

GEOSS



SensorWeb

May 30, 2013

Enabling Information Discovery  
and Sharing To Foster Citizen  
Science And Support Societal  
Needs

HysplRI Symposium – Greenbelt MD

# Open GeoSocial

Dan **Mandl**  
Stu **Frye**  
Pat **Cappelaere**

# Who Has Heard of This?

- NSCEO



## NATIONAL STRATEGY FOR CIVIL EARTH OBSERVATIONS

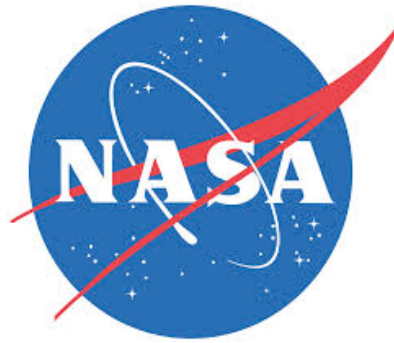
Executive Office of the President  
National Science and Technology Council

APRIL 2013



# Before NSCEO

3

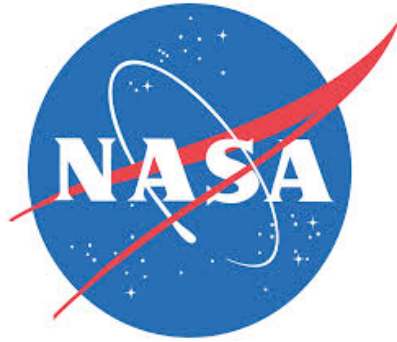


Earth Sciences From Space

Mission Priority 

# After NSCEO

4



**GEOSS**



Earth Sciences From Space



Mission Priority

# Problem Statement For GEOSS End-Users

5

- Hard To **Discover** Data [From Multiple Sources]
- Hard To **Process** It Into Actionable Information
- Hard To **Distribute** To Other End-Users
- Hard To **Validate** and Improve

*GEOSS Users Do Not Care About Data  
They Want Products they can put on a map*

Push Information To The Last Mile

### Science Data/Assets Available For **Societal Benefits**

- Turning Big Data Into Actionable Information (“Products”)
- Leverage Citizen To Improve Science Products

#### ■ **Partners**

- World Bank Global Facility For Disaster Risk Management
- Humanitarian OpenStreetMap
- SERVIR
- Universities: Dartmouth, MD, Kansas...
- ESA ESSI-Labs
- RASOR (FP7)...

#### ■ **GEOSS Architecture Implementation Flood Pilots**

- Caribbean
- Namibia
- New Interests: [Mozambique, Malawi, Nepal, MENA...]

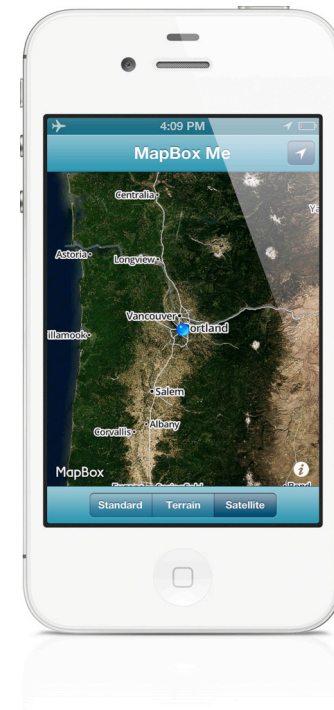
# A Higher Level Approach

- Server Publishes
  - **Products** (Not Data, Resources nor Services)
  - **Behaviors** (Activity Sequences to Generate Products)
    - Write Once (on Server), Runs Every time (on Client).
- Client Specifies
  - AOI
  - Societal Benefit Area
  - Product Type

**“I want a Flood Map for Haiti”**

*Products are queried, generated and acquired from multiple sources*

And Runs On These Platforms...



Actionable Information on the Client Side...



