

South Asia Regional Flash Flood Guidance System: FFGS Products and Data Needs



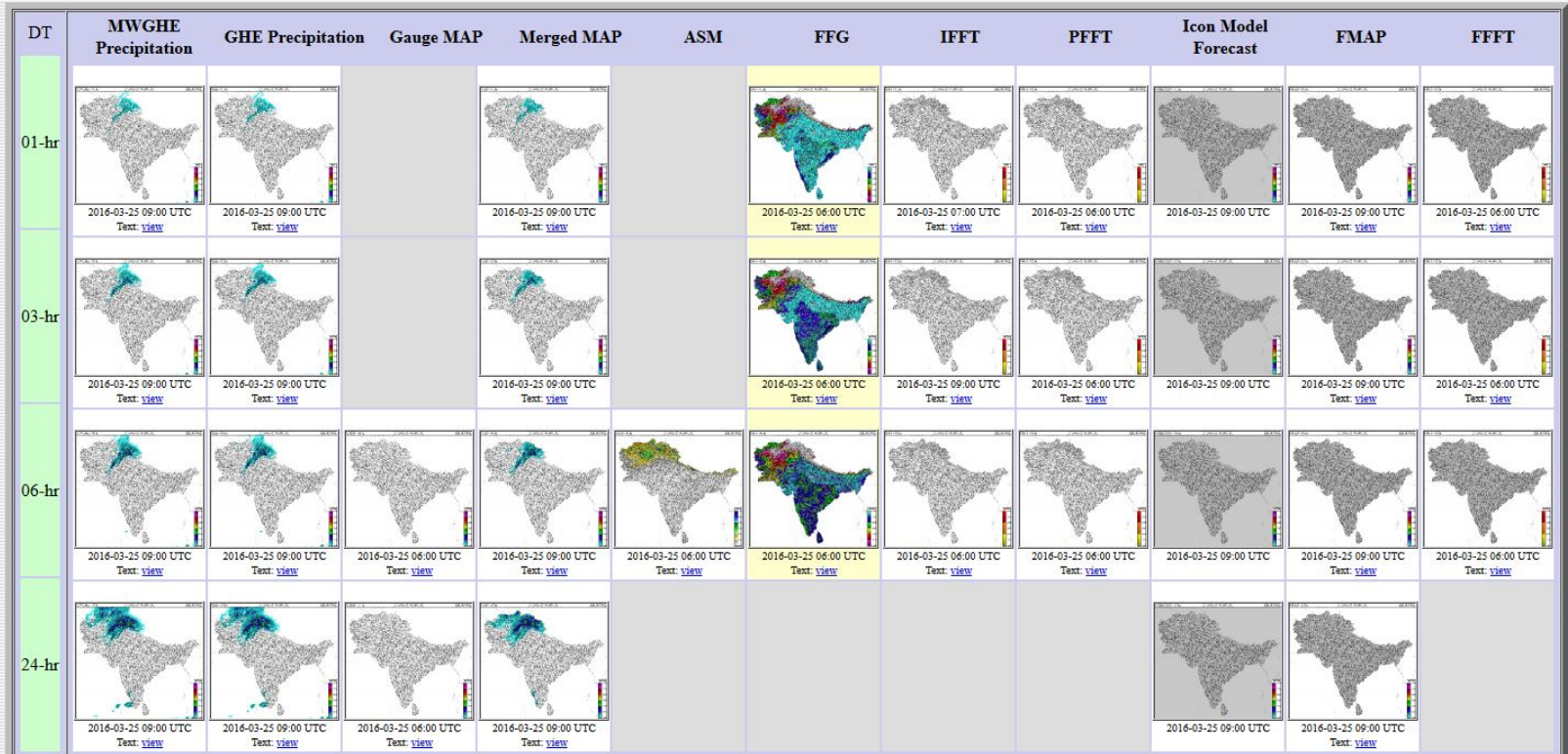
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Hydrologic Research Center

SAsiaFFG Steering Committee Meeting
27 April 2016
New Delhi, INDIA

Motivation

SAsia-FFG - South Asia Flash Flood Guidance System

Current Date: 2016-04-25 09:48 UTC Nav Date: 2016-03-25 09:00 UTC
 Year: 2016 Month: 03 Day: 25 Hour: 09 REGION: REGIONAL Submit
 -1 Month -1 Day -6 Hours -1 Hour +1 Hour +6 Hours +1 Day +1 Month
 Prev 6-hr Interval (06 UTC) Reset to Current Next 6-hr Interval (12 UTC)



