Space Technologies for DRR on Water

Contribution
by the Earth Observation Communities

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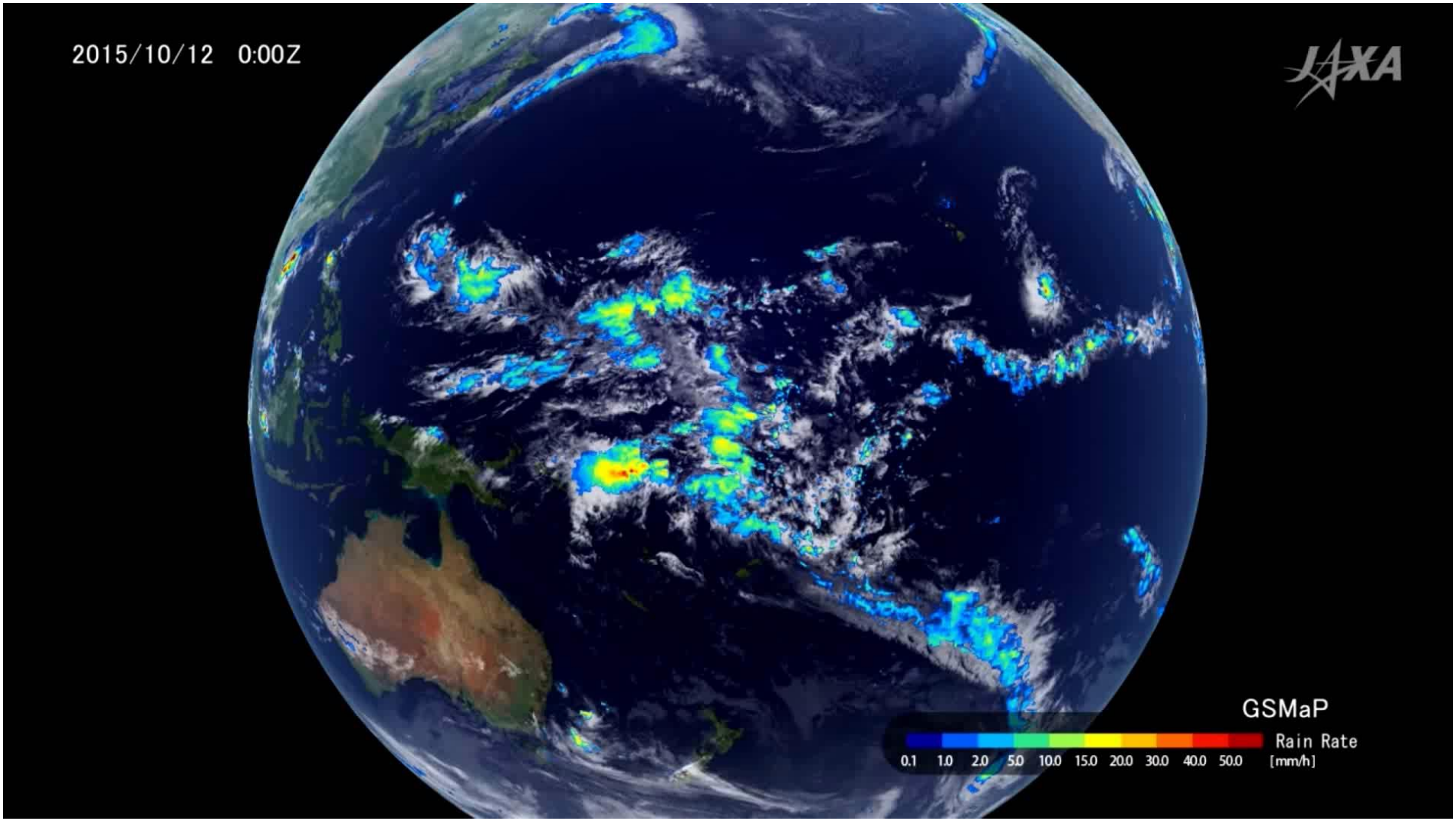
ASTRONAUTICA AD PACEM HOMINUMQUE PROGRESSUM IAF