The screenshot shows a web browser window with the URL `localhost:7464/search`. The page has a navigation bar with links: **Home**, **About**, **Contact**, and **Find**. Below the navigation bar, there are three main search filters, each with a **Select** button:

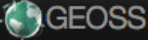
- Target of Interest**: Includes a map showing a location in Africa with a blue pin and a label "Target". Below the map, the coordinates `-17.62, 24.61` are displayed. A **Select** button is at the bottom.
- Societal Benefit Area**: Includes the text `geoss:disaster:floods` and a **Select** button.
- Product Type**: Includes the text `geoss:imagery:floods:flood_map` and a **Select** button.


At the bottom left, there is a globe icon and a **Search For Products Now** button. Three red arrows point from text labels to the filters:

- An arrow points from **By Target Location (Area of Interest)** to the **Target of Interest** filter.
- An arrow points from **By Societal Benefit Area** to the **Societal Benefit Area** filter.
- An arrow points from **By Product Type** to the **Product Type** filter.

# Potential Products Matching Constraints...

10

 [Home](#) [About](#) [Contact](#) [Find](#)



**Target of Interest**

-17.62, 24.61

Select

**Societal Benefit Area**

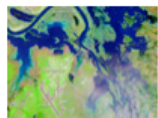
geoss:disaster:floods

Select

**Product Type**

geoss:imagery:floods:flood\_map

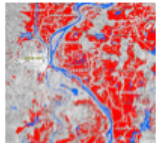
Select



## EO-1 ALI Flood Map

EO-1 Flood Map at 30m resolution

Get Product



## Radarsat-2 Flood Map

Radarsat-2 Flood Map at < 10m resolution

Get Product



## Water Reference Map

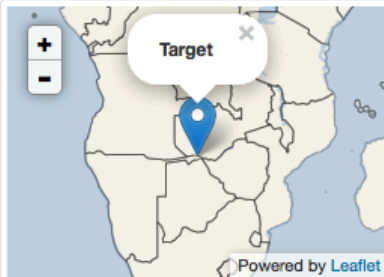
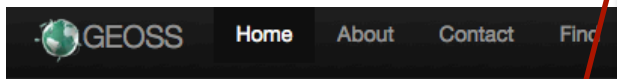
OpenStreetMap Water Reference

Get Product

Products That  
Could Be  
Generated

# Checkout the Behavior...

11



## Target of Interest

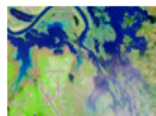
-17.62, 24.61

Select

## Societal Area

geoss:disaster:

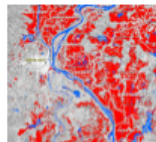
Select



### EO-1 ALI Flood Map

EO-1 Flood Map at 30m resolution

Get Product



### Radarsat-2 Flood Map

Radarsat-2 Flood Map at < 10m resolution

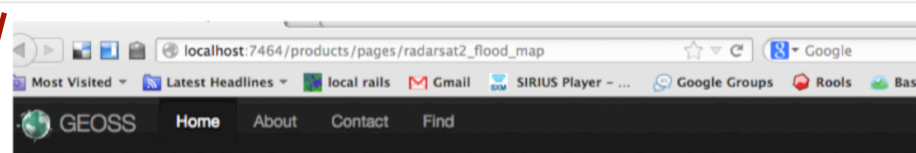
Get Product



### Water Reference Map

OpenStreetMap Water Reference

Get Product



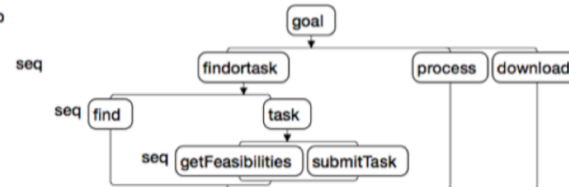
## Radarsat-2 Flood Map

Radarsat-2 Flood Map at < 10m resolution

url:	http://localhost:7464/products/pages/radarsat2_flood_map
From:	NASA Radarsat-2 Flood Map Server
Source:	satellite:radarsat2:instrument:radar
Org:	org:csa
Societal Benefit Areas:	geoss:disasters:flood
Page Source:	<a href="#">Click</a>
Behavior:	<a href="#">Execute</a>

