Black Sea and Middle East Flash Flood Guidance (BSMEFFG) System Operational Concept

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Introduction (1 of 2)

- The primary mission of the Black Sea Middle East Flash Flood Guidance (BSMEFFG) System is to provide real-time informational guidance products related to the imminence of potential small-scale flash flooding throughout the region of application.

- Ingests real-time radar, satellite and gauge precipitation data on an hourly basis, and on the basis of available spatial databases produces flash-flood-occurrence diagnostic indices over small basins in the region of interest.

- BSMEFFG System is not a predictive system in itself, rather it is a diagnostic system for flash floods that the forecaster can use with forecasts or nowcasts of precipitation to produce forecasts and ultimately warnings for flash floods.