Typical Examples of the EO satellite images

Rainfall – GSMaP, in Oct. 2015

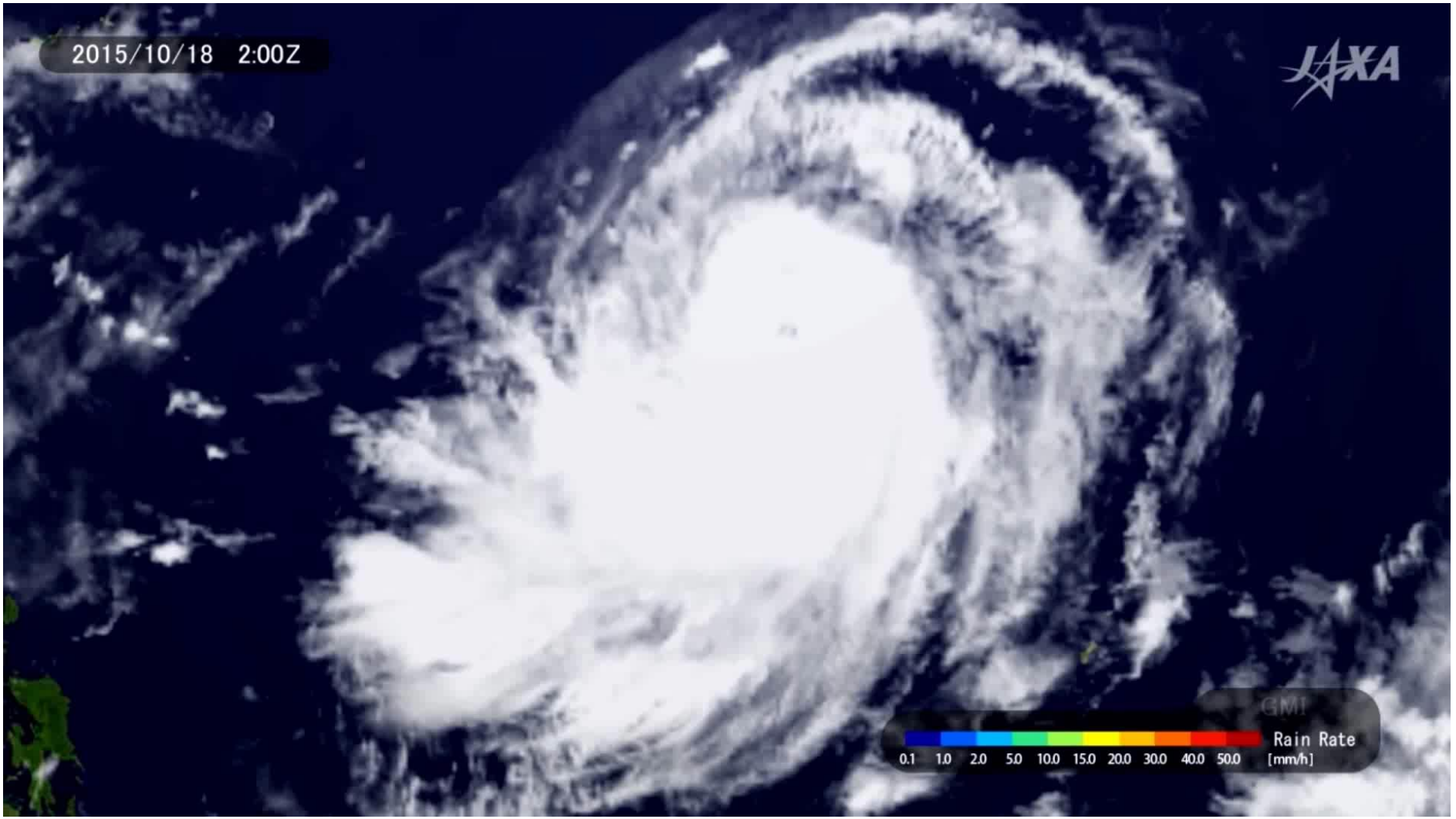
http://sharaku.eorc.jaxa.jp/GSMaP/



(also shown in the image, Typhoons No.24 “KOPPU” and No.25 “CHAMPI”)

