

SEEFFG Operations Workshop

Overview of SEEFFG System Forecaster Interface



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A Little Motivation

(Why do we care about flash floods?)

Flash Floods are very significant disasters globally ...

- More than 5000 deaths per year worldwide
- Millions of dollars of property and infrastructure damage
- Highest number of deaths per people affected (mortality rate)
- WMO survey (2008) finds 105 out of 139 countries identified flash floods among their top two most important hazards.



A Little Motivation

(Why do we care about flash floods?)

But there are no discernible trends for loss reduction.

- Lack of flash flood warnings for vast populated areas of the world
- Lack of local expertise and regional cooperation
- Little in-situ data for small regions
- Large river warning strategies are ineffective for flash floods

*Usually, flow crest is reached within **6 hours** of causative event (Only consider < **2000km²**)*

Flash floods are local *hydrometeorological* phenomena that require:

1. Both hydrological and meteorological expertise for real-time forecasting
2. Knowledge of local up-to-the-hour information for effective warning

Importance of Soil Moisture

GEORGAKAKOS ET AL.: HYDROCLIMATOLOGY OF WATERSHEDS, 1

BIRD CREEK NEAR SPERRY, OK

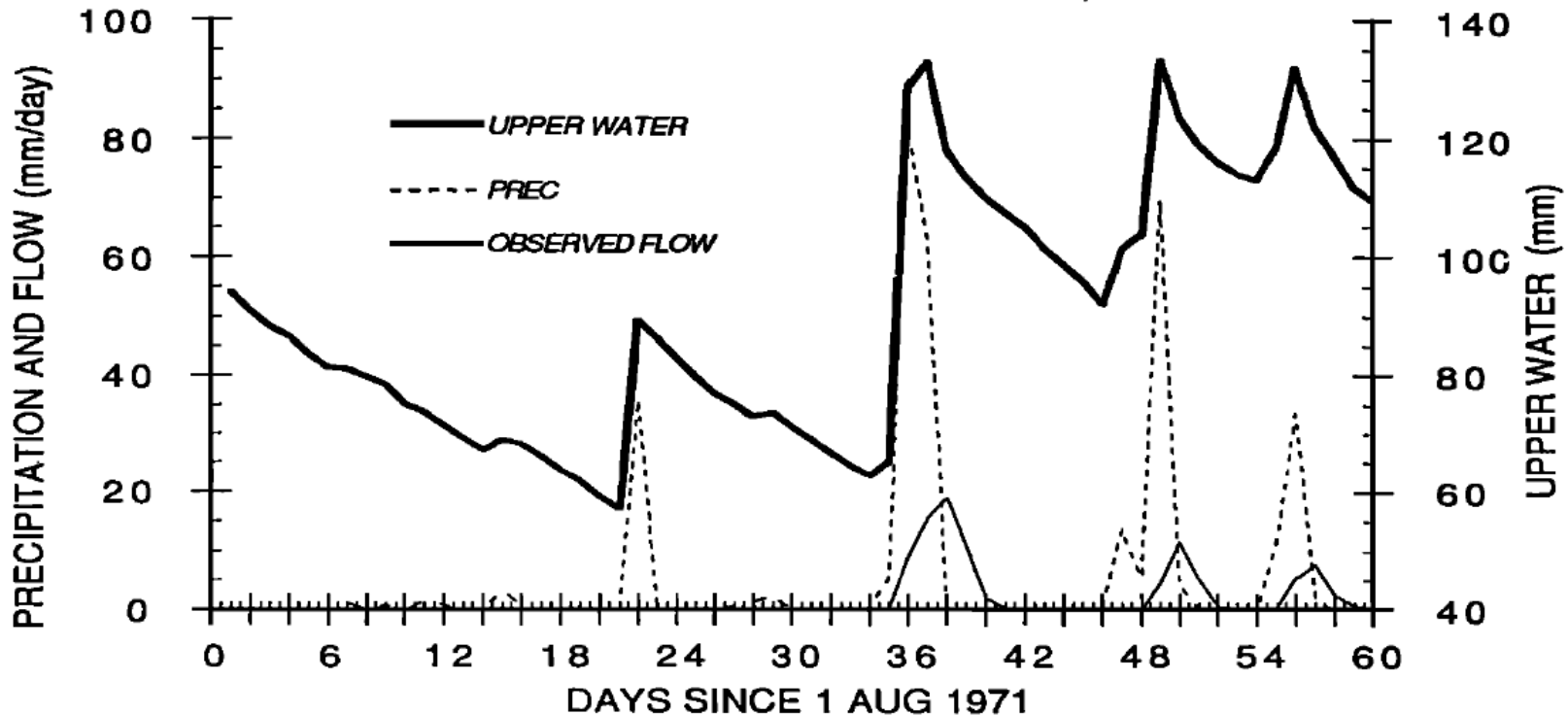
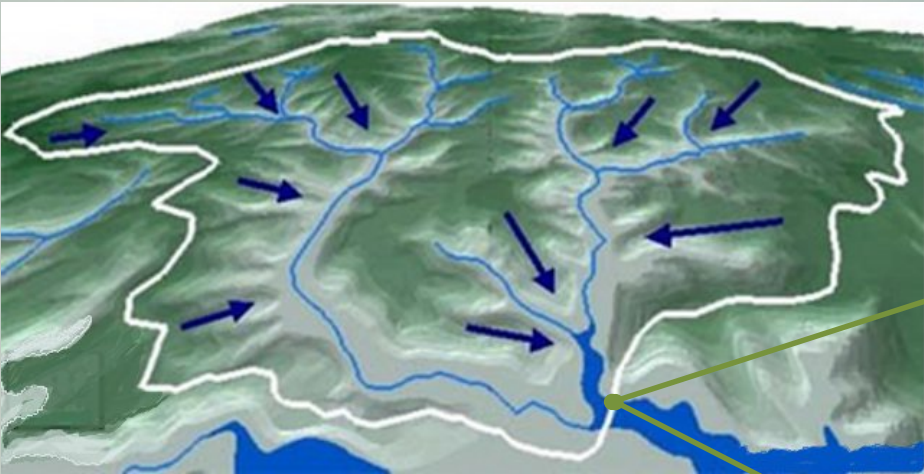


Figure 2. Daily values of rainfall rate (dashed line), flow rate (solid line), and upper soil water (heavy solid line) for Bird Creek near Sperry, Oklahoma, for August and September 1971. Rainfall and flow rates are in millimeters per day and are read on the left ordinate axis. Upper water is in millimeters and is read on the right ordinate axis. Upper water capacity is 135 mm.

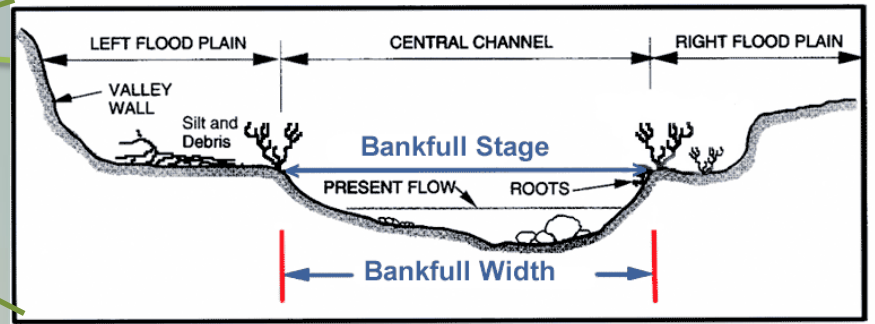
Fundamental Concepts for Flash Flood Guidance

FFG ↓ ↓ ↓ ↓ ↓ ↓ ↓

- Rainfall threshold (familiar concept)
- Meteorology and hydrology decoupled to allow for adjustments
- Concerned only with bankfull flow



Soil Water Deficit
Channel bankfull storage



Bankfull Flow

Flash Flood Guidance (FFG): The amount of **rainfall** of a given duration and over a given catchment that is just enough to cause **flooding conditions** at the outlet of the draining stream

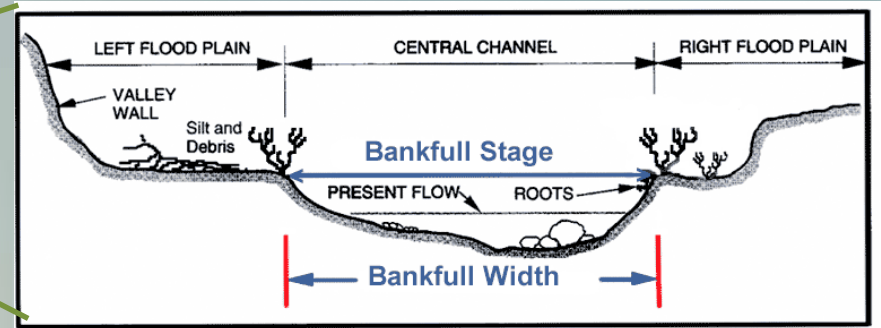
Threshold exceedance concept to estimate occurrence only!

