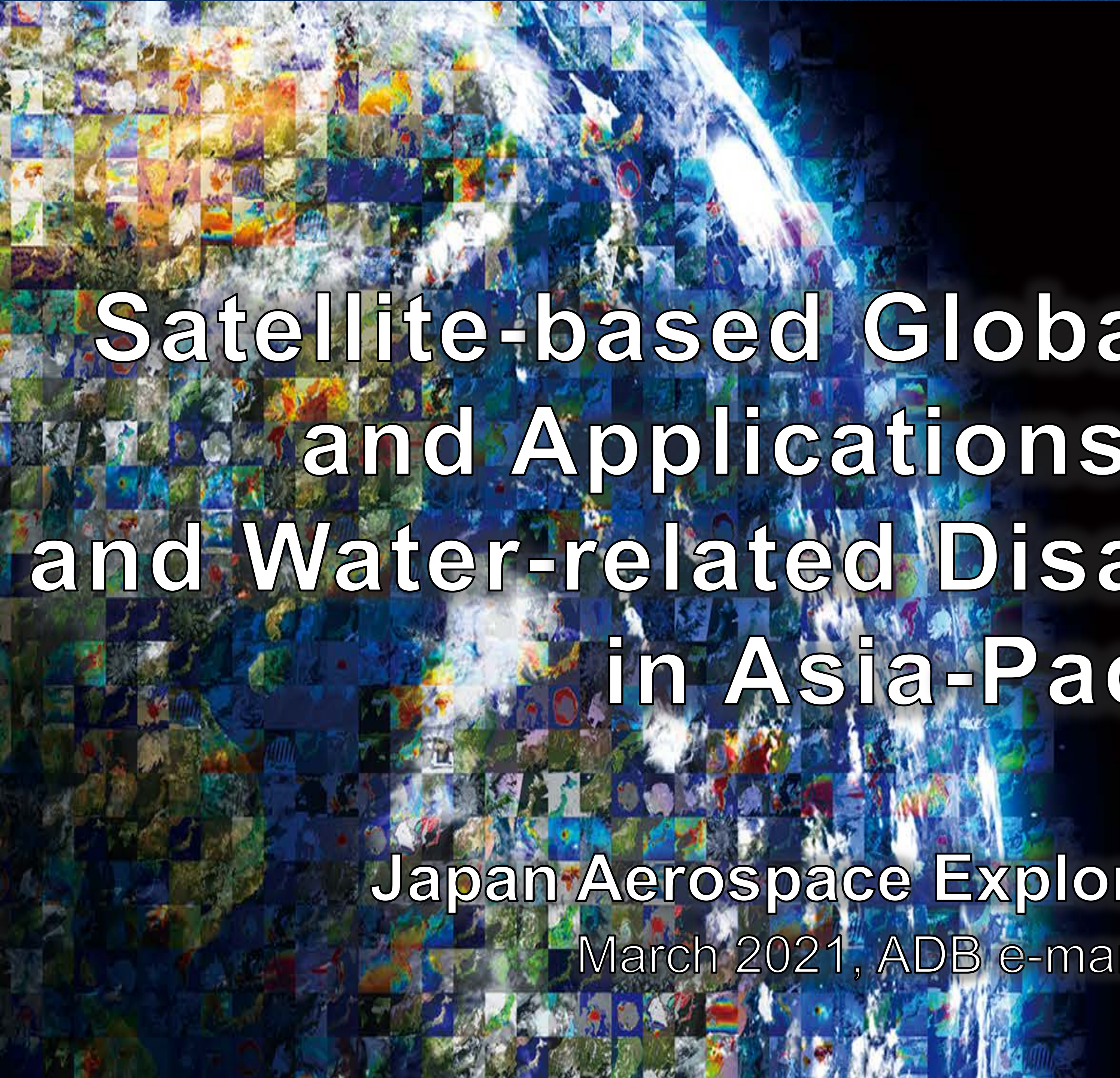


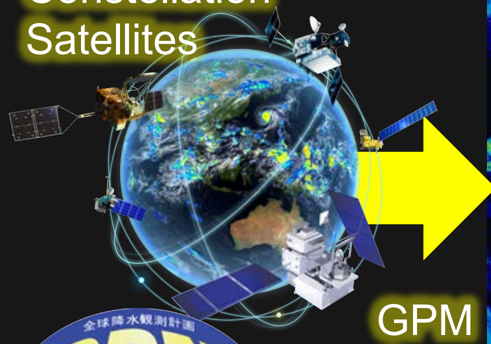
Satellite-based Global Rainfall Map and Applications for IWRM and Water-related Disaster Resilience in Asia-Pacific