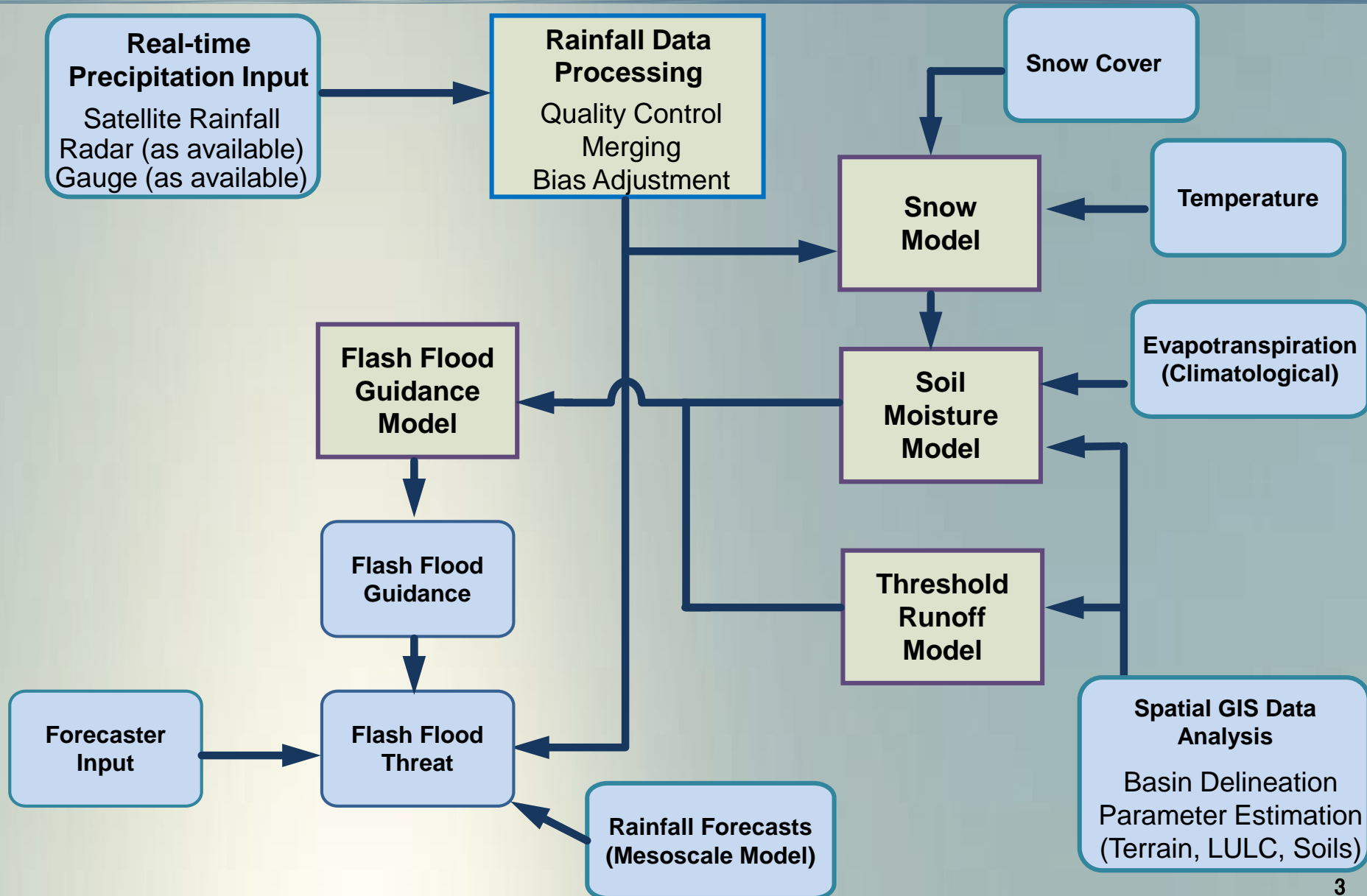
Composite Product: [text](#) [CSV](#) [CSVt](#)

SFTP data transfer (requires SFTP Client): [EXPORTS/REGIONAL/2016/03/25](#)

Station Identifier	Station Name	Accumulated Precipitation (mm/6hr)	Average Temperature (C)	Region
No reports for region	No reports for region	No reports for region	No reports for region	No reports for region

OBJECTIVE FOR THIS PRESENTATION:
Review FFGS products, and discuss data requirements.