Typical Examples of the EO satellite images

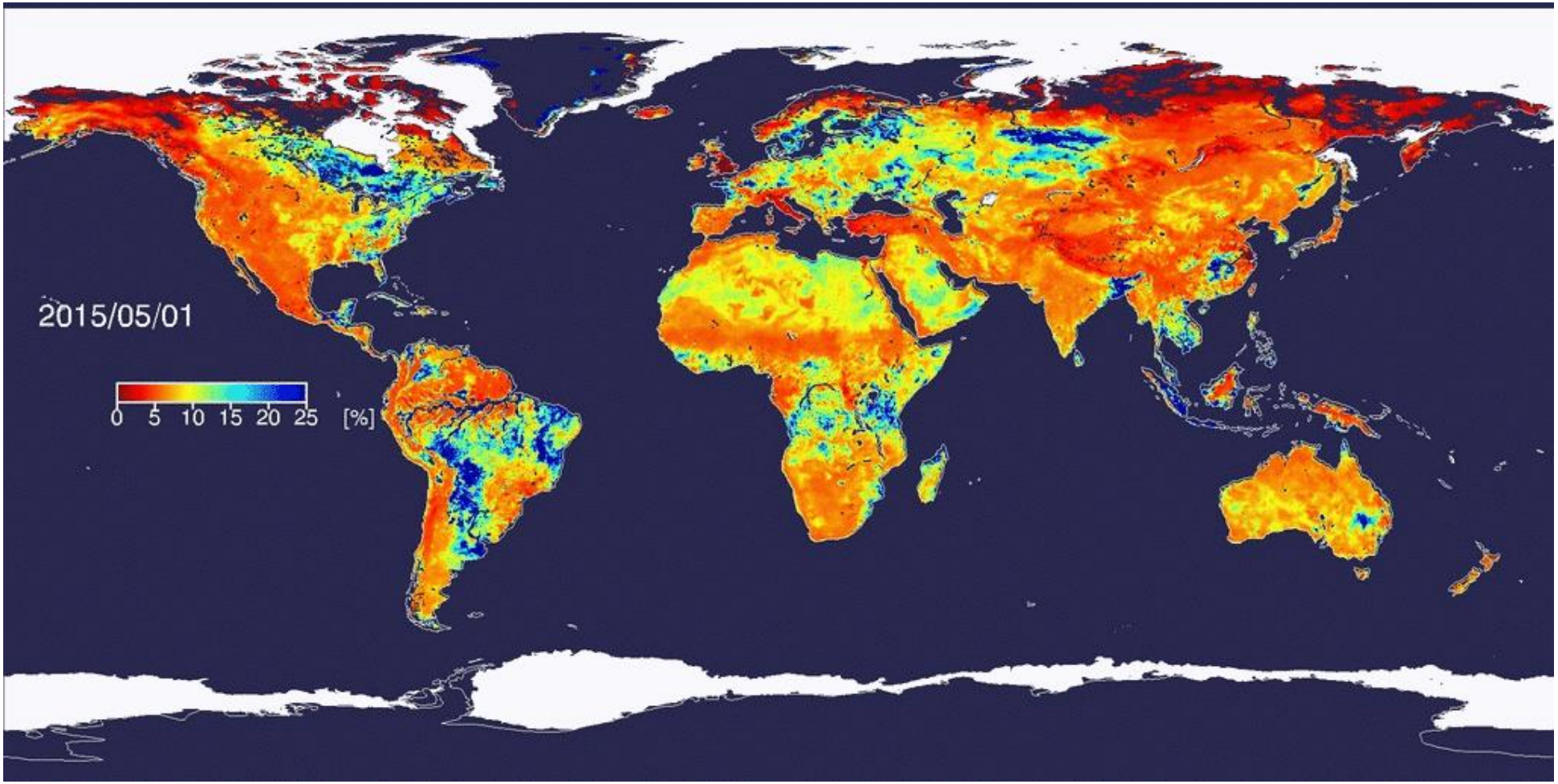
Rainfall - GPM/DPR



(Typhoon No.25 “CHAMPI” in October 2015)