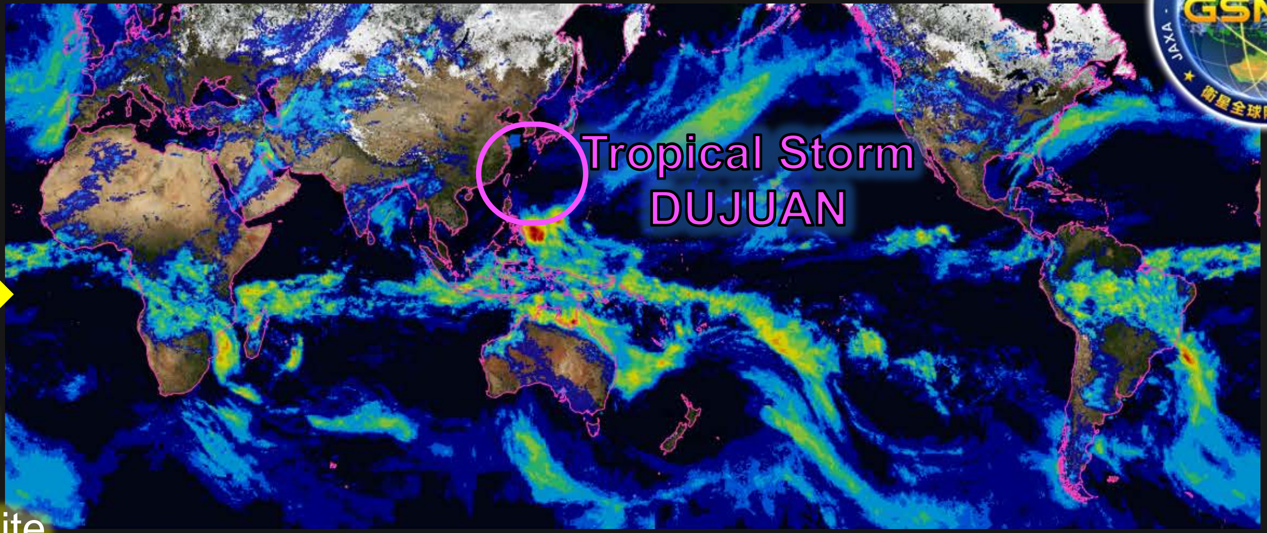
Japan Aerospace Exploration Agency

March 2021, ADB e-market place

Satellite-based global rainfall map:

衛星全球降水マップ
GSMaP
GLOBAL SATELLITE MAPPING OF PRECIPITATION


GPM
Constellation
Satellites
GPM
Core
Satellite


Tropical Storm
DUJUAN

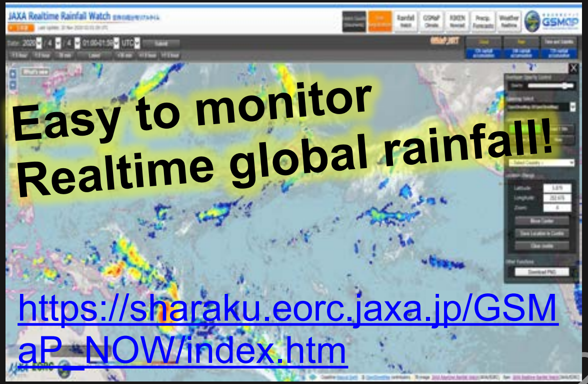
- **Hourly global** rainfall data
- Spatial resolution: about **11x11km**
- Various version such as **real-time for monitoring** or **long-term gauge-adjusted for climatological purposes**

The unique advantage of GSMaP

- Space-based rainfall observations allow us to capture the rainfall even in the area lack of ground-based observations.
- Rainfall can be measured globally, continuous and same interval, and consistent accuracy.
- Open and freely available via web-based GUI, FTP site and data analysis cloud platforms (ex. Tellus, GEE)
- Long-term archive data for more than 20 years (since 2000)

7233
registered users
from 138
countries/regions
(as of February 2021)
+ website users
(not registered)

Statistics!
Long-term!
Realtime!