KEY TECHNICAL COMPONENTS OF SASIAFFG SYSTEM

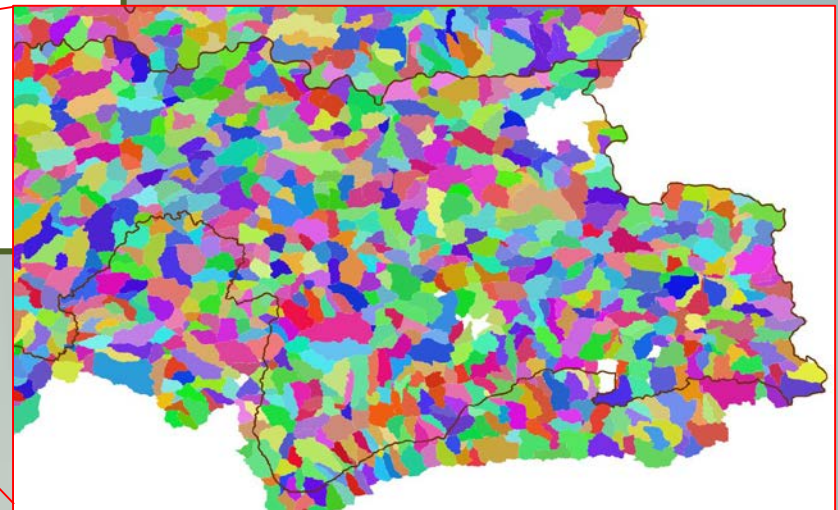
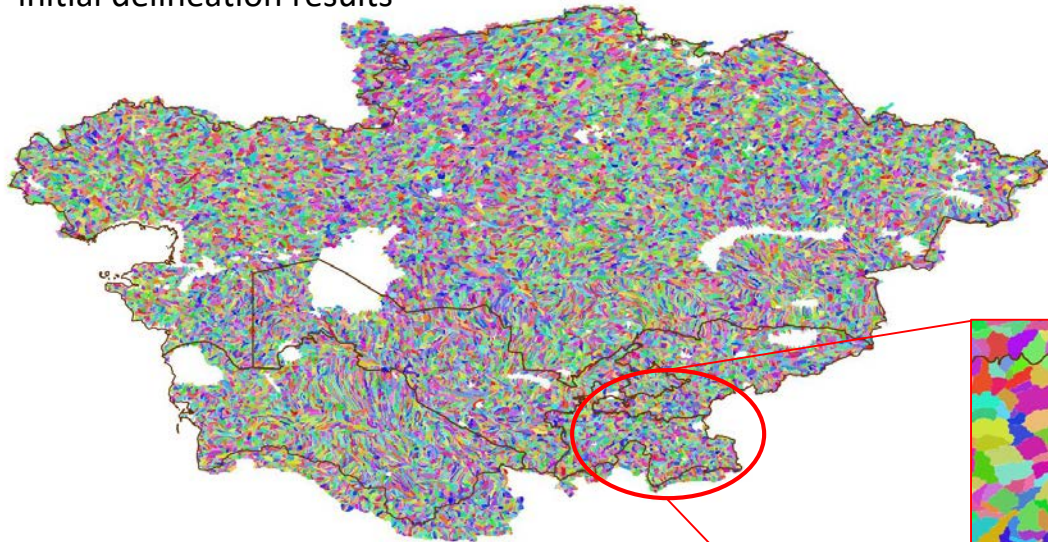


Spatial Analysis for Basin Delineation

OBJECTIVE:

- ❑ Define flash flood-scale watershed boundaries
- ❑ Provide spatial representation for model parameterization
- ❑ Determine geometric properties of flash flood basins used in model calculations.

*initial delineation results



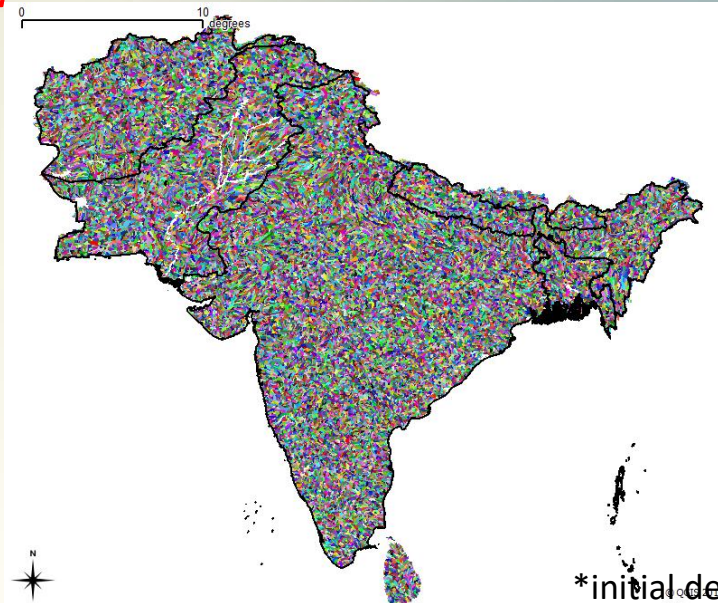
Spatial Analysis for Basin Delineation

DEVELOPMENT INPUT DATA:

- ❑ Digital Elevation Model (DEM) data
 - The preliminary delineation shown was based on SRTM-90m data