## Behavior Tree

define radarsat2\_flood\_map



## Javascript Representation Tree

```
{
  "behavior": "radarsat2_flood_map",
  "tree": {
    "identifier": "start",
    "strategy": "sequential",
    "nodes": [
      {
        "type": "goal",
        "name": "goal",
        "children": [
          {
            "type": "findortask",
            "name": "findortask",
            "children": [
              {
                "type": "find",
                "name": "find",
                "children": [
                  {
                    "type": "task",
                    "name": "task",
                    "children": [
                      {
                        "type": "getFeasibilities",
                        "name": "getFeasibilities"
                      },
                      {
                        "type": "submitTask",
                        "name": "submitTask"
                      }
                    ]
                  },
              {
                "type": "process",
                "name": "process"
              },
              {
                "type": "download",
                "name": "download"
              }
            ]
          }
        ]
      }
    ]
  }
}
```

## Select Matching Scene...

Execute Behavior

localhost:7464/bt

Most Visited Latest Headlines local rails Gmail SIRIUS Player ... Google Groups

GEOSS Home About Contact Find

### GEOSS Product: eo1\_ali\_surface

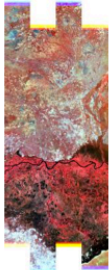
Type: geoss:imagery:floods:surface\_water  
Target: -17.62, 24.61  
Activity: Select one scene...

[Generate It](#)

Found Scenes: 91  
Selected Scene: EO1A1740722013124110KF  
[Advanced Filter](#)

[Select Scene](#)

[1]




Scene: [EO1A1740722013124110KF](#)

Date: 2013-05-04

Size: N/A

Center: -17.43876, 24.840768

[2]



Scene: [EO1A1740722013098110KF](#)

Date: 2013-04-08

Size: N/A

Center: -17.699551, 24.775501

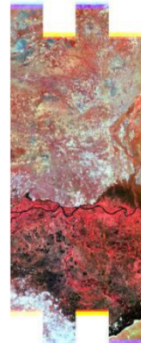
earthexplorer.usgs.gov/metadata/1852/EO1A174072

Most Visited Latest Headlines local rails Gmail SIRIUS Player ... Google Groups Rools Bookmark

**USGS**  
science for a changing world  
EarthExplorer

USGS Home  
Contact USGS  
Search USGS

### Full Display of EO1A1740722013124110KF\_SG1\_01



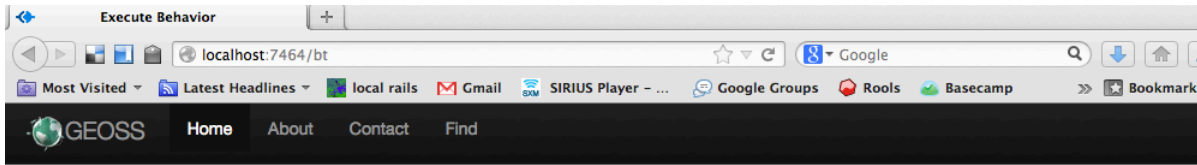
Standard Browse

Data Set Attribute	Attribute Value
Entity ID	EO1A1740722013124110KF_SG1_01
Acquisition Date	2013/05/04
Cloud Cover	0 to 9% Cloud Cover
Orbit Path	173
Orbit Row	72
Target Path	174
Target Row	72
Station	SG1
Processing Level	Level 1T and Level 1 Products Available
Scene Start Time	2013:124:07:47:52.639
Scene Stop Time	2013:124:07:48:04.887
Sun Azimuth	49.833829
Sun Elevation	40.220017
Satellite Inclination	98.02
Look Angle	-8.8564
Date Entered	2013/05/06
Center Latitude	17°51'43.01"S
Center Longitude	24°55'10.29"E
NW Corner Lat	17°00'54.35"S

Link to Metadata...