Typical Examples of the EO satellite images

Drought (Soil Moisture) – GCOM-W(AMSR2), 2015/5/1-15/10/31

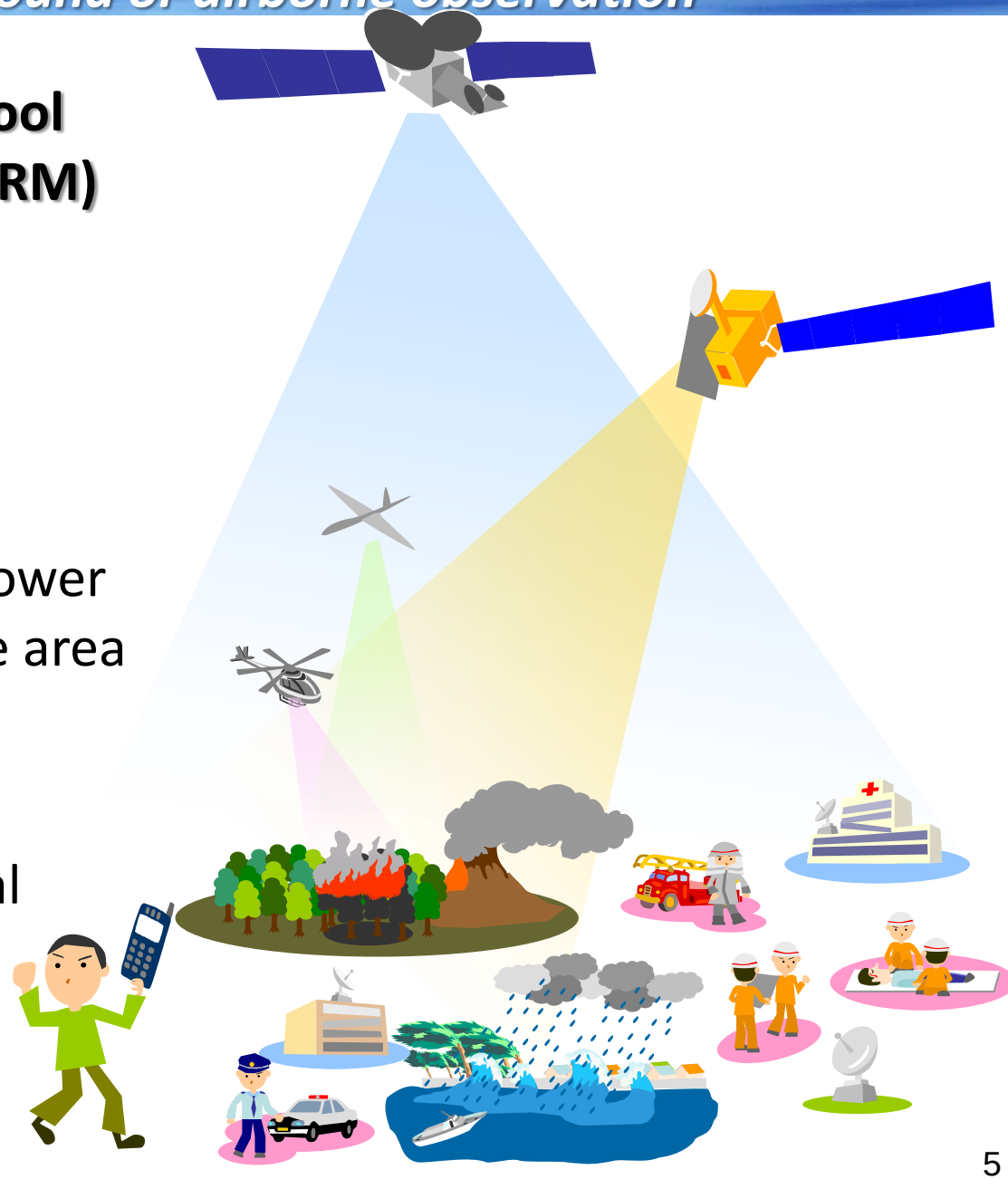


Space Technology for DRM

- Advantage over ground or airborne observation -

Space Technology is the unique tool for Disaster Risk Management (DRM)