VALIDATION DATA:

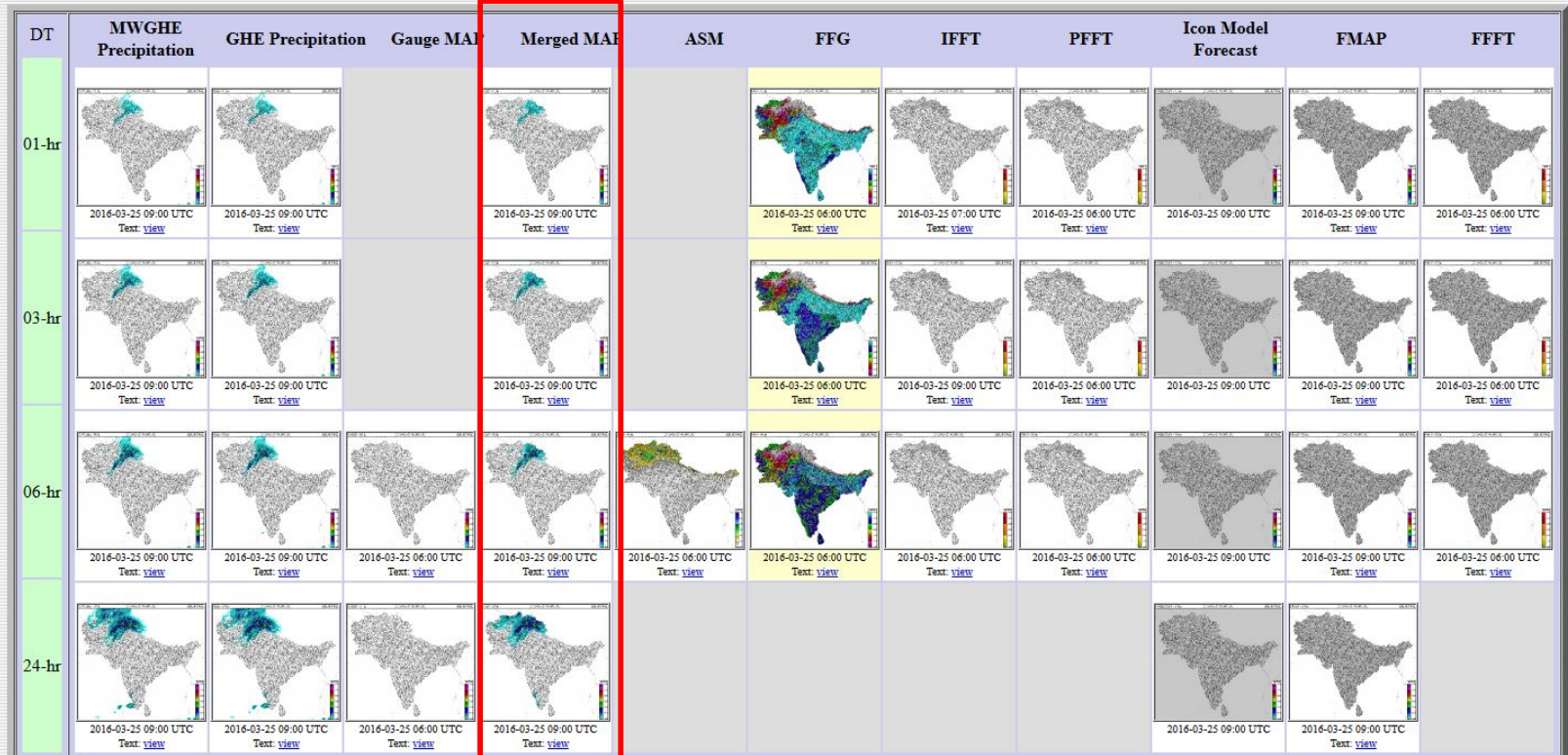
- ❑ Digital stream network data (Digital Chart of the World database)
- ❑ Comparison with satellite visible imagery (e.g., GoogleEarth)
- ❑ Country-provided *digital* stream and/or basin GIS files
- ❑ *Country-representative review and comments*



Real-Time Rainfall Processing and Merged MAP

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Composite Product: [text](#) [CSV](#) [CSV1](#)

SFTP data transfer (requires SFTP Client): [EXPORTS/REGIONAL/2016/03/25](#)

Surfmet Gauge Observations at 2016-03-25 06:00 UTC

Station Identifier	Station Name	Accumulated Precipitation (mm/6hr)	Average Temperature (C)	Region	Latitude	Longitude	Elevation	Enable Precipitation Flag	Enable Temperature Flag
No reports for region	No reports for region	No reports for region	No reports for region	No reports for region	No reports for region	No reports for region	No reports for region	No reports for region	No reports for region

Real-Time Rainfall Processing and Merged MAP

OBJECTIVE:

- ❑ Provide “best estimate” of mean areal precipitation over each watersheds input to soil water and FFG models.