Fundamental Concepts for Flash Flood Guidance

FFG



Location of Occurrence



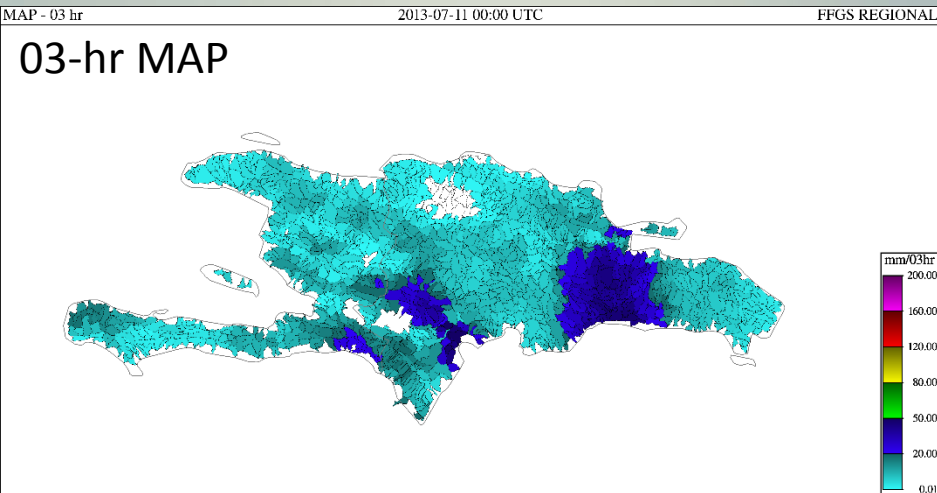
Urban environment

- Not represented due to scale
- Not represented due to sewers

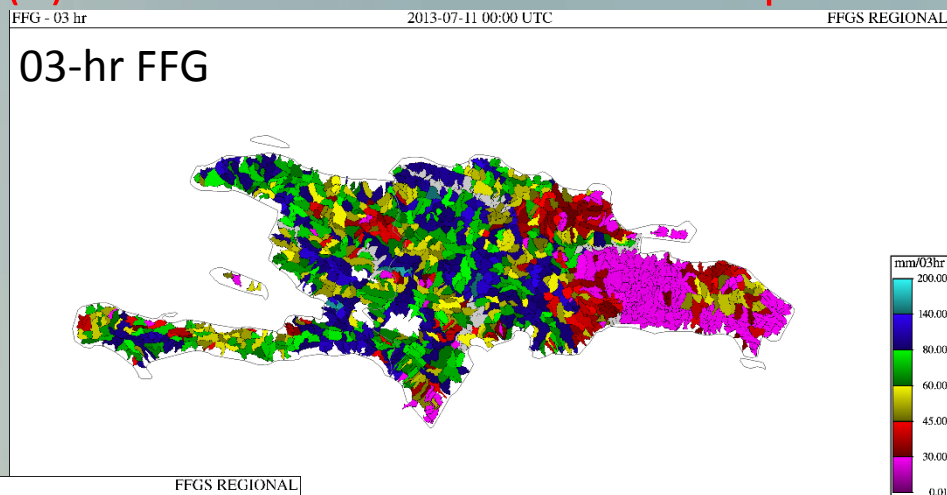
Application of Flash Flood Guidance

Example from Haiti/Dominican Republic

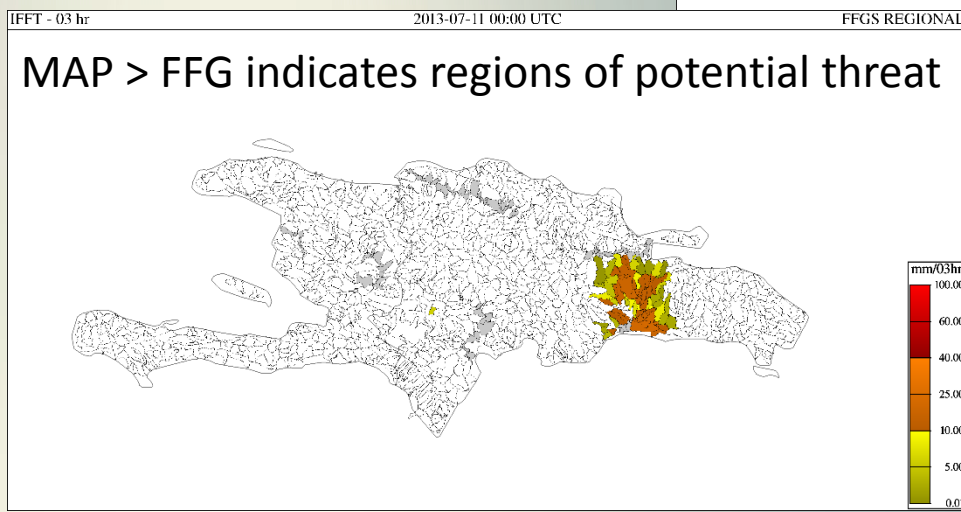
(A) Amount of Rainfall



(B) How much rainfall can land accept?



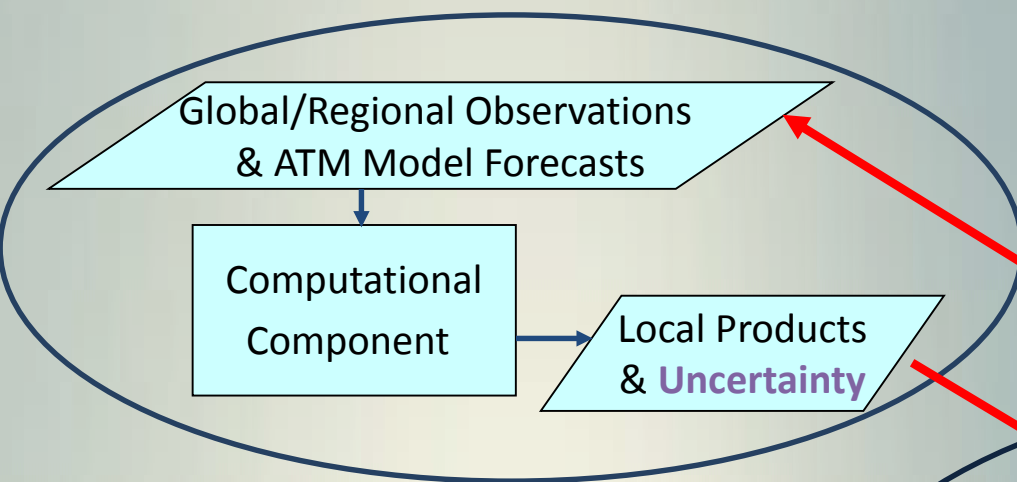
(C) Compare MAP with FFG



Design Fundamental for Flash Flood Guidance Systems

From Global Data and Regional Hydrometeorology to Country Data and Warnings

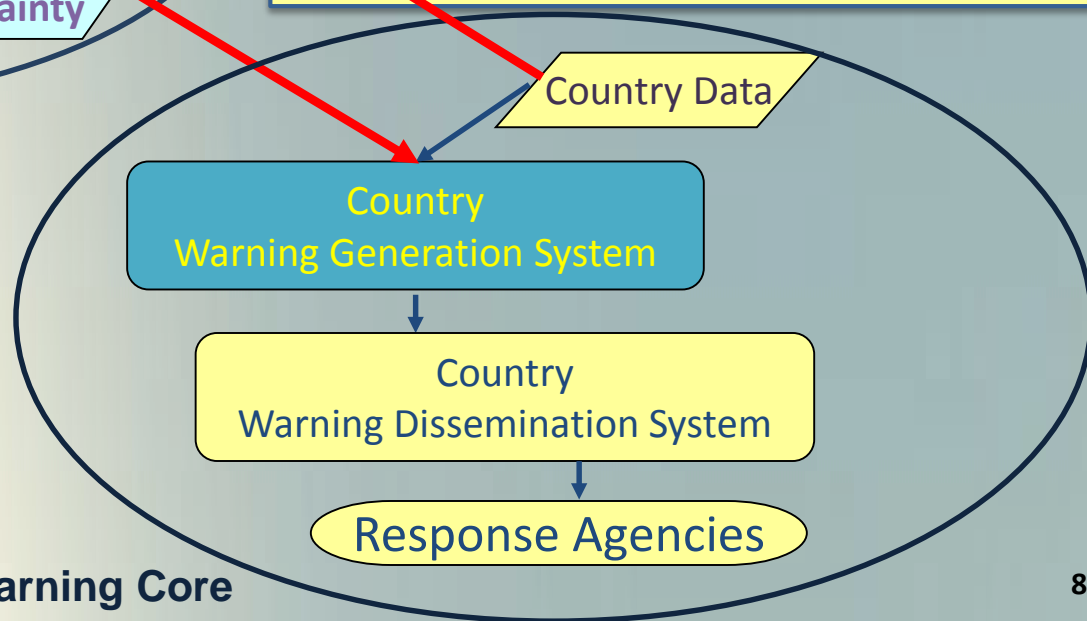
Regional Center: Computational Core



FFG System Design Goal:

Provide *operational forecasters* with up to date information to support decisions regarding local flash flood potential.