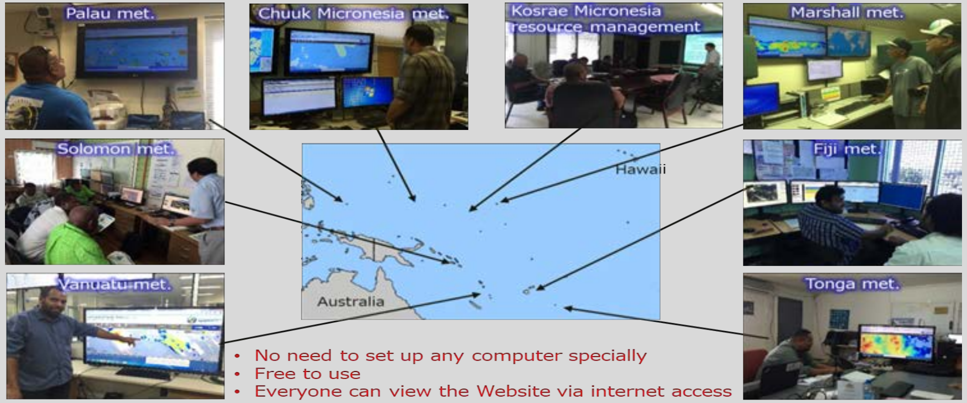


Easy to monitor Realtime global rainfall!

https://sharaku.eorc.jaxa.jp/GSMaP_NOW/index.htm

Various Utilizations of GSMaP rainfall product

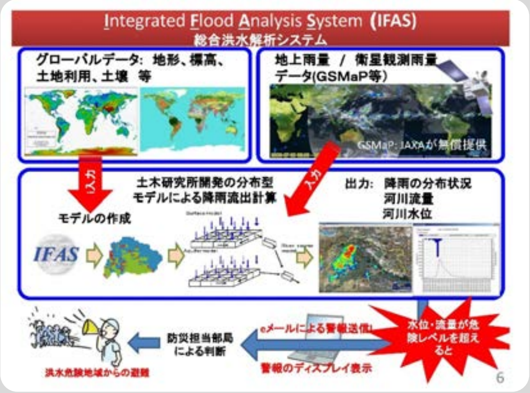
Weather monitoring


Palau met.
Chuuk Micronesia met.
Kosrae Micronesia resource management
Marshall met.
Solomon met.
Fiji met.
Vanuatu met.
Tonga met.
Hawaii
Australia

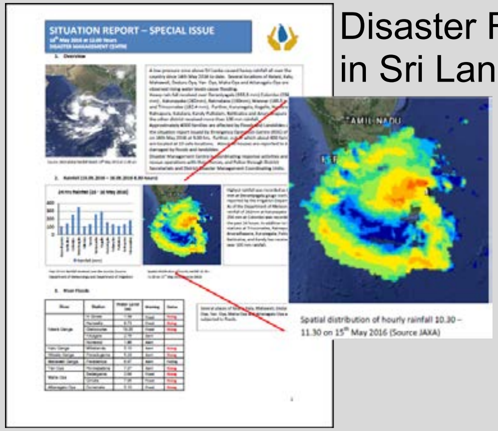
- No need to set up any computer specially
- Free to use
- Everyone can view the Website via internet access

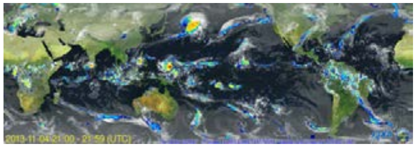
Disaster Prevention

Integrated Flood Alert System by ICHARM


Integrated Flood Analysis System (IFAS)
総合洪水解析システム
グローバルデータ: 地形、標高、土地利用、土壌 等
地上雨量 / 衛星観測雨量データ(GSMaP等)
GSMaP: JAXAが無償提供
入力
入力
土木研究所開発の分布型モデルによる降雨流出計算
出力: 降雨の分布状況 河川流量 河川水位
モデルの作成
IFAS
水位・流量が危険レベルを超えると
eメールによる警報送信
警報のディスプレイ表示
防災担当部局による判断
洪水危険地域からの避難
6

Disaster Report in Sri Lanka

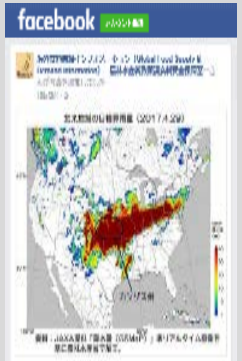

SITUATION REPORT – SPECIAL ISSUE
TAMIL NADU
Spatial distribution of hourly rainfall 10.30 – 11.30 on 15th May 2016 (Source JAXA)