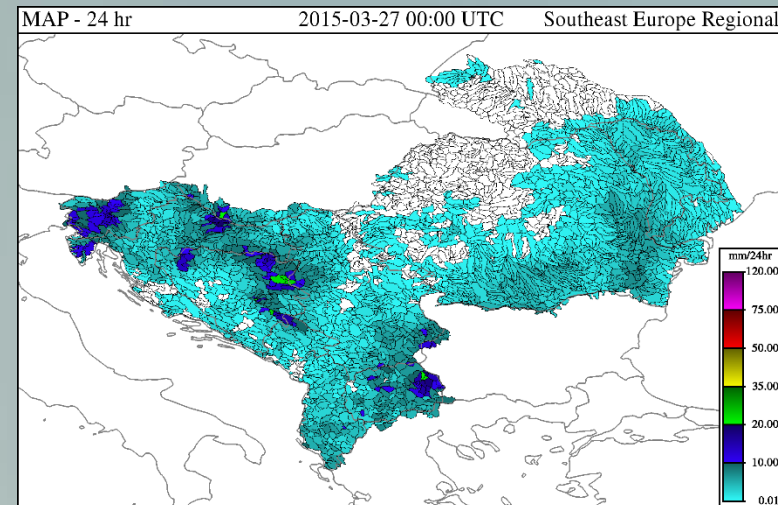
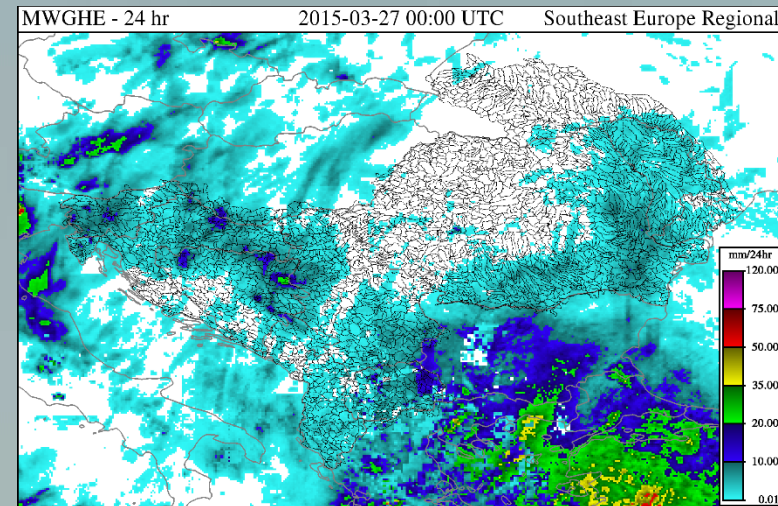
DEVELOPMENT INPUT DATA:

- ❑ Historical satellite precipitation data (HRC)
- ❑ Historical rain gauge precipitation data (6-hourly or daily)
- ❑ Analysis of climatological bias of satellite precipitation

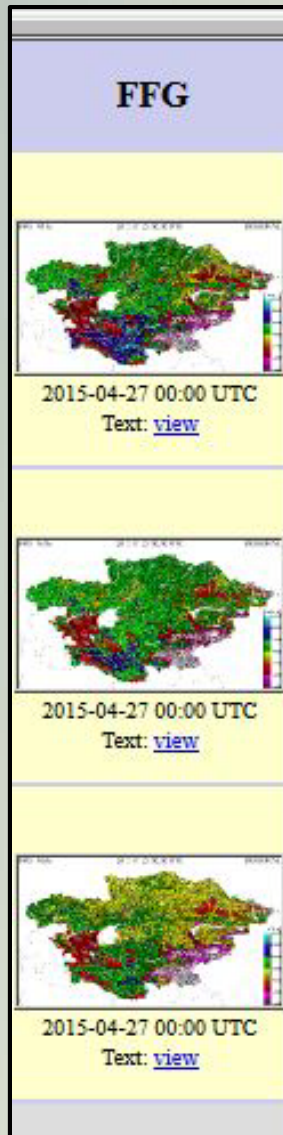
REAL-TIME INPUT DATA:

- ❑ Satellite precipitation (GHE, MWGHE)
- ❑ Climatological adjustment factors
- ❑ Real-time rain gauge precipitation for dynamic (real-time) precipitation bias adjustment

Examples from SEFFGS



Flash Flood Guidance



FFG product is computed through several hydrologic modeling components:

- Threshold Runoff Modeling
- Snow Modeling
- Soil Water Modeling

Threshold Runoff Model Component

Threshold Runoff is a foundational parameter of FFG, defined as the amount of *effective* rainfall of a given duration over a watershed that produces bankfull flow at the watershed outlet.

