# Developing Collaborative Mechanism and Tool for Near-Real-Time Flood Monitoring in Southeast Asia

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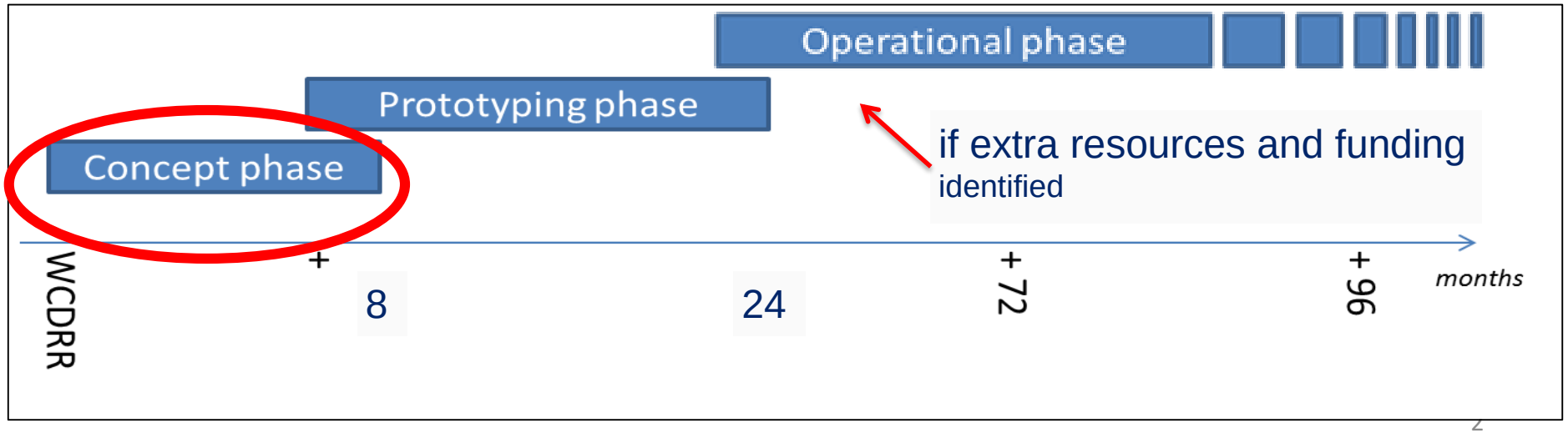
adpc