- Wide coverage and Repetitive
  - ✓ Global observation
- Simultaneously
  - ✓ Like a higher broadcasting tower to share information in wide area
- Robustness over a disaster
  - ✓ Not on the ground
  - ✓ Maintenance free for several years



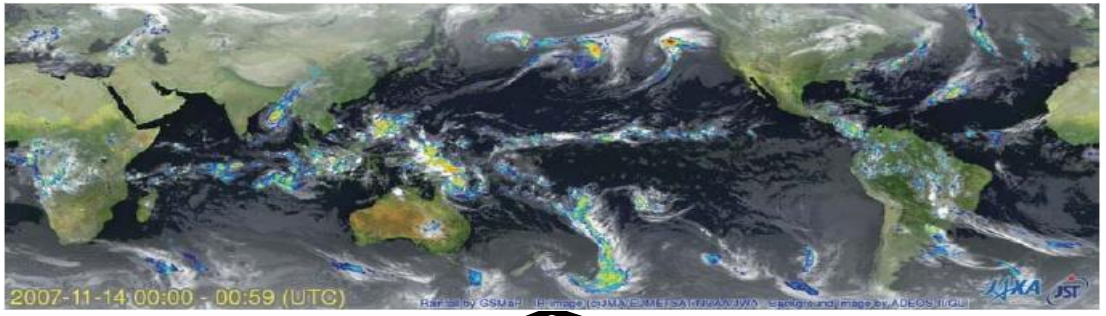
Goals of the space-based Earth Observations

1. **To Understand the water cycle**, based on the Earth Observation satellite data, integrate with ground data and create the climate models **for predicting the floods and the droughts**.

2. **To help Disaster Recovery**, by quick monitoring and the assessment using satellite data.