OBJECTIVE:

- ❑ Estimate *Threshold Runoff* for all flash flood-scale watersheds in region.



DEVELOPMENT INPUT DATA:

- ❑ Geometric properties of watersheds as determined via spatial analysis;
- ❑ Stream surveys or estimates of cross-sectional properties at channel bankfull for developing regional relationships;
- ❑ Return period discharge information for flash flood prone streams to develop regional relationships.

Snow Model Component (1)

OBJECTIVE:

- ❑ Estimate area covered by snow

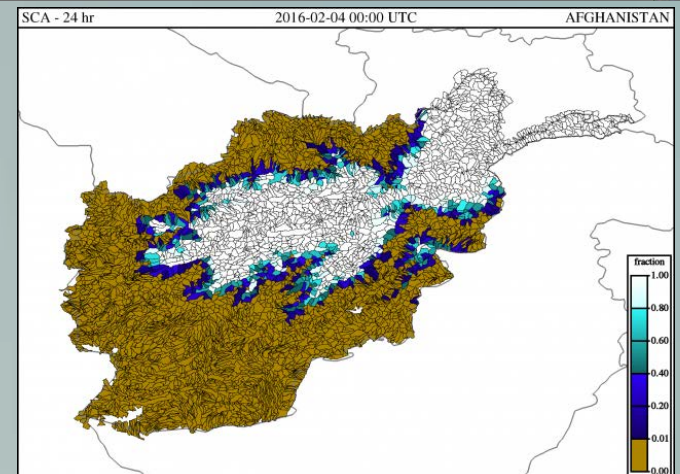
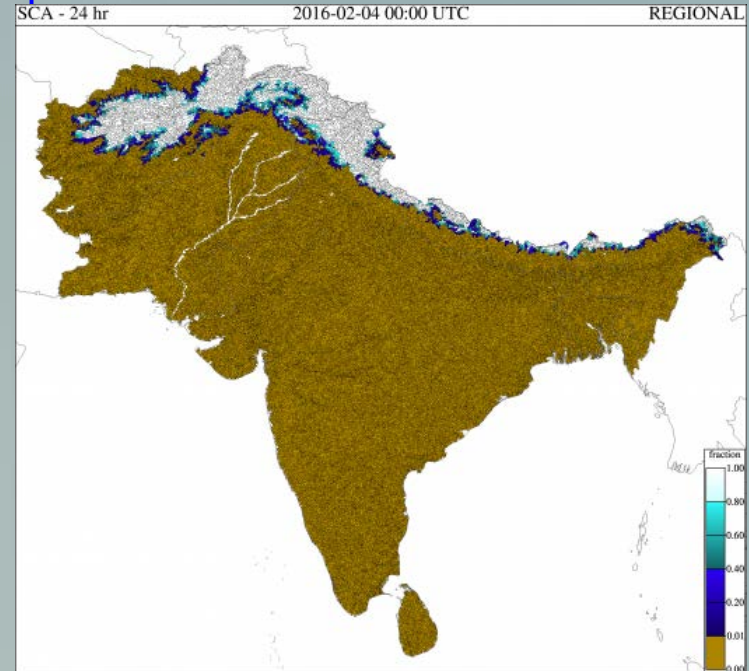
REAL-TIME INPUT DATA:

- ❑ NOAA Integrated Multi-Sensor (IMS) Snow and Ice satellite product

DEVELOPMENT INPUT DATA:

- ❑ Spatial Land Cover Data
- ❑ Historical archive of IMS products (for climatology analysis)
- ❑ Historical snow cover data (observations)

Examples of Snow Cover Area over South Asia



Snow Model Component (2)

OBJECTIVE:

- ❑ Account for snow melt contribution to soil water modeling

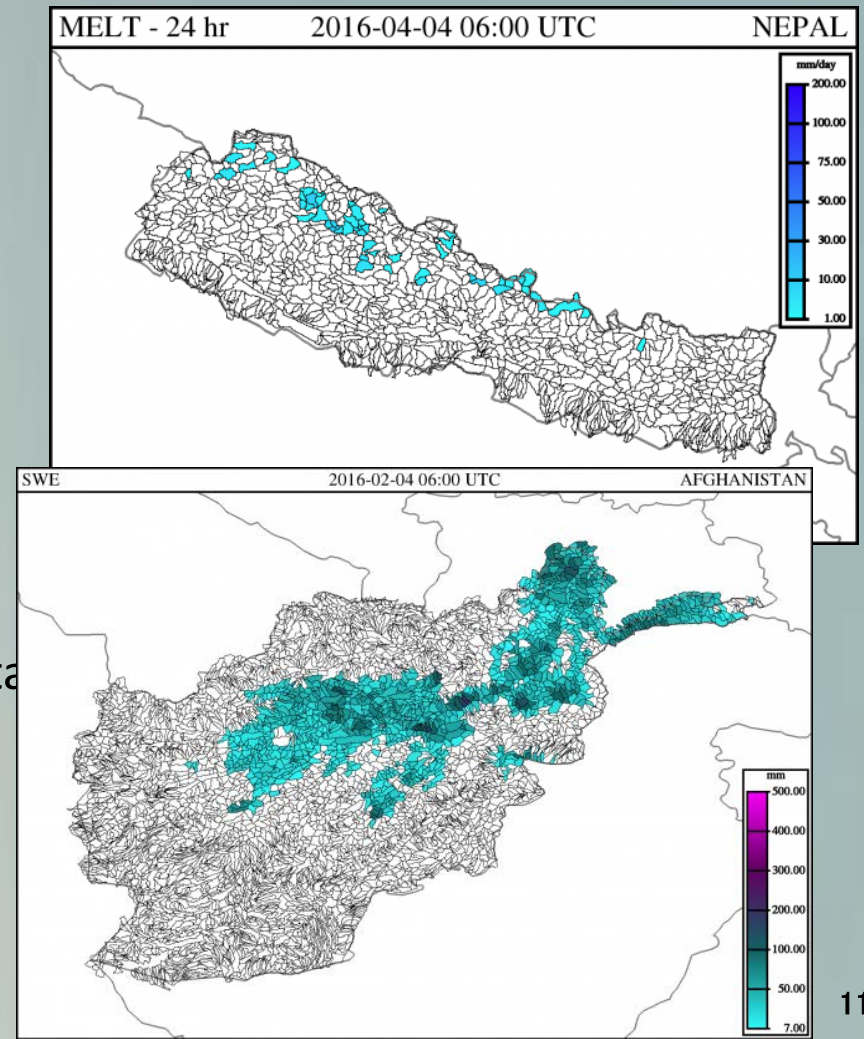
Examples of Snow Melt & SWE from SAsiaFFGS

REAL-TIME INPUT DATA:

- ❑ Mean Areal Precipitation (from Rainfall Processing)
- ❑ Mean Areal Temperature
- ❑ Snow Covered Area (IMS Product)

DEVELOPMENT INPUT DATA:

- ❑ Spatial Land Cover Data
- ❑ Historical temperature data (for climatology)
- ❑ Historical snow cover/snow depth data
- ❑ Historical snow water equivalent



Soil Water Model Component

OBJECTIVE:

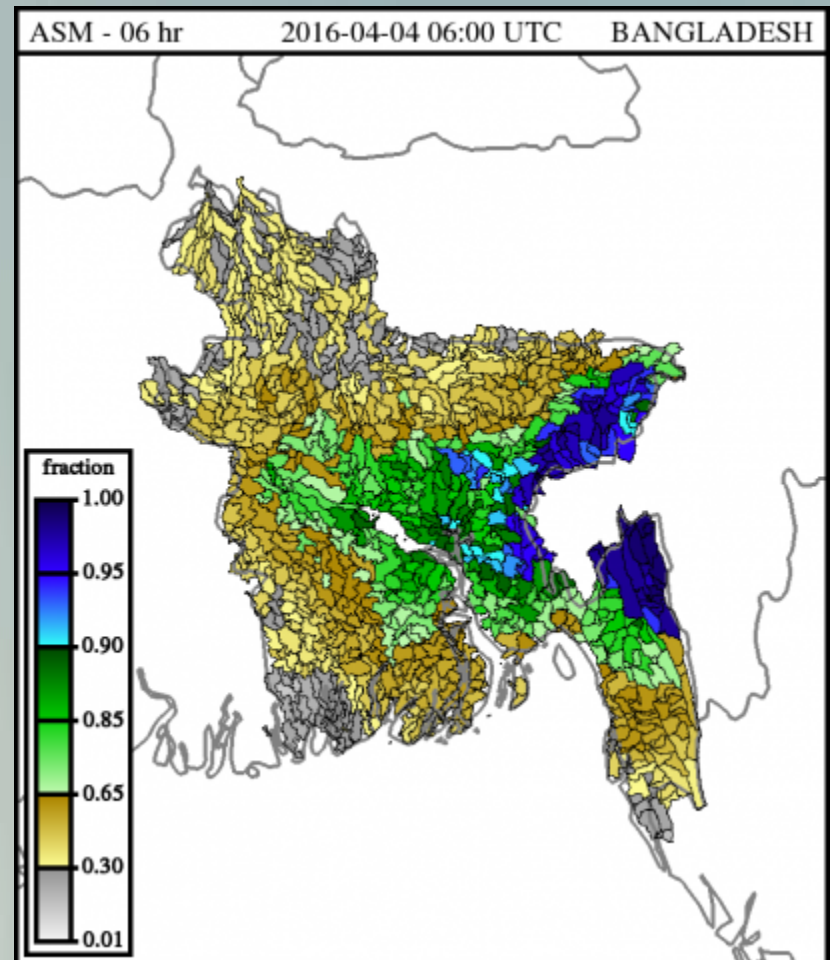
- Estimate soil water conditions within basins in real-time
- Account for land surface processing in transformation of rainfall to runoff