# GEO-DARMA: a framework for developing use of satellite data for risk management

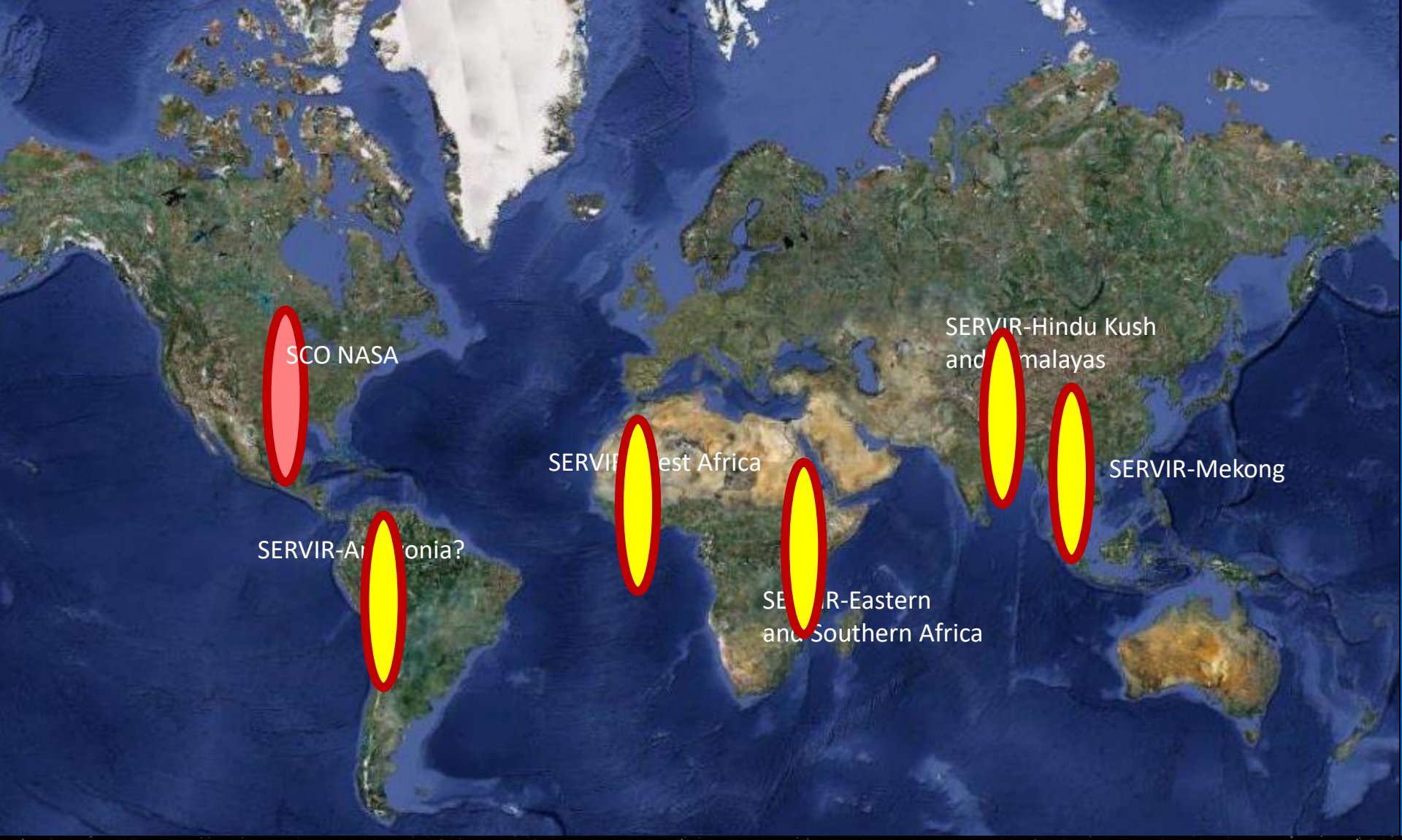
- **Concept phase completed for two of three regions: Asia and Africa. ADPC's SERVIR Mekong project is first GEO-DARMA Pilot to go forward.**

- **Iterative process means new projects welcome at any time, but must fit within identified DRR priorities.**



# SERVIR Mekong GEO-DARMA Pilot Background

- **Championed by ADPC;**
- **Leverages existing NASA/USAID-funded Mekong SERVIR project; fully-funded for five years;**
- **Part of larger international SERVIR network;**
- **Incorporates new data types, faster service delivery, higher resolution flood maps, capacity building;**
- **Financing for project in place, but some partners still to be confirmed (e.g. on-going discussion with CEOS Flood Demonstrator Team);**
- **Vision to extend to larger SE Asia area if successful.**