Current achievements to our goals

Case 1; GSMaP - Predicting Floods and Droughts



Integrate the satellite data and the Water Cycle models

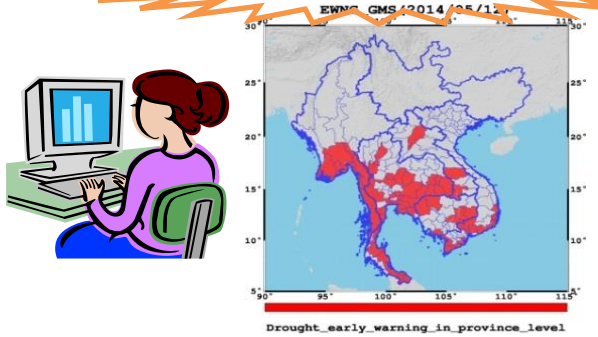
Flood Forecasting System

Flood Warning

- Bangladesh
- Viet Nam
- Philippines

Automatic Calculation of Drought Indices

Drought Warning



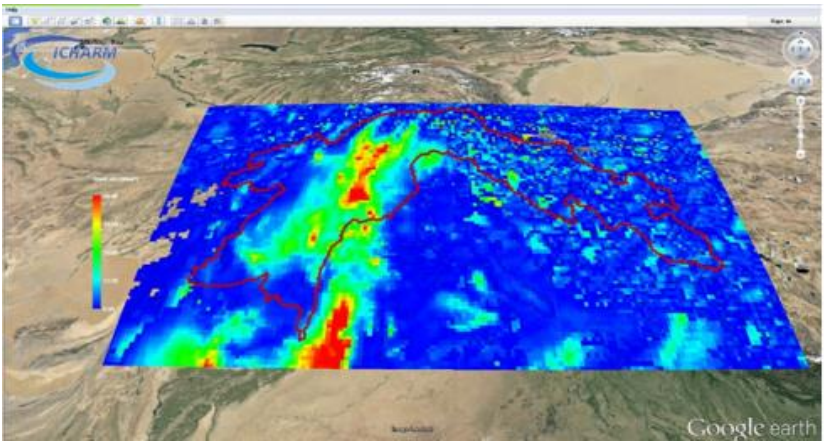
Great Mekong Sub region

ADB Asian Development Bank
FIGHTING POVERTY IN ASIA AND THE PACIFIC

Case 1; GSMaP - Predicting Floods and Droughts

- **Under UNESCO-IHP** project, **JAXA**, **ICHARM** and Pakistan Meteorological Department (PMD) to develop operational flood analysis system.
- After calibration of **GSMaP product** with **ground-based stations** in Pakistan, correlation coefficients are increased from 0.5 to 0.7, and can be used in the Indus Integrated Flood Analysis System (Indus-IFAS) developed by ICHARM.
- The system will be in operation in 2015 by PMD, and plan to extend the system to larger regions is underway.

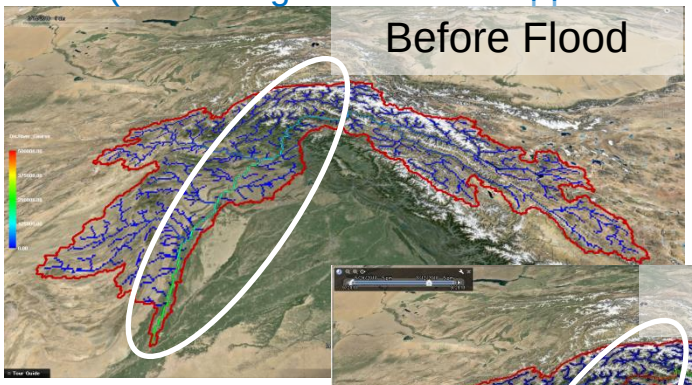
Rainfall by GSMaP



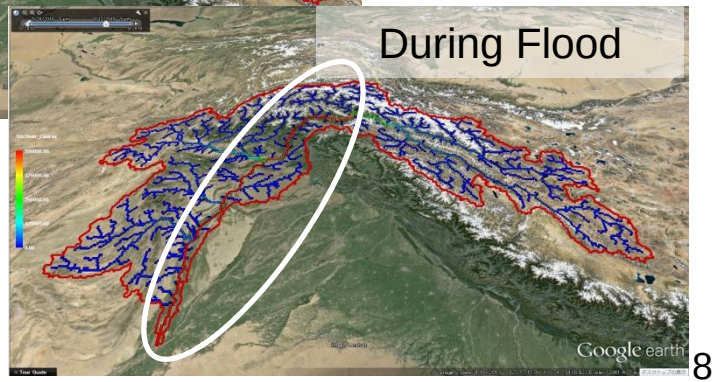
(Area within red line is Indus river basin)

INPUT

River discharge output using GSMaP
(increasing as rainfall in upper stream increased)



Discharge of main river is normal (green) before flood

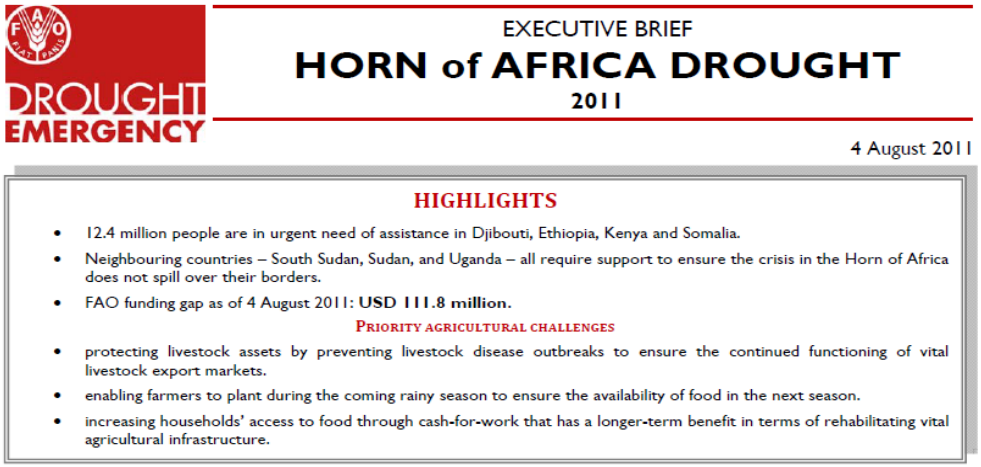


Discharge of main river is largely increased (red) during flood

Example of Indus-IFAS in Pakistan (Image provided by ICHARM)