REAL-TIME INPUT DATA:

- Small watershed mean areal precipitation
- Snow melt

DEVELOPMENT INPUT DATA:


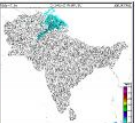




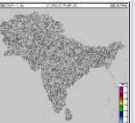

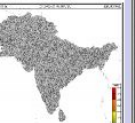

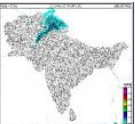




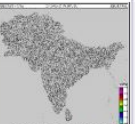

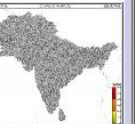

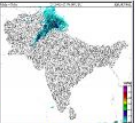

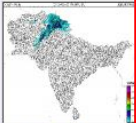




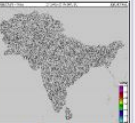

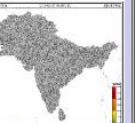
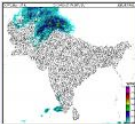


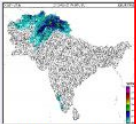
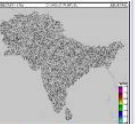

- Soils Properties
- Spatial Land Cover Data
- Historical temperature and evaporation data
- Stream discharge data



South Asia FFG System Products and Data Needs

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DT	MWGHE Precipitation	GHE Precipitation	Gauge MAP	Merged MAP	ASM	FFG	IFFT	PFFT	Icon Model Forecast	FMAP	FFFT
01-hr	 2016-03-25 09:00 UTC Text: view	 2016-03-25 09:00 UTC Text: view		 2016-03-25 09:00 UTC Text: view		 2016-03-25 06:00 UTC Text: view	 2016-03-25 07:00 UTC Text: view	 2016-03-25 06:00 UTC Text: view	 2016-03-25 09:00 UTC	 2016-03-25 09:00 UTC Text: view	 2016-03-25 06:00 UTC Text: view
03-hr	 2016-03-25 09:00 UTC Text: view	 2016-03-25 09:00 UTC Text: view		 2016-03-25 09:00 UTC Text: view		 2016-03-25 06:00 UTC Text: view	 2016-03-25 09:00 UTC Text: view	 2016-03-25 06:00 UTC Text: view	 2016-03-25 09:00 UTC	 2016-03-25 09:00 UTC Text: view	 2016-03-25 06:00 UTC Text: view
06-hr	 2016-03-25 09:00 UTC Text: view	 2016-03-25 09:00 UTC Text: view	 2016-03-25 06:00 UTC Text: view	 2016-03-25 09:00 UTC Text: view	 2016-03-25 06:00 UTC Text: view	 2016-03-25 06:00 UTC Text: view	 2016-03-25 06:00 UTC Text: view	 2016-03-25 06:00 UTC Text: view	 2016-03-25 09:00 UTC	 2016-03-25 09:00 UTC Text: view	 2016-03-25 06:00 UTC Text: view
24-hr	 2016-03-25 09:00 UTC Text: view	 2016-03-25 09:00 UTC Text: view	 2016-03-25 06:00 UTC Text: view	 2016-03-25 09:00 UTC Text: view					 2016-03-25 09:00 UTC	 2016-03-25 09:00 UTC Text: view	
Composite Product: text CSV CSV						SFTP data transfer (requires SFTP Client): EXPORTS/REGIONAL/2016/03/25					
Surfnet Gauge Observations at 2016-03-25 06:00 UTC											
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No reports for region	No reports for region	No reports for region	No reports for region	No reports for region	No reports for region	No reports for region	No reports for region	No reports for region	No reports for region		

Summary of Development Data

Note: These are global datasets.

- ❖ Shuttle Radar Topography Mission (SRTM) Digital Elevation Data (CGIAR)
- ❖ Hydro-Estimator Satellite Precipitation (NOAA/NESDIS)
- ❖ CMORPH Satellite Precipitation (NOAA/CPC)
- ❖ Soils Taxonomy (FAO Soils Database)
- ❖ Digital Land Cover (AVHRR)

Summary of Data Needs



Development needs:

- ❖ Historical precipitation, temperature, and soils data
- ❖ Real-time station precipitation and temperature data (e.g., GTS)
- ❖ Local/Country specific soils and land use data, if available

South Asia FFG System Products and Data Needs