# SERVIR GLOBAL

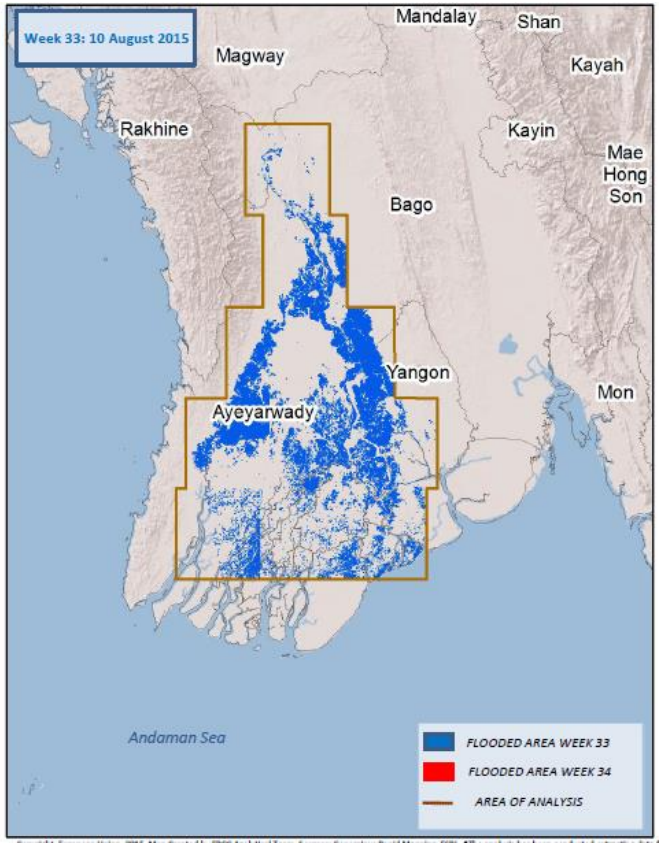
CONNECTING SPACE TO VILLAGE

## Why Flood Mapping for Myanmar?

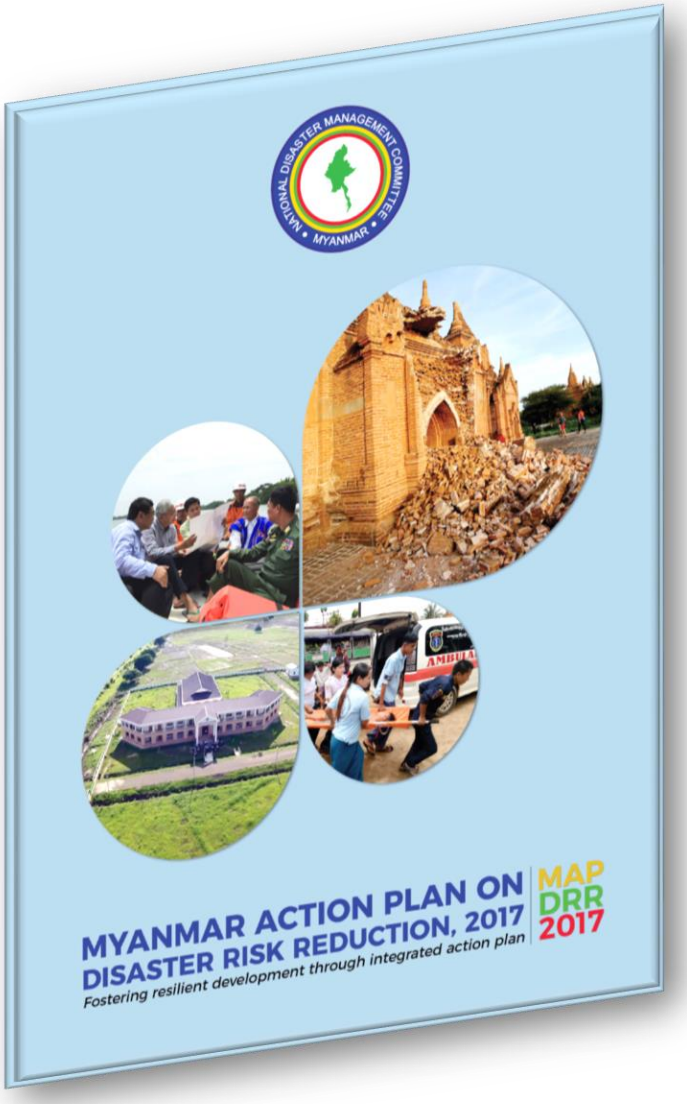
Provide information to users on:

- The extent of flooded areas
- Possible severity of flood (e.g., depth, duration, size)

Is a visualization tool to assist planning for emergency response and relief



# MAPDRR




- Pillar 4: Enhancing disaster preparedness for effective response and resilient rehabilitation and Construction
  - ➢ 4.2 Improved disaster response system in Myanmar

## Functions of Department of Disaster Management (DDM) in response phase:

- ✓ Provision of relief aids (with General Administration Department)
- ✓ Social protection to vulnerable groups affected by disasters
- ✓ Coordination and cooperation with UN Country Team
- ✓ Mobilizing the humanitarian assistance & emergency relief from international communities
- ✓ Reporting and technical advices to National Disaster Management Committee and ASEAN Coordinating Centre for Humanitarian Assistance
- ✓ Early warning dissemination (with Department of Meteorology and Hydrology and General Administration Department)