Current achievements to our goals

Case 2; Horn of Africa Drought predicted by using AMSR-E



DROUGHT EMERGENCY

EXECUTIVE BRIEF

HORN of AFRICA DROUGHT

2011

4 August 2011

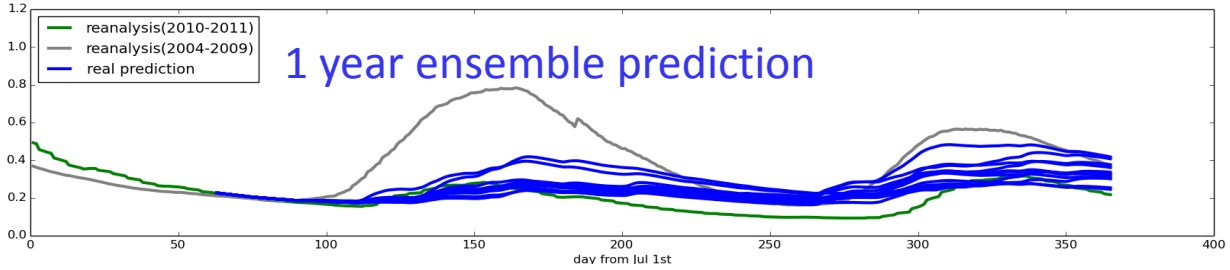
HIGHLIGHTS

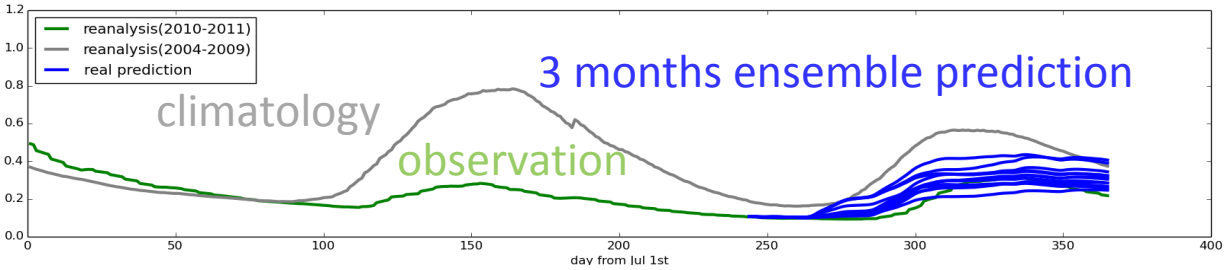
- 12.4 million people are in urgent need of assistance in Djibouti, Ethiopia, Kenya and Somalia.
- Neighbouring countries – South Sudan, Sudan, and Uganda – all require support to ensure the crisis in the Horn of Africa does not spill over their borders.
- FAO funding gap as of 4 August 2011: **USD 111.8 million.**

PRIORITY AGRICULTURAL CHALLENGES

- protecting livestock assets by preventing livestock disease outbreaks to ensure the continued functioning of vital livestock export markets.
- enabling farmers to plant during the coming rainy season to ensure the availability of food in the next season.
- increasing households' access to food through cash-for-work that has a longer-term benefit in terms of rehabilitating vital agricultural infrastructure.

Agricultural drought index (Leaf Area Index) can be predicted by coupling a satellite-based microwave radiometer (AMSR-E), a seasonal prediction model (NOAA/GFDL) and a data assimilation system (CLVDAS) by Univ. of Tokyo