Acknowledging that forecasters may need to modify products of *regional* system with *local* data or information not available to regional system.



Country NMHS: Adjustments and Warning Core

SEFFG System Interface

1. Dashboard

SECURE WEBSITE @ <https://seffg.hrc-lab.org/DASHBOARD/>

- INTENDED TO provide a “quick look” at current system status for system administrators

2016-05-03 21:15:51 EET **IMAGES (ANIMATION)** **SEFFG - Real-Time Status Dashboard** **2016-05-03 19:15:51 UTC**

Real-Time Data Download and Inventory Status:

MRC MWGHE Download					NESDIS GHE Download					GAGE Download					IMS Download				
ENABLED					ENABLED					ENABLED					ENABLED				
SUCCESS					SUCCESS					PENDING					SUCCESS				
Apr-29	Apr-30	May-01	May-02	May-03	Apr-29	Apr-30	May-01	May-02	May-03	Apr-29	Apr-30	May-01	May-02	May-03	Apr-29	Apr-30	May-01	May-02	May-03
50	54	51	54	52	50	50	55	51	51	50%	52%	51%	51%	51%	-	-	-	-	-

Real-Time Data Processing Status:

MRC MWGHE Data Processing		NESDIS GHE Data Processing		GAGE Data Processing		IMS Data Processing	
ENABLED	SUCCESS	ENABLED	SUCCESS	ENABLED	SUCCESS	ENABLED	SUCCESS
PENDING							

Model Processing Status:

SNOW Model Processing		SACEMA & FFG Model Processing	
ENABLED	SUCCESS	ENABLED	SUCCESS
SUCCESS		SUCCESS	

Export Processing Status:

Text CSV Exports		Image Exports	
ENABLED	SUCCESS	ENABLED	SUCCESS
SUCCESS		SUCCESS	

Computational Server Status:

General Info				Processing Load			CPU Activity			Disk Activity			Storage					
IP Address	Hostname	Uptime	Active Legals	5-Min	5-Min	15-Min	Swap Used	System	User	IDwait	Idle	Transfers	Read	Write	Free	Used	% Used	Days to Filled
194.180.140.77	SEFFG03	149:70 days	0	103.21 %	104.64 %	101.22 %	100014 KB	92.17 %	0.01 %	0.00 %	0.00 %	773.21/s	952.60 KB/s	20,951.35 KB/s	117,076.10K	1,666,382.10K	94 %	23 days

Dissemination Server Status:

General Info				Processing Load			CPU Activity			Disk Activity			Storage					
IP Address	Hostname	Uptime	Active Legals	5-Min	5-Min	15-Min	Swap Used	System	User	IDwait	Idle	Transfers	Read	Write	Free	Used	% Used	Days to Filled
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

LINKS

[Southeast Europe Regional](#)
[Albania](#)
[Bosnia & Herzegovina](#)
[Croatia](#)
[Moldova](#)
[Montenegro](#)
[Romania](#)
[Serbia](#)
[Slovenia](#)
[The former Yugoslav Republic of Macedonia](#)

Go to Southeast Europe Regional Product Console

This page will automatically refresh every 60 seconds.

In process status: Green is good; Red is concern.

SEFFG System Interface

2. Product Console

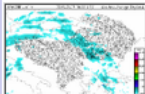
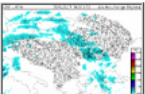
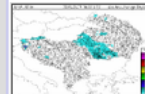
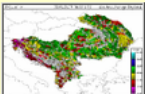


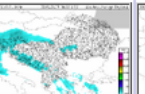
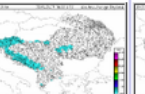

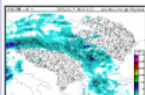
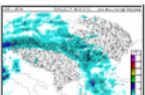
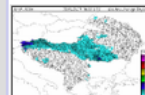
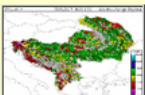


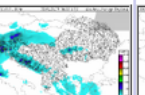
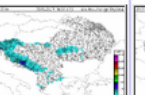

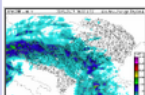
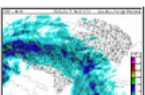
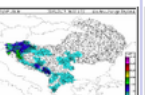
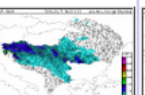
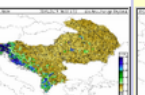
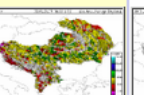
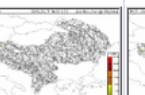
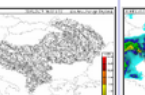
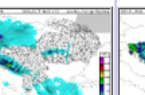
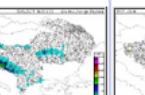

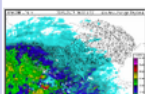
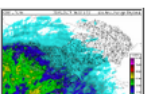
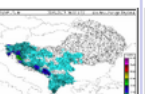
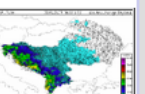
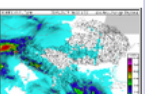
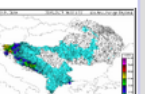
SECURE WEBSITE @ <https://seffg.hrc-lab.org/CONSOLE/>

SEFFG - Southeast Europe Flash Flood Guidance System

2) Product Table

1) Navigation

Current Date: 2015-03-25 19:44 UTC Nav Date: 2015-03-25 18:00 UTC
 Year: 2015 Month: 03 Day: 25 Hour: 18 REGION: REGIONAL Submit
 -1 Month -1 Day -6 Hours -1 Hour +1 Hour +6 Hours +1 Day +1 Month
 Prev 6-hr Interval (12 UTC) Reset to Current Next 6-hr Interval (00 UTC)

DT	MWGH Precipitation	GHE Precipitation	Gauge MAP	Merged MAP	ASM	FFG	IFFT	PFPT	ALADIN Forecast	FMAP	FFFT
01-hr	 2015-03-25 18:00 UTC Text view	 2015-03-25 18:00 UTC Text view		 2015-03-25 18:00 UTC Text view		 2015-03-25 18:00 UTC Text view	 2015-03-25 18:00 UTC Text view	 2015-03-25 18:00 UTC Text view	 2015-03-25 18:00 UTC	 2015-03-25 18:00 UTC Text view	 2015-03-25 18:00 UTC Text view
03-hr	 2015-03-25 18:00 UTC Text view	 2015-03-25 18:00 UTC Text view		 2015-03-25 18:00 UTC Text view		 2015-03-25 18:00 UTC Text view	 2015-03-25 15:00 UTC Text view	 2015-03-25 18:00 UTC Text view	 2015-03-25 18:00 UTC	 2015-03-25 18:00 UTC Text view	 2015-03-25 18:00 UTC Text view
06-hr	 2015-03-25 18:00 UTC Text view	 2015-03-25 18:00 UTC Text view	 2015-03-25 18:00 UTC Text view	 2015-03-25 18:00 UTC Text view	 2015-03-25 18:00 UTC Text view	 2015-03-25 18:00 UTC Text view	 2015-03-25 18:00 UTC Text view	 2015-03-25 18:00 UTC Text view	 2015-03-25 18:00 UTC	 2015-03-25 18:00 UTC Text view	 2015-03-25 18:00 UTC Text view
24-hr	 2015-03-25 18:00 UTC Text view	 2015-03-25 18:00 UTC Text view	 2015-03-25 18:00 UTC Text view	 2015-03-25 18:00 UTC Text view					 2015-03-25 18:00 UTC	 2015-03-25 18:00 UTC Text view	

3) Text Downloads

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

SFTP data transfer (requires SFTP Client): [EXPORTS REGIONAL/2015/03/25](#)

Surfmet Gauge Observations at 2015-03-25 18:00 UTC

Station Identifier	Station Name	Accumulated Precipitation (mm/06hr)	Average Temperature (C)	Snow Depth (cm)	Snow Cover (Index)	Region	Latitude	Longitude	Elevation	Enable Precipitation Flag	Enable Temperature Flag
11001	Wolfsegg	0.00	10.95	No Report	No Report	REGIONAL	48.1	13.683333333333	634	Enabled	Enabled
11008	Rohrbach	0.00	12.60	No Report	No Report	REGIONAL	48.566666666666	14	602	Enabled	Enabled
11010	Linz / Hoersching- Tribelhofen	0.00	14.55	No Report	No Report	REGIONAL	48.233333333333	14.183333333333	298	Enabled	Enabled

SEEFFG System Interface

2. Product Console

SECURE WEBSITE @ <https://seeffg.hrc-lab.org/CONSOLE/>

4-hr

Image Unavailable
2015-03-24 22:00 UTC
Text: [Waiting](#)

2015-03-24 22:00 UTC
Text: [view](#)

2015-03-24 18:00 UTC
Text: [view](#)