**Flood maps are useful in all of these functions.**

# Satellite-based Flood Mapping

## Advantages

- ✓ Capability to acquire data everywhere in the world
- ✓ Capability to acquire data in any conditions (even through clouds – SAR)
- ✓ Capability to monitor flood progress and retreat over time

## Limitations

- ✓ Possibility of not being in the right place at the right time
- ✓ Compared to ground survey, the flood depth information is harder to get and is less accurate from satellites

# Satellite-based Flood Mapping


Source: JAXA, Sentinel Asia

# Proposed Support to Emergency Flood Mapping of Myanmar

- ✓ Developing an online platform that is user-friendly and allow users access to flood maps on a (near) real-time basis
- ✓ Developing capacity of Myanmar government and other stakeholders
- ✓ Supporting DDM in integrating the satellite-based flood mapping into existing policy framework and guideline for emergency response
- ✓ Collaborating with international and national partners to improve the satellite-based emergency mapping overall

# An Online Flood Mapping Platform

- ✓ Utilize multiple satellites to increase temporal resolution
- ✓ Target daily updates on flood extents
- ✓ User-friendly
- ✓ Interface to be co-designed with national stakeholders such as DDM
- ✓ Modular design allowing future integration of additional satellite data to improve accuracy
- ✓ Promote collaboration
- ✓ Built-in capacity building into the development and implementation

# GEO-DARMA data request – background

- ADPC began discussion with GEO-DARMA in 2017, as part of regional assessment of DRR priorities.
- ADPC proposed SERVIR-MEKONG as a GEO-DARMA pilot project at January 2018 GEO-DARMA Steering Committee meeting.
- Improved access to satellite data through CEOS/GEO-DARMA will increase temporal revisit and improve resolution and accuracy of flood products, as well as supporting archive of past flood events for better risk assessment.
- SERVIR MEKONG proposes to use imagery for validation of proposed NRT service in Myanmar starting in the 2018 flood season – July till September 2018.
- SAR data will be processed and integrated into system by SERVIR partner Deltares (discussions underway for further support from NASA as pre-cursor to Flood demonstrator)
- This data can be further utilized in later versions of this product which will enhance spatio-temporal coverage.

# GEO-DARMA data request - data types

**For the 2018 flood season, the project plans to use the following sensors:**

**District level – high resolution optical data and high resolution SAR data**

- SPOT 10m resolution and higher
- Sentinel-2 30m resolution
- Sentinel-1 20m resolution (systematic extraction each pass)
- RADARSAT Scan SAR Narrow and Scan SAR Wide 50m and 100m resolution in 350-500km swath

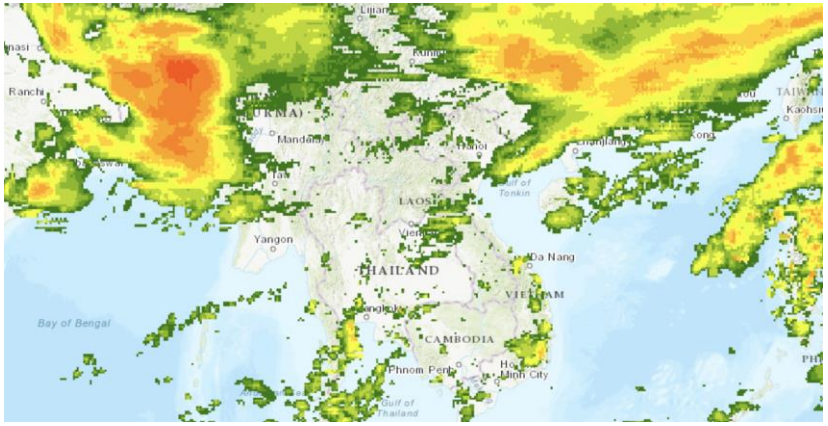
**Urban Flooding (very high resolution optical data and very high resolution SAR data)**