# Product Generated By WCPS... Download Here!

13



Still No Coding...

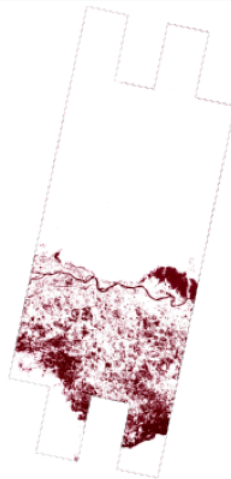
## GEOSS Product: eo1\_ali\_surface\_water

Type: geoss:imagery:floods:surface\_water

Target: -17.62, 24.61

Activity: Done.

[Generate It](#)



Surface Water detected from EO-1, scene:EO1A1740722013124110KF

scene: EO1A1740722013124110KF

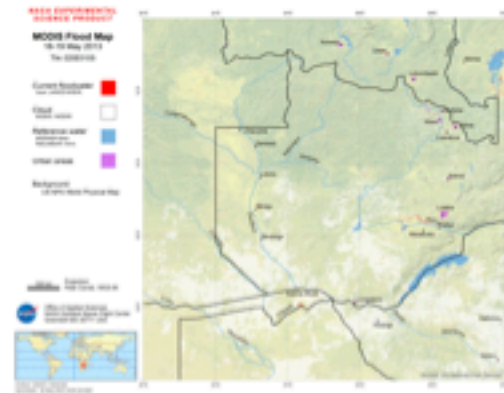
sensor: EO-1 ALI instrument

2013-05-20T22:16:09.884Z

[Download](#)

## WCPS Algorithm

```
-- =====  
-- title:      b10_density_slice  
-- description: Water Detection  
-- author:  
-- openid:     http://op.geobliki.com/cappelaere  
-- date:       2012-02-05  
-- version:    1.0  
-- tags:       ali_11t, 9  
-- duration:   10s  
-- =====  
  
-- =====  
-- Alpha Transparency Mask  
--  
function alpha_mask(b1)  
  if b1 == 0 or b1 > 800 then  
    return 0  
  else  
    return 255  
  end  
end  
  
local b10 = band(10)  
  
local mask = process_mask_function( alpha_mask, {b1=b10})  
  
local rgba = colorize( b10, "red_purple", mask )  
  
write_file(rgba)
```



## Surface Water detected from Modis tile:020E010S

MODIS tile 020E010S

sensor MODIS

2013-05-20

[Download](#)

## Flood Map Returned As Product... Download Here!

Execute Behavior

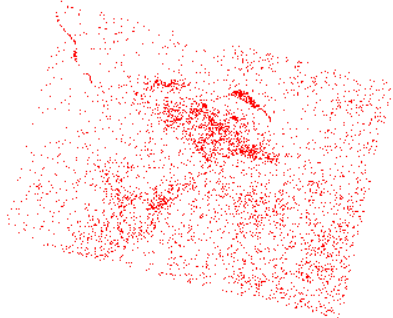
localhost:7464/bt

Most Visited Latest Headlines local rails Gmail SIRIUS Player - ... Google Groups Rools Basecamp

GEOSS Home About Contact Find

### GEOSS Product: geoss:imagery:floods:flood\_map

Target: -17.62, 24.61  
Activity: Done.



Surface Water detected from Radarsat-2, scene:RS2\_OK29106\_PK288777\_DK261250\_F0W1\_20120413\_035834\_HH\_HV\_SGF

scene RS2\_OK29106\_PK288777\_DK261250\_F0W1\_20120413\_035834\_HH\_HV\_SGF  
sensor RADARSAT-2 SAR F0W1 undefined  
LinesxCols 19434x27934  
Bbox -17.0865 24.0796 -18.5280 25.4148  
Center Lat -17.6195  
Center Lon 24.6118  
Country Namibia  
Admin Caprivi Oos

2012-04-13T03:58:34.994446Z

[Download](#)