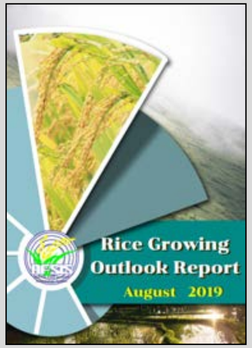


衛星全球降水マップ
GSMaP
GLOBAL SATELLITE MAPPING OF PRECIPITATION

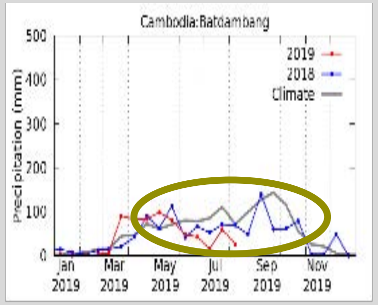
7233
registered users
from 138
countries/regions
(as of February 2021)
+ website users
(not registered)

Agriculture
(food security, weather index insurance and so on.)



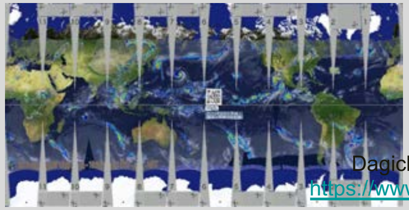

Rice Growing Outlook Report
August 2019

Cambodia



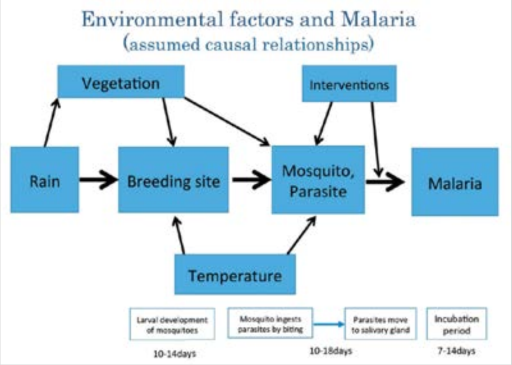
http://www.aptfsis.org/publication

Educations



Dagick Team
https://www.dagik.net/

Public Health


Environmental factors and Malaria
(assumed causal relationships)
Vegetation
Interventions
Rain
Breeding site
Mosquito, Parasite
Malaria
Temperature
Larval development of mosquitoes
Mosquito ingests parasites by biting
Parasites move to salivary gland
Incubation period
10-14days
10-18days
7-14days

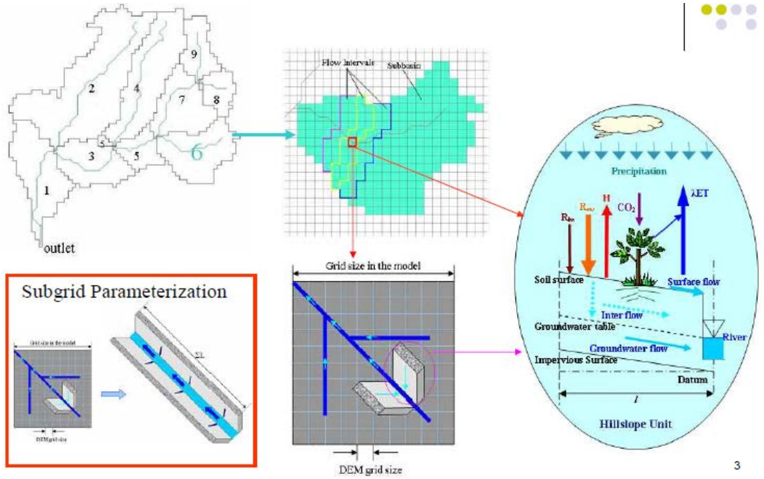
https://www.eorc.jaxa.jp/GPM/doc/data_utilization/2019_jireishu_j.pdf

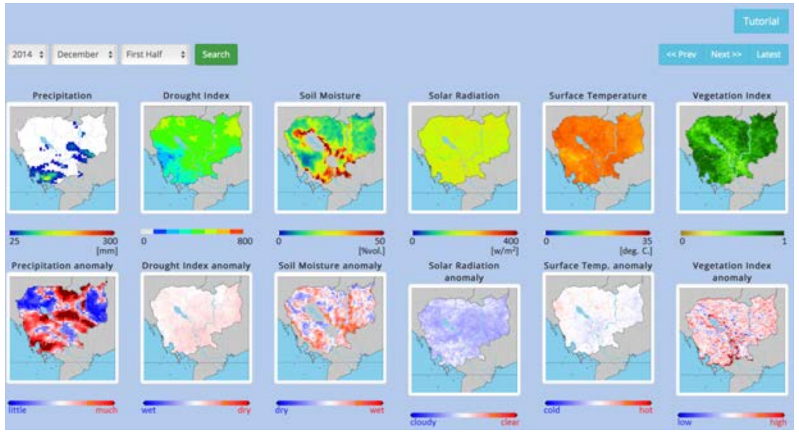
Others
Climate monitoring etc.