- SPOT 1.5m
- Pleiades 70cm
- Cosmo-SKYMED 1m

**Analysis of results will be conducted after the flood season and a new request will be made for 2019-2020**

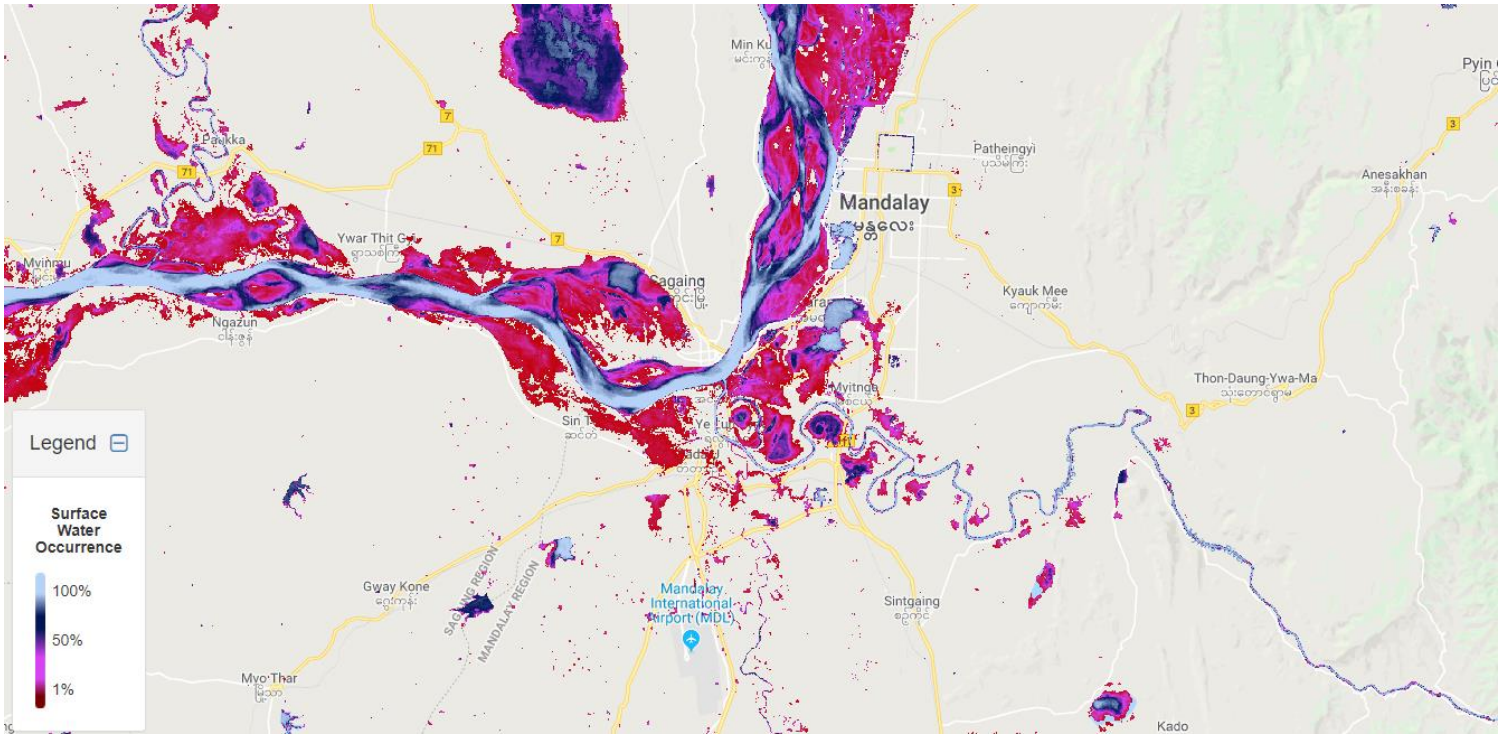
**Additional Data Sources**

- Inundated areas from multiple sensors
  - RiverWatch - streamflow estimates derived from passive microwave
  - Updated daily - Global Flood Monitoring System
- Contextual information from other **Lower Mekong** systems
  - Updated daily - MODIS-based NASA Project Mekong
- Inundation depth
  - TIN Based Approaches
- Precipitation conditions
  - SERVIR-Mekong Virtual Rain and Stream Gauge