# Activities Appear On User Timeline for Discovery as Stories... With Links to Allow Mimicking...

16




A screenshot of a Facebook profile page for a user named 'Geo Bliki'. The browser window shows the URL 'www.facebook.com/geo.bliki'. The profile features a green circular profile picture with a yellow ring. The cover photo is a green sphere with a yellow ring. The 'About' section lists birth information (September 8, 1957) and links to add work, school, and city. Navigation tabs include About, Friends (3), Photos (1), Map, and Likes. The main timeline shows a recent activity: 'Geo downloaded RS2\_OK33065\_PK325248\_DK29... on Radarsat.Geobliki.com'. Below this is a 'Photos' section with one photo. The left sidebar shows a 'Status' update prompt, a 'Friends' section with three friends (Patrice Cappelaere, Doreen Drake Cappelaere, Allison Righter), and a 'Radarsat.Geobliki.com' download link. The right sidebar contains sponsored posts, including 'Class of 1975', 'Warning! Highly Addictive', 'NEW! The fastest Match 3 game on Facebook!', 'Take a Look! yearbookarchives.com', and 'Power Companies scared power4home.com'. A 'Chat' button is at the bottom right. The footer includes a search bar and navigation links like 'Find', 'Next', 'Previous', 'Highlight all', and 'Match case'.



## Community Involvement

facebook
Search for people, places and things

---



**FAVORITES**

- Welcome
- News Feed
- Messages
- Events
- Find Friends

**APPS**

- App Center
- WCPS.Geobliki.com
- Radsat.Geobliki.com
- Games Feed
- Photos
- Music
- Notes
- Links
- Pokes
- Developer

**GROUPS**

- Belize GIS & remote se...
- Create Group...

**PAGES**


- Like Pages

**FRIENDS**

- Close Friends
- Family

Chat is currently off. To chat with your friends,

facebook
Search for people, places and things



**FAVORITES**

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Search for people, places and things

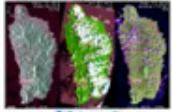
## Belize GIS & remote sensing discussion group

About
Events
Photos
Files



**Emil A. Cherrington**


@Pat (Geo Blikl) – In promoting what 10m pan-sharpened EO–1 imagery can provide, we have posted an album of maps of various Caribbean islands, showcasing ~recent ALI imagery. Thank you to you and the rest of the EO–1 team (Stu, Dan, et al.) for getting those images!



**Remote sensing of the Caribbean**

Satellite imagery and satellite-derived data for different parts of the Caribbean  
By: CATHALAC  
Photos: 11


Like · Comment · Unfollow Post · 3 minutes ago



Geo Blikl This is exceptional work and this points to a new way of leveraging social networks for increased societal benefits. We need to continue in that direction. Thanks for your lead.  
about a minute ago · Like

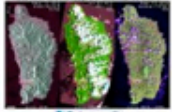
Press Enter to post.

Notifications



**Emil A. Cherrington**


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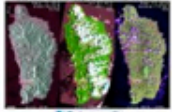
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about a minute ago · Like

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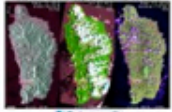
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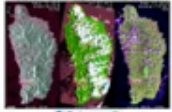
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# IPM Tasking

**facebook**    Search for people, places and things 

## Request A New WCPS Imaging Task


Place Name:


Description:

Theme:

Category:

Algorithm:



**Submit Task Request** 

- Increase Speed of Acquisition, Data Processing and Distribution Using Ubiquitous Social Tools
- Increase Science Collaboration Around The Data At Lower Cost
- Leverage Cognitive Surplus Available on The Web to Solve Big Science Problem
- Increase Potential For More Science Applications & Research
- Increase Societal Benefits of Science Data At Lower Cost to Science Mission
- Provide Societal Benefits Analytics

# Thank You

## ■ Contact

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- skype: patrice\_cappelaere
- <http://twitter.com/cappelaere>
- <http://github.com/cappelaere>
- <http://www.linkedin.com/pub/pat-cappelaere/0/163/236/>
- <http://www.slideshare.net/cappelaere>