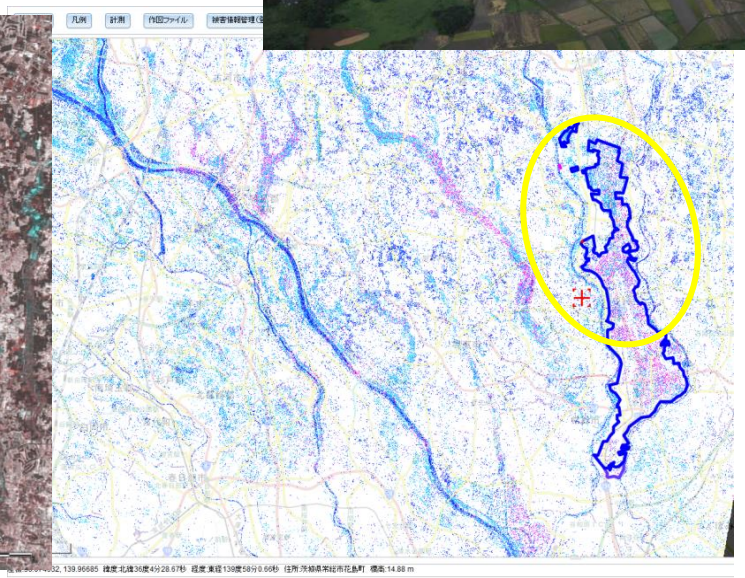


Current achievements to our goals

Case 3; Quick Assessment of Flood Disaster

- Flood in Kinugwa-river and Observation by ALOS-2 (Sep. 2015)

- ❖ Emergency observation after 1 hour setting up
- ❖ Only means to grasp the situation of wide area in bad weather
- ❖ Assisting decision making for the dispatch request of drain pump vehicles



出典:関東地方整備局ホームページ

Reginal, Inter-Agency, International Collaborations

■ Int'l Charter and Sentinel Asia

- **Space agencies provide timely and easy-to-understand information through the International Charter and the Sentinel Asia.**

■ GEO (Group on Earth Observations) and CEOS (Committee on Earth Observation Satellites)

- **Space agencies support understanding disaster risks on global and local scales through GEO and CEOS projects.**
- **CEOS is willing to provide coordinated satellite observation plan in response to requirements of Disaster Management community.**


Thank you

参考

- **International Charter for Major Disasters: 国際災害チャータ**

2004年ESA及びCNESによって創設。現在、12の宇宙機関が参加。2005年以降、世界の大規模災害に対して、400回以上の緊急観測を実施、データを提供してきている。ただし、発災後の緊急対応（1～2週間）のみ。

・Sentinel Asia： センチネルアジア

2005年APRSAFのイニシャチブとして創設されたアジアオセアニア地域の衛星を活用した地域災害管理支援システム。日、台湾、インド、タイ、韓国、シンガポールの宇宙機関を含む90を超える地域の防災機関が参加。2006年以降、200回以上の緊急観測を実施、データを提供してきている。緊急対応だけでなく、予防段階（ハザードマップの作成）及び復興段階（被災地の復興状況の定期観測）にも対応している。

・GEO (Group on Earth Observations)： 地球観測に関する政府間会合

地球観測に関する政府間会合として、2005年に設立。現在、メンバー　95か国、参加機関　84機関。これまでに公開・無償を原則とするGEOSSデータ共有原則を推進、米国のランドサット及び欧州のセンチネル衛星で採用されている。地球観測データを活用して9つの社会利益分野に貢献。防災の分野では、世界の災害リスクの高いホットスポット（Super Site)の集中観測・データ共有プロジェクトを実施している。

・CEOS (Committee on Earth Observations)： 地球観測衛星委員会

地球観測衛星計画の国際調整を行うことを目的にG7サミットの下、1984年に設立。宇宙機関（メンバー）31機関及びデータ利用機関（准メンバー）24機関が参加。防災WGにおいて、CEOS防災パイロットを実施、地震、火山及び洪水分野で、世界の防災ユーザと連携して調整された衛星観測計画を立案、実施している。

・HFA (Hyogo Framework for Action)： 兵庫行動枠組

第2回国連防災世界会議（2005年、神戸市）において採択された、2005年～2015年までの国際的な防災の取組み指針。防災の制度化、早期警報、知識・技術・教育の活用、リスク要因の軽減、応急対応のための事前準備の5つの優先行動を設定している。第3回防災会議では、2015年以降のポストHFAを策定予定。