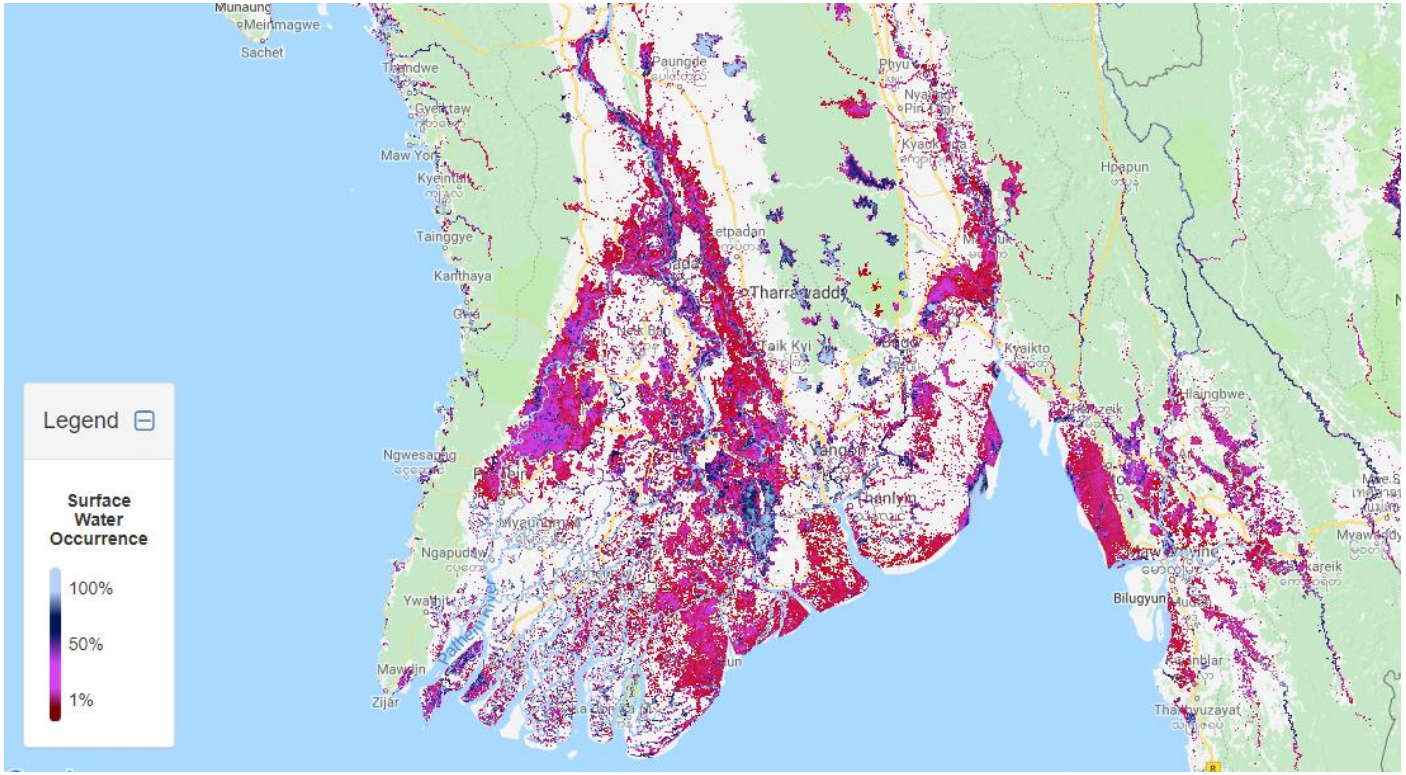
# Suggested Area of Interest for urban flooding, Myanmar

Mandalay – areas prone to floods based on surface water occurrence maps
(based on 2000-2015 Landsat imagery)



# Suggested Area of Interest for Wide Area flooding, Myanmar

Irrawaddy Delta – areas prone to floods based on surface water occurrence maps (based on 2000-2015 Landsat imagery)




Spatial Informatics Group

SEI STOCKHOLM ENVIRONMENT INSTITUTE

Deltares Enabling Delta Life

# GEO-DARMA data request - data volumes

**For 2018:**

| Agency | ASI | CSA | CNES | CNES | ESA |
|---|---|---|---|---|---|
| **Satellite** | CSK | RADARSAT-2 | SPOT | Pleiades | Sentinel-1 |
| **Archived and new images** | 30 | 15 | 20 | 15 | All passes, available archives of past events of interest |