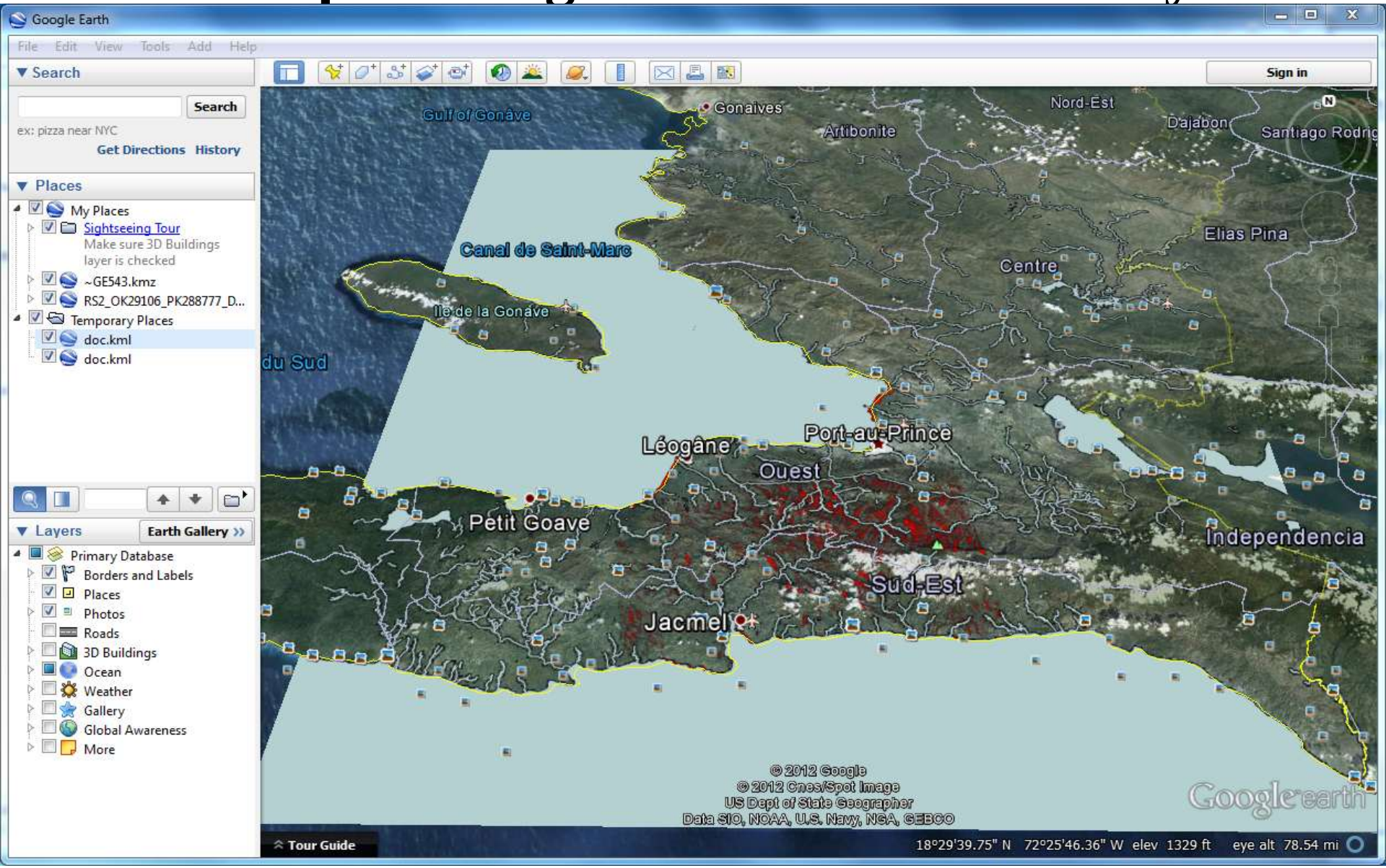
R-2 Detected Water Extent (Red) Map



OSM Normal Water Level (light blue overlay)