2015-03-24 22:00 UTC
Text: [view](#)

2015-03-24 22:00 UTC
Text: [view](#)

2015-03-24 22:00 UTC
Text: [view](#)

Composite Product: [text](#), [CSV](#), [CSV/T](#)

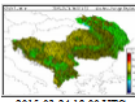
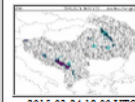
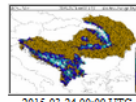
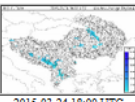
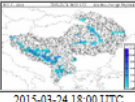
SFTP data transfer (requires SFTP Client): [EXPORTS/REGIONAL/2015/03/24](#)

Surfmet Gauge Observations at 2015-03-24 18:00 UTC

Station Identifier	Station Name	Accumulated Precipitation (mm/06hr)	Average Temperature (C)	Snow Depth (cm)	Snow Cover (Index)	Region	Latitude	Longitude	Elevation	Enable Precipitation Flag	Enable Temperature Flag
11001	Wolfsegg	0.00	10.55	No Report	No Report	REGIONAL	48.1	13.6833333333	634	Enabled	Enabled
11008	Rohrbach	0.00	10.55	No Report	No Report	REGIONAL	48.5666666666	14	602	Enabled	Enabled
11010	Linz / Hoersching-Flughafen	0.00	13.60	No Report	No Report	REGIONAL	48.2333333333	14.1833333333	298	Enabled	Enabled
11012	Kremsmuenster	0.00	12.30	No Report	No Report	REGIONAL	48.05	14.1333333333	383	Enabled	Enabled
11018	Amstetten	0.00	13.60	No Report	No Report	REGIONAL	48.1166666666	14.8666666666	274	Enabled	Enabled
11019	Allentsteig	0.00	12.40	No Report	No Report	REGIONAL	48.6833333333	15.3666666666	598	Enabled	Enabled
11020	Zwiesel	0.00	10.70	No Report	No Report	REGIONAL	48.6166666666	15.2	506	Enabled	Enabled

4) Station Information

Snowpack Products

DT	Gauge MAT	Latest IMS SCA	SWE	Melt
06-hr	 2015-03-24 18:00 UTC Text: view	 2015-03-24 18:00 UTC Text: view		
24-hr		 2015-03-24 00:00 UTC Text: view		 2015-03-24 18:00 UTC Text: view
4-day				 2015-03-24 18:00 UTC Text: view

5) Snow Products

6) Links

SEEFFG System Interface

rw Serbia: Flash floods - Emer... SEEFFG Real-Time Product Co... +

https://seeffg.hrc-lab.org/CONSOLE/index.php

Search

SEEFFG - Southeast Europe Flash Flood Guidance System

Current Date: 2016-05-04 18:26 UTC

Nav Date: 2016-05-04 12:00 UTC

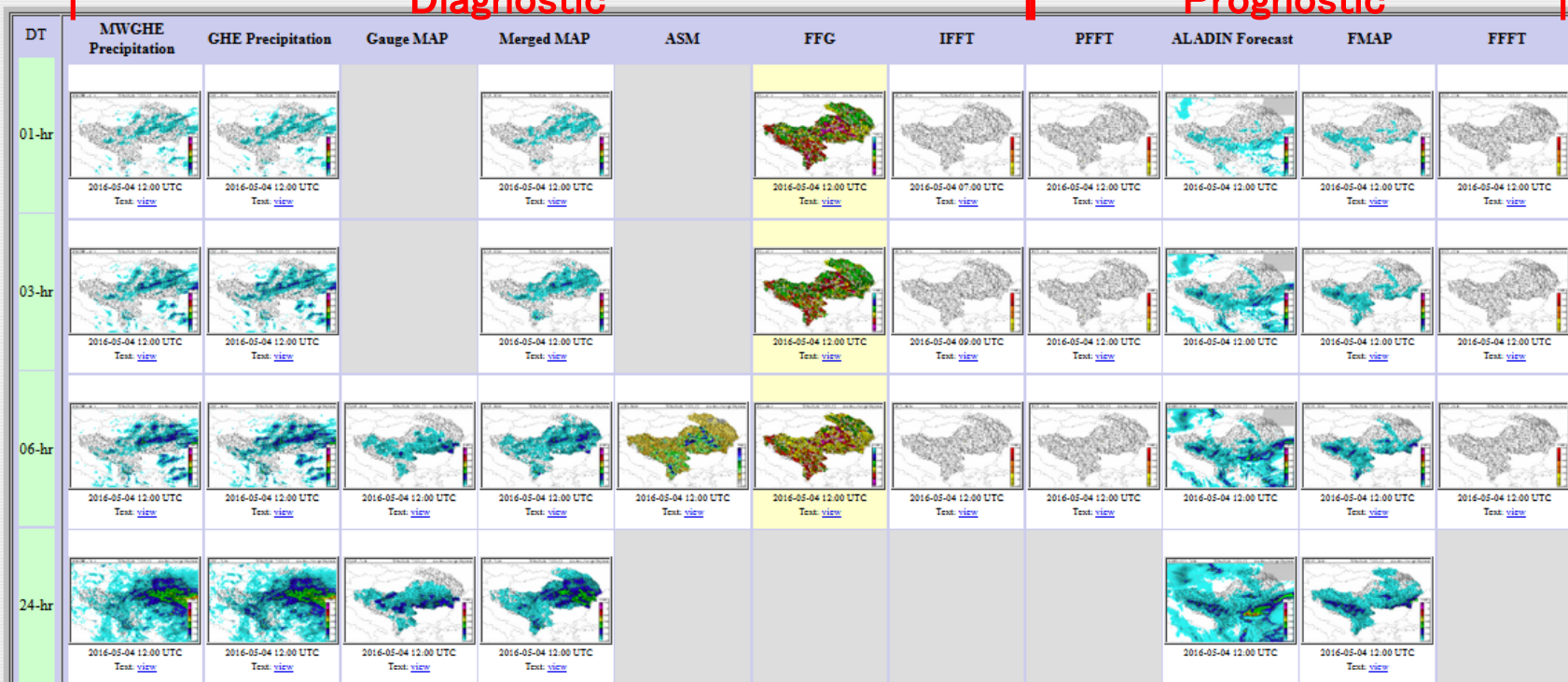
Year: 2018 Month: 05 Day: 04 Hour: 12 REGION: Southeast Europe Regional Submit

-1 Month -1 Day -8 Hours -1 Hour +1 Hour +8 Hours +1 Day +1 Month

Prev 6-hr Interval (06 UTC) Reset to Current Next 6-hr Interval (18 UTC)

Diagnostic

Prognostic



Composite Product: [text](#), [CSV](#), [SVT](#)

SFTP data transfer (requires SFTP Client): [EXPORTS_REGIONAL_2016_05_04](#)

Surfnet Gauge Observations at 2016-05-04 12:00 UTC

Station Identifier	Station Name	Accumulated Precipitation (mm/06hr)	Average Temperature (C)	Snow Depth (cm)	Snow Cover (Index)	Region	Latitude	Longitude	Elevation	Enable Precipitation Flag	Enable Temperature Flag
11001	Wolfegg	0.20	6.65	No Report	No Report	Southeast Europe Regional	48.1	13.683333333	634	Enabled	Enabled
11008	Rehrbach	0.30	7.50	No Report	No Report	Southeast Europe Regional	48.566666666	14	602	Enabled	Enabled
11010	Line / Moersching-Flughafen	0.10	8.40	No Report	No Report	Southeast Europe Regional	48.233333333	14.183333333	298	Enabled	Enabled
11012	Kremsmuenster	10.00	7.75	No Report	No Report	Southeast Europe Regional	48.05	14.133333333	383	Enabled	Enabled
11018	Amstetten	9.00	8.05	No Report	No Report	Southeast Europe Regional	48.116666666	14.866666666	274	Enabled	Enabled
11019	Altensteig	6.00	5.75	No Report	No Report	Southeast Europe Regional	48.683333333	15.366666666	598	Enabled	Enabled
11020	Zwentl	9.00	6.35	No Report	No Report	Southeast Europe Regional	48.616666666	15.2	506	Enabled	Enabled
11051	Ilzstetten	4.00	5.85	No Report	No Report	Southeast Europe Regional	48.066666666	16.033333333	564	Enabled	Enabled