GSMaP Applications in ADB Projects

Flood Forecasting

- TA 8074-REG: Applying Remote Sensing Technology in River Basin Management
- Bangladesh, Philippines and Viet Nam
- Flood forecasting and early warning system by flood model (WEB-DHM) with GSMaP


9
2
4
7
8
3
5
6
1
outlet
Flow Intervals
Subbasin
Precipitation
R_{lw}
R_{sw}
H
CO_2
λET
Soil surface
Surface flow
Inter flow
Groundwater table
River
Groundwater flow
Impervious Surface
Datum
l
Hillslope Unit
Grid size in the model
DEM grid size
Subgrid Parameterization
3

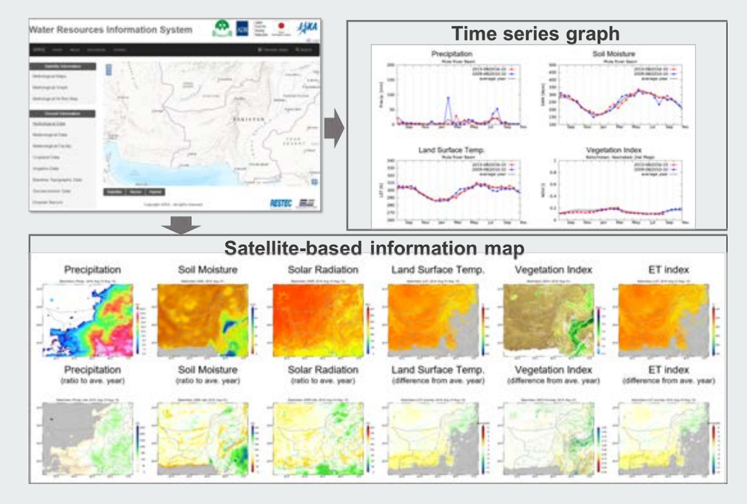

Tutorial
2014
December
First Half
Search
<< Prev
Next >>
Latest
Precipitation
Drought Index
Soil Moisture
Solar Radiation
Surface Temperature
Vegetation Index
25
300
[mm]
0
800
0
50
[%vol.]
0
400
[w/m²]
0
35
[deg. C.]
0
1
Precipitation anomaly
Drought Index anomaly
Soil Moisture anomaly
Solar Radiation anomaly
Surface Temp. anomaly
Vegetation Index anomaly
little
much
wet
dry
dry
wet
cloudy
clear
cold
hot
low
high

- TA-6521-REG: Accelerating the Implementation of the Core Agriculture Support Program (CASP)
- TA 8163-REG: Implementing the Greater Mekong Subregion Core Agriculture Support Program (Phase II)
- Cambodia, Lao PDR, Myanmar, Thailand and Viet Nam
- Drought and agro-met monitoring for regional food security by drought index based on GSMaP

Drought Monitoring

IWRM

- TA 8800-PAK: Balochistan Water Resources Development Project
- Pakistan
- Water Resource Information System (WRIS) utilizing GSMaP for integrated water resource management (IWRM)


Water Resources Information System
Time series graph
Precipitation
Soil Moisture
Land Surface Temp.
Vegetation Index
Satellite-based information map
Precipitation
Soil Moisture
Solar Radiation
Land Surface Temp.
Vegetation Index
ET index
Precipitation (ratio to ave. year)
Soil Moisture (ratio to ave. year)
Solar Radiation (ratio to ave. year)
Land Surface Temp. (difference from ave. year)
Vegetation Index (difference from ave. year)
ET index (difference from ave. year)
RESTEC

Contents of our Live Session

- 10 minutes presentation including below contents:
  - Overview of GSMaP, a satellite-based global rainfall map
  - GSMaP applications and potential use in development projects for water, agriculture sector and disaster risk management
  - Next step of GSMaP applications: global terrestrial hydrological simulation system

- 20 minutes Q&A/discussion