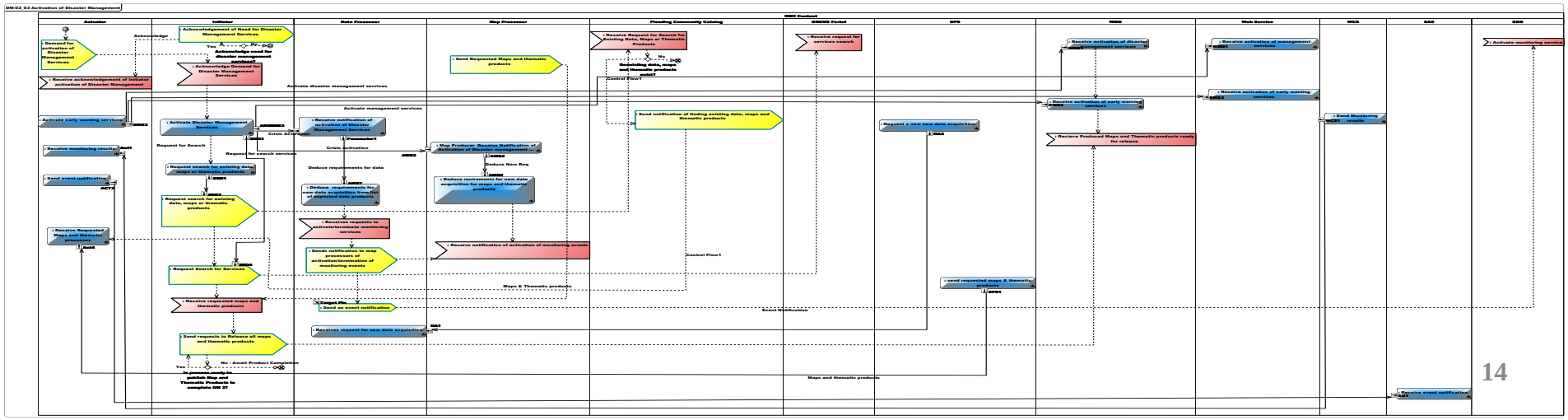


Composite Light Blue on Red Overlay



AIP-5 Disaster Group Lessons Learned
- Disaster Architecture -

- **GEOSS Architecture is very hard to document. It gets complicated very quickly. UML does not really help us get the big picture**
  - **See UML Diagram below**
- **There are some User Stories (user activity descriptions) but:**
  - **Not extensive**
  - **Not formalized to User Activities as in {user} {verb} {object} {target} to document the user activities necessary to achieve a specific goal. Those are very readable and could be used to increase communication/discussion.**
- **Architecture documentation ought to address this - User centric view - before diving into other more complex views**



AIP-5 Disaster Group Lessons Learned (2)
- Disaster Use Cases and Scenarios -

- **Security and DRM require work and participation… [First fax machine was not very useful]**
- **Very few people willing to customize their clients… Too much work**
- **Data is hard to get automatically. We are still working in manual mode. [data providers reluctant to implement API… too hard and expensive… MDA example]**
- **Discovery almost impossible. Users do not care about services and data. Actionable products (user goals) are not discoverable in catalogs**
- **A few experts in the world may be able to create some interesting products but this is not repeatable by large user community (EO-1 lessons learned)**
- **We are not leveraging communities of practice or social communities to help with discovery**
- **We do not know if we have an adequate number user activities solidly described that will take place during a disaster**
  - **Here is one amongst a dozen published only this year: http://www.congrexprojects.com/12m03/memorandum**

AIP-5 Disaster Group Lessons Learned (3)
- Standards -

- **Too low level. Not user centric, but for engineers**
- **Too numerous… too complex… and hard to implement correctly**
- **Too many bindings… Too many specs to read**

Possible Way Forward

- **Focus on the user more (and less on engineering viewpoints) in Architecture and Standards areas**
- **Develop a user activity view of the architecture (user stories, goals, behaviors, and activities)… some light semantic work for Geo Activities… see Activity Streams…**
- **Develop an Open Geo-Social API for disaster end users on top of SOAP and REST (for data providers)**
  - **OWS-10?**

Possible Way Forward (2)

- **Demonstrate interoperability and usability with GEO disaster pilot users on the ground**
  - **Get something going in March timeframe with a few interested CEOS players (NASA, NOAA, CSA, ESA…) to start a demo**
- **Incorporate into AIP-6 CFP**
  - **An AIP-6 workplan could have a task dedicated to mapping/translating the "Users and their information needs" chapters (for this specific work, but from others too) into a selected programming framework (activities, behaviors, ...)**
- **Secure but 'web-friendly' user management (e.g. OpenID two stage authentication) and Automation were only 'touched' during AIP-5**
  - **They are two serious game changers for the DM systems that need to be addressed, especially for user delegation of authority to workflows across multiple servers through APIs**