SEEFFG System Interface

rw Serbia: Flash floods - Emer... SEEFFG Real-Time Product Co... +

https://seeffg.hrc-lab.org/CONSOLE/index.php Search

SEEFFG - Southeast Europe Flash Flood Guidance System

Current Date: 2016-05-04 18:26 UTC Nav Date: 2016-05-04 12:00 UTC

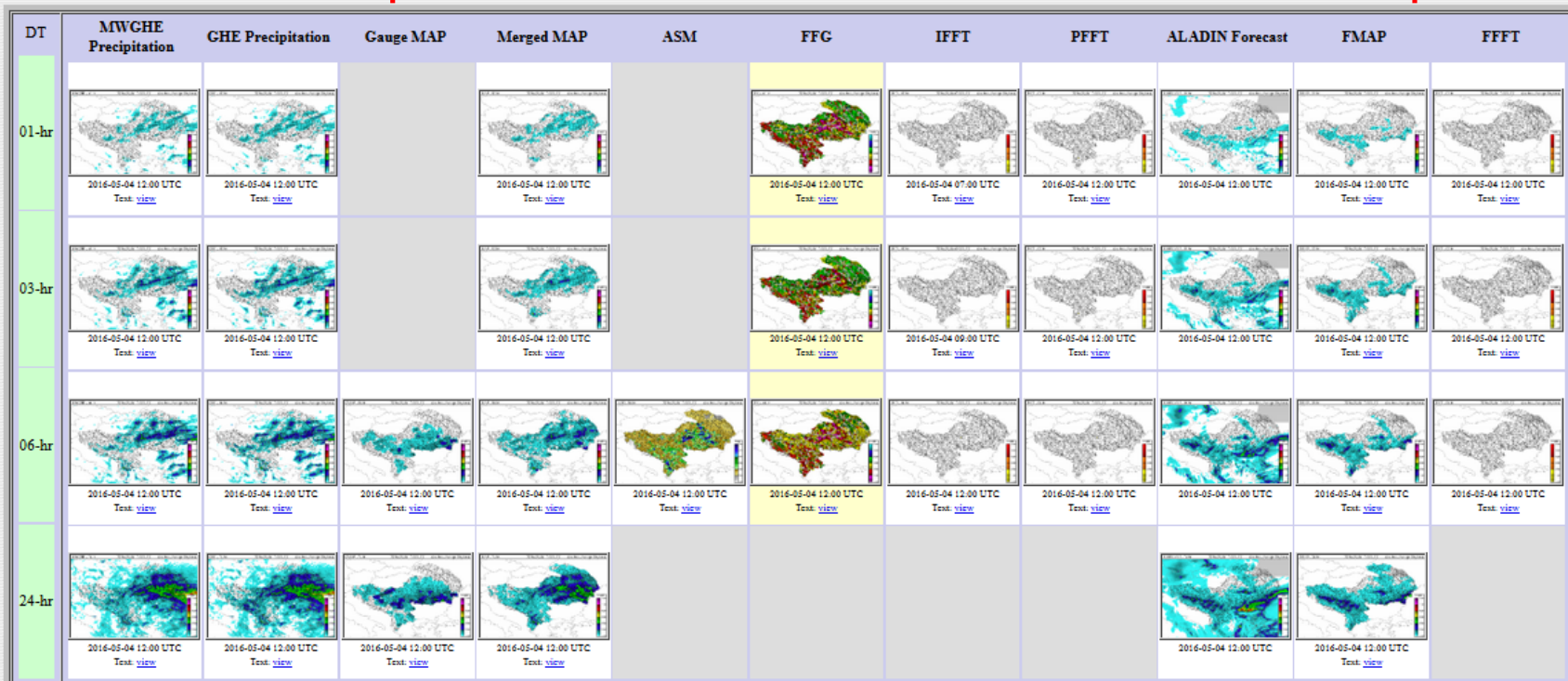
Year: 2018 Month: 05 Day: 04 Hour: 12 REGION: Southeast Europe Regional Submit

-1 Month -1 Day -8 Hours -1 Hour +1 Hour +8 Hours +1 Day +1 Month

Prev 6-hr Interval (06 UTC) Reset to Current Next 6-hr Interval (18 UTC)

Observed Precipitation

Forecast Precipitation



Composite Product: [text](#), [CSV](#), [SVT](#)

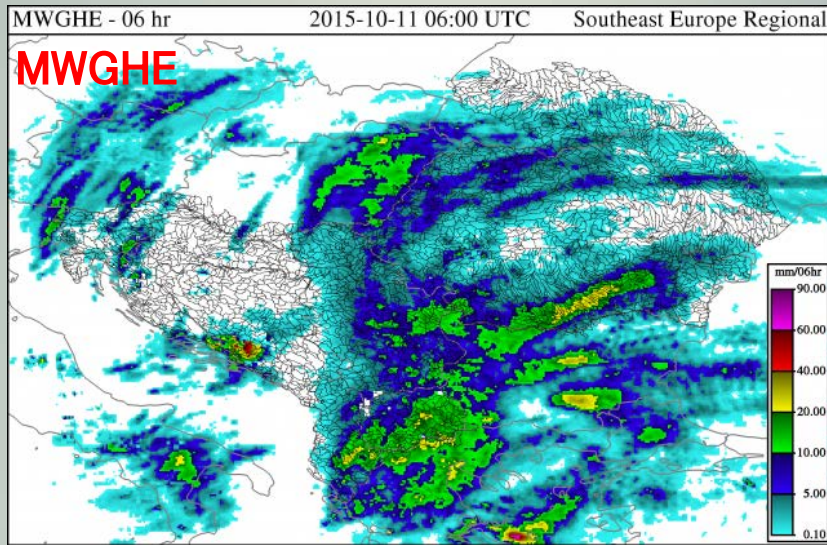
SFTP data transfer (requires SFTP Client): [EXPORTS_REGIONAL_2016_05_04](#)

Surfnet Gauge Observations at 2016-05-04 12:00 UTC

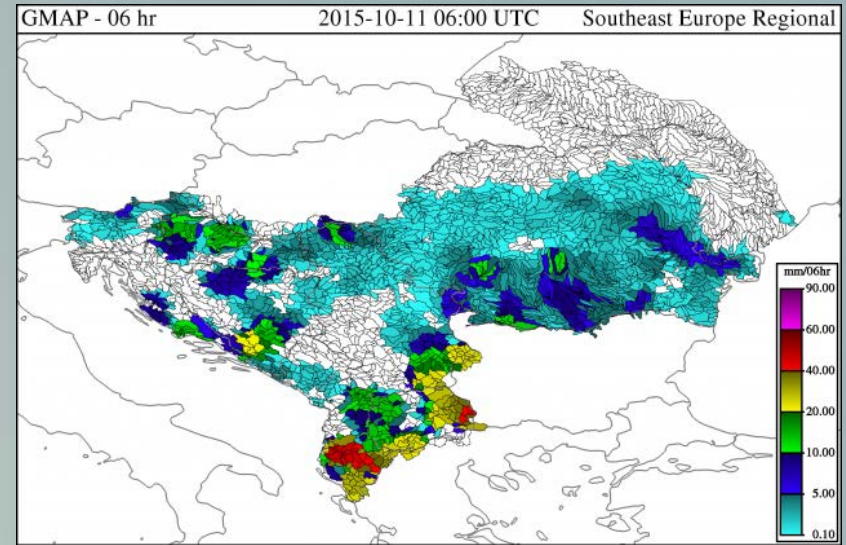
Station Identifier	Station Name	Accumulated Precipitation (mm/06hr)	Average Temperature (C)	Snow Cover (cm)	Snow Cover (Index)	Region	Latitude	Longitude	Elevation	Enable Precipitation Flag	Enable Temperature Flag
11001	Wolfegg	0.20	6.65	No Report	No Report	Southeast Europe Regional	48.1	13.6833333333	634	Enabled	Enabled
11008	Rehrbach	0.30	7.50	No Report	No Report	Southeast Europe Regional	48.5666666666	14	602	Enabled	Enabled
11010	Line / Moersching-Flughafen	0.10	8.40	No Report	No Report	Southeast Europe Regional	48.2333333333	14.1833333333	298	Enabled	Enabled
11012	Kremsmünster	10.00	7.75	No Report	No Report	Southeast Europe Regional	48.05	14.1333333333	383	Enabled	Enabled
11018	Amstetten	9.00	8.05	No Report	No Report	Southeast Europe Regional	48.1166666666	14.8666666666	274	Enabled	Enabled
11019	Altensteig	6.00	5.75	No Report	No Report	Southeast Europe Regional	48.6833333333	15.3666666666	598	Enabled	Enabled
11020	Zwentl	9.00	6.35	No Report	No Report	Southeast Europe Regional	48.6166666666	15.2	506	Enabled	Enabled
11051	Ilzsch	4.00	5.85	No Report	No Report	Southeast Europe Regional	48.0666666666	16.0333333333	564	Enabled	Enabled

Observed Precipitation Products

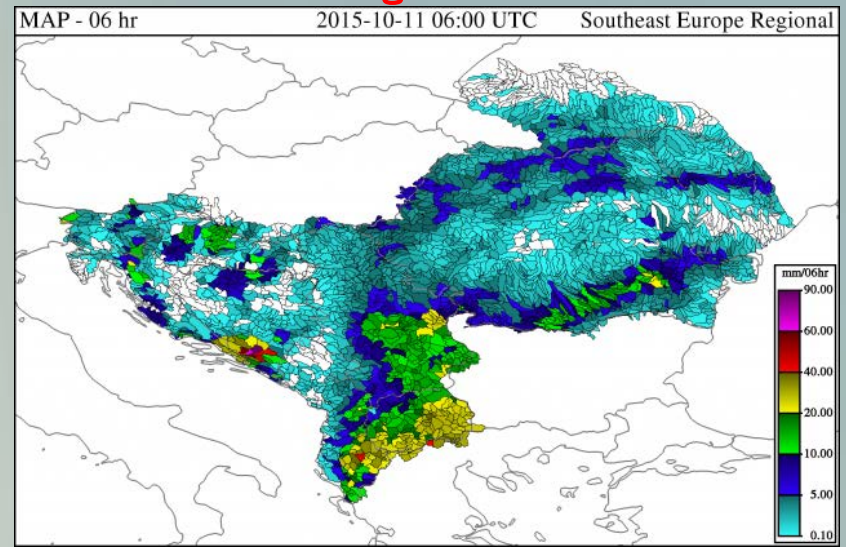
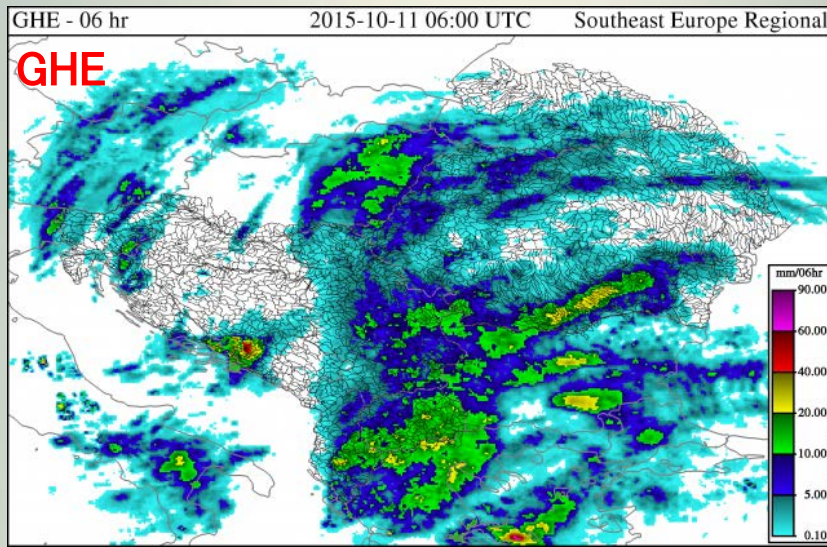
Satellite Precipitation



Gauge MAP

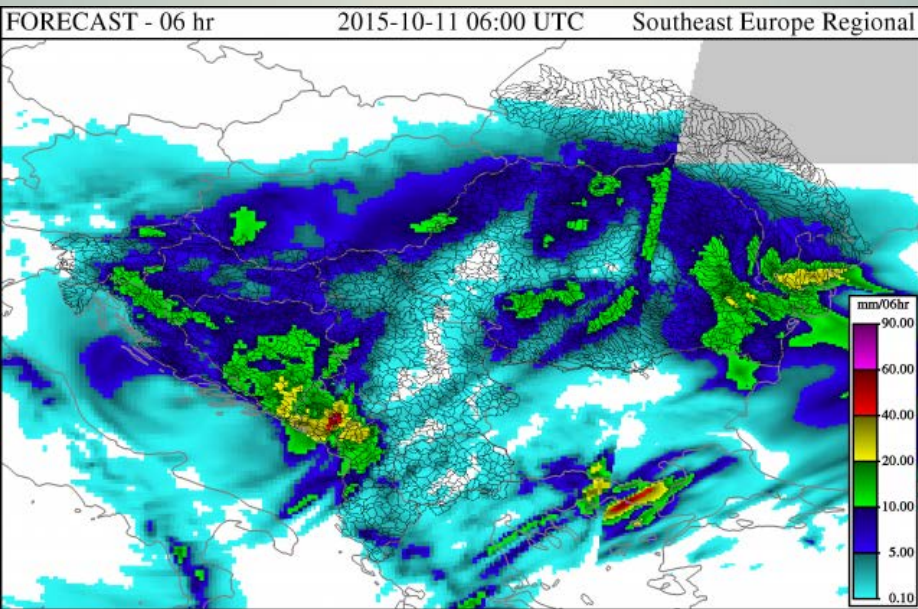


Merged MAP

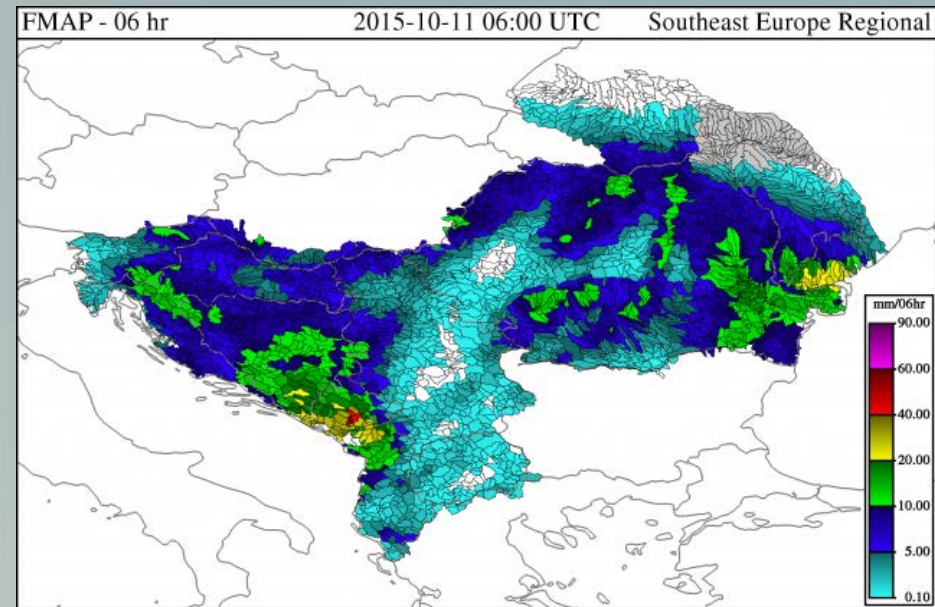


Forecast Precipitation

Forecast Precipitation (2 models)



Forecast MAP



SEEFFG System Interface

rw Serbia: Flash floods - Emer... SEEFFG Real-Time Product Co... +

https://seeffg.hrc-lab.org/CONSOLE/index.php

SEEFFG - Southeast Europe Flash Flood Guidance System

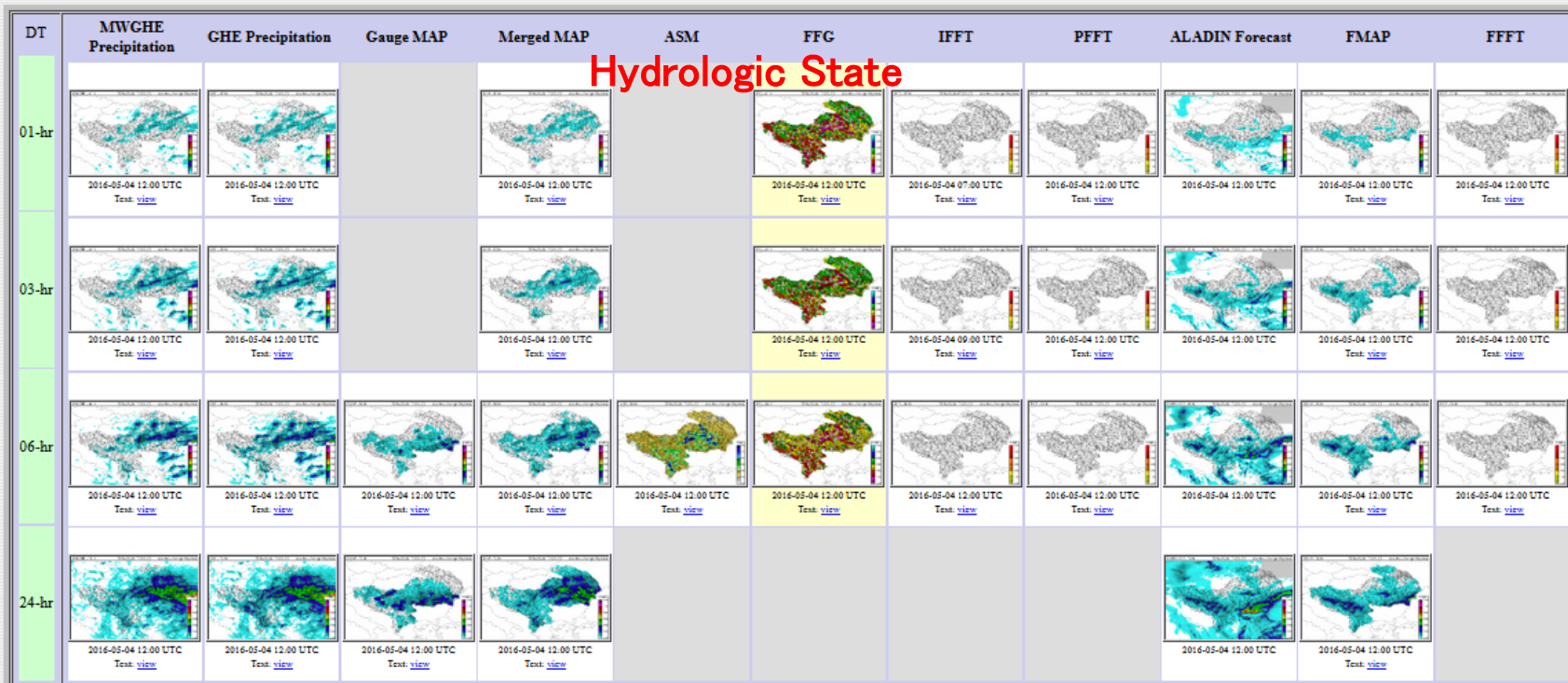
Current Date: 2016-05-04 18:26 UTC

Nav Date: 2016-05-04 12:00 UTC

Year: 2018 Month: 05 Day: 04 Hour: 12 REGION: Southeast Europe Regional Submit

-1 Month -1 Day -8 Hours -1 Hour +1 Hour +8 Hours +1 Day +1 Month

Prev 6-hr Interval (06 UTC) Reset to Current Next 6-hr Interval (18 UTC)



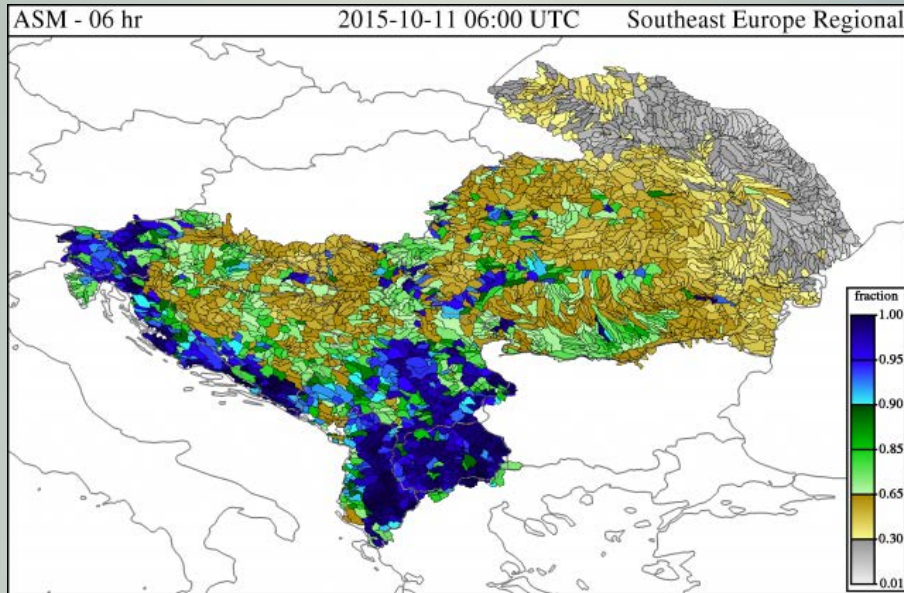
Composite Product: [text](#), [CSV](#), [SVT](#)

SFTP data transfer (requires SFTP Client): [EXPORTS_REGIONAL_2016_05_04](#)

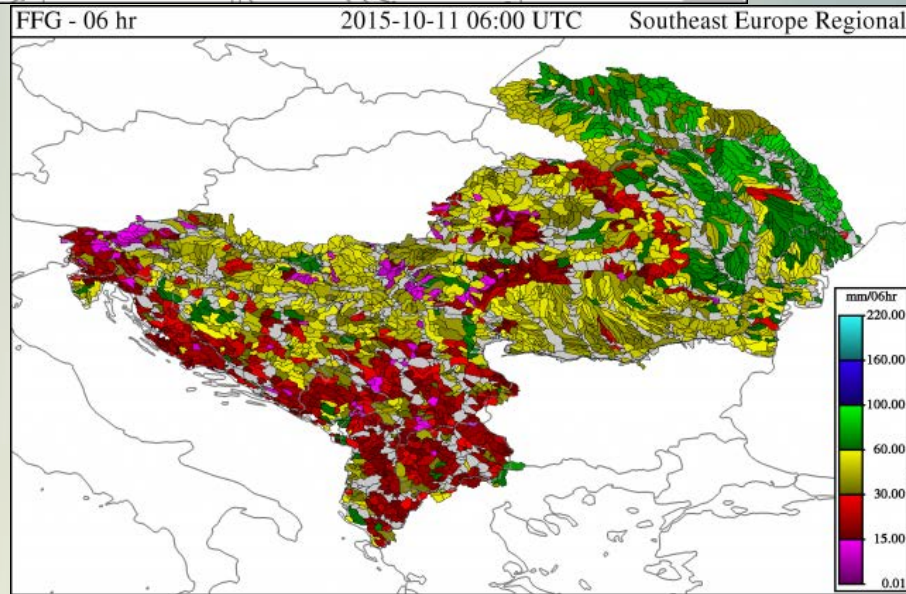
Surfnet Gauge Observations at 2016-05-04 12:00 UTC

Station Identifier	Station Name	Accumulated Precipitation (mm/6hr)	Average Temperature (C)	Snow Depth (cm)	Snow Cover (Index)	Region	Latitude	Longitude	Elevation	Enable Precipitation Flag	Enable Temperature Flag
11001	Wolfegg	0.20	6.65	No Report	No Report	Southeast Europe Regional	48.1	13.683333333	634	Enabled	Enabled
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11051	Litzelsdorf	4.00	5.85	No Report	No Report	Southeast Europe Regional	48.066666666	16.033333333	564	Enabled	Enabled

Hydrologic Products



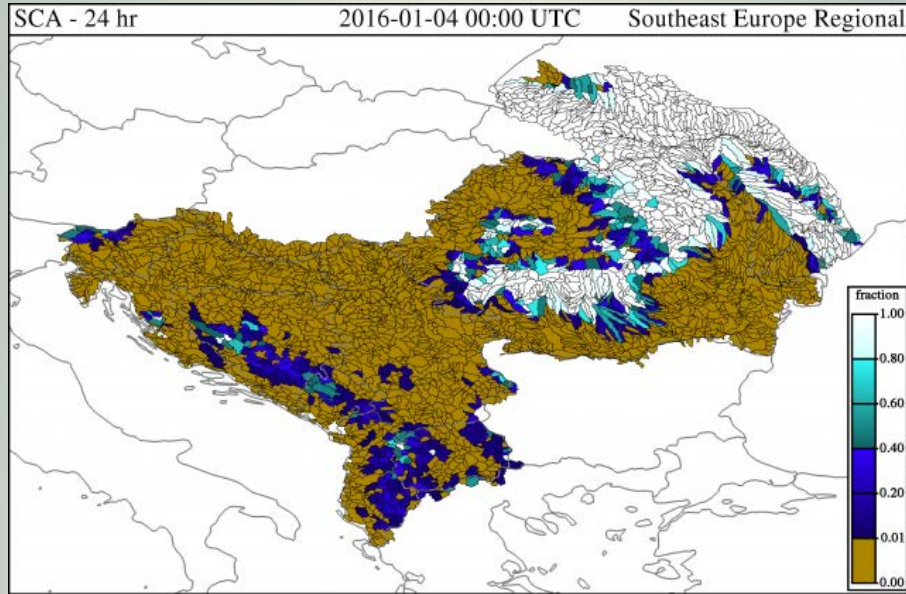
ASM: Average Soil Moisture
Average soil saturation *fraction* [0–1] in the top layer of soil depth (most relevant for flash flood occurrence).
Updated every 6 hours



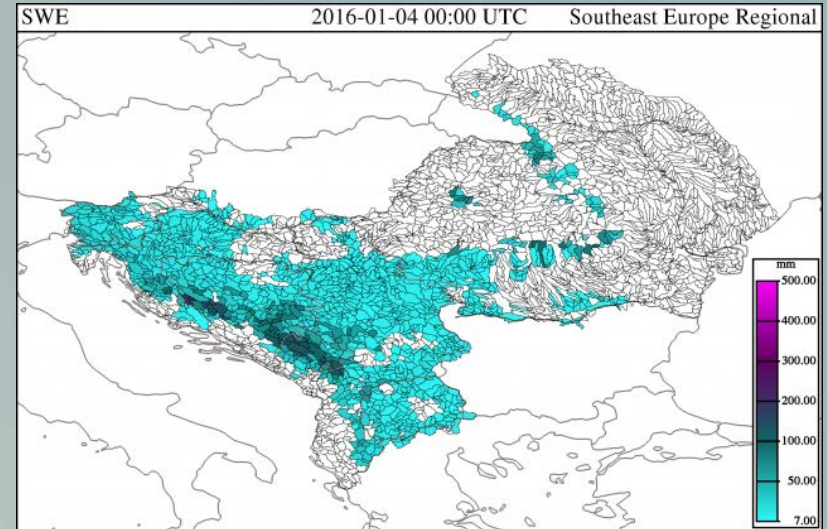
FFG: Flash Flood Guidance
Amount of precipitation of a given duration over each watershed which is just enough to bring the channel at watershed outlet to bankfull.
Updated every 6 hours for rainfall durations of 01–, 03–, and 06–hours

Snow Products

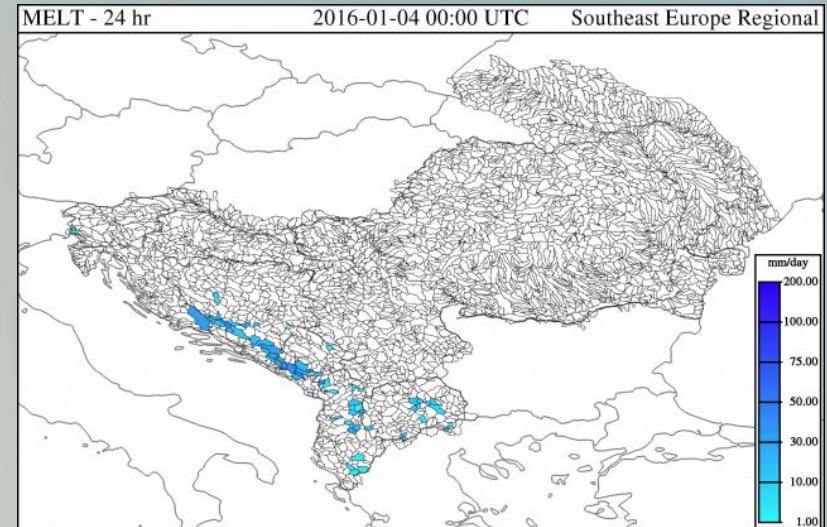
Satellite Snow Covered Area (daily)



Snow Water Equivalent (model calculation)



Snow Melt (model calculation)



SEEFFG System Interface

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https://seeffg.hrc-lab.org/CONSOLE/index.php

Search

SEEFFG - Southeast Europe Flash Flood Guidance System

Current Date: 2016-05-04 18:26 UTC

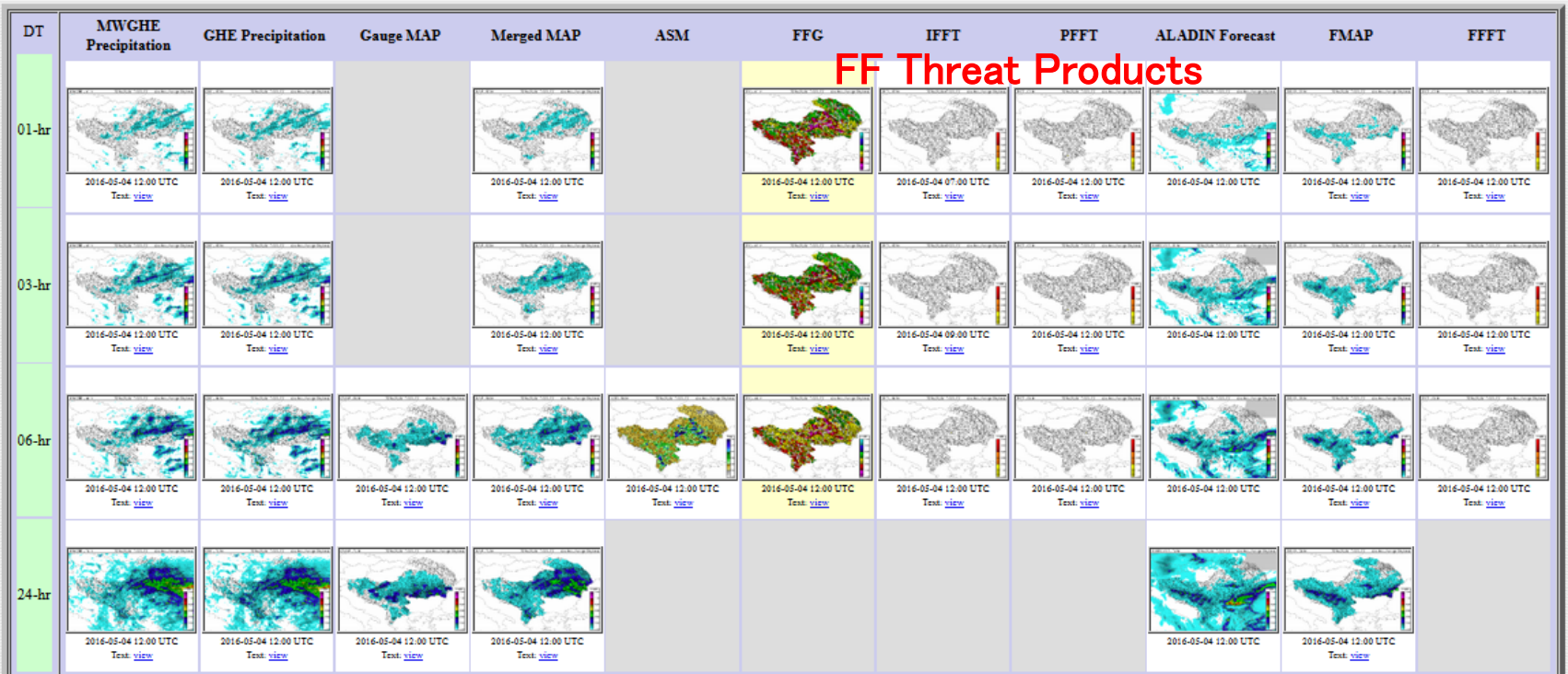
Nav Date: 2016-05-04 12:00 UTC

Year: 2018 Month: 05 Day: 04 Hour: 12 REGION: Southeast Europe Regional Submit

-1 Month -1 Day -8 Hours -1 Hour +1 Hour +8 Hours +1 Day +1 Month

Prev 6-hr Interval (06 UTC) Reset to Current Next 6-hr Interval (18 UTC)

FF Threat Products



Composite Product: [text](#), [CSV](#), [SVT](#)

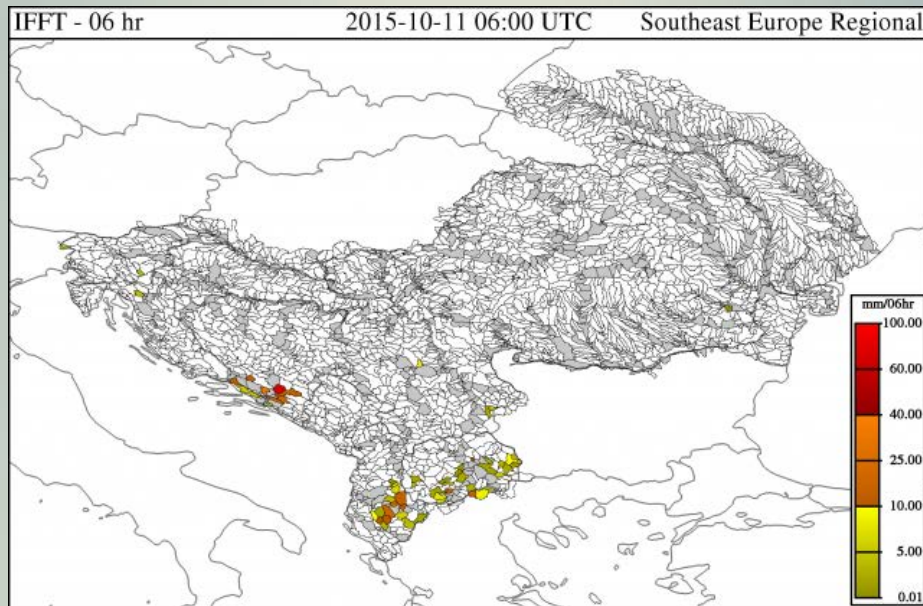
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Surfnet Gauge Observations at 2016-05-04 12:00 UTC

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Flash Flood Threat Products

Potential for flash flooding is increased when *PRECIPITATION* > *FFG*.



Flash Flood Threat, FFT, defined:

$$FFT = MAP - FFG$$

- imminent
- persistence
- forecast

Updated every 6 hours for
1-, 3-, and 6-hour durations

***FFT products are *not* intended to be the forecast;
Rather, these are indicators of regions of potential concern that
the forecaster should review.***

Summary

- ❖ SEEFFG System is design to provide operational forecasters of NMHSs with up-to-date information on precipitation and hydrologic conditions favorable to flash flood occurrence in support of decision making pertaining to warning generation.
- ❖ SEEFFG System Forecaster Interface (Product Console) provides real-time information on:
 - precipitation (satellite and raingauges)
 - soil moisture condition (upper soil layer)
 - flash flood guidance
 - forecast precipitation
- ❖ SEEFFG System Dashboard provides information on current system status, and animation of recent precipitation, soil moisture, and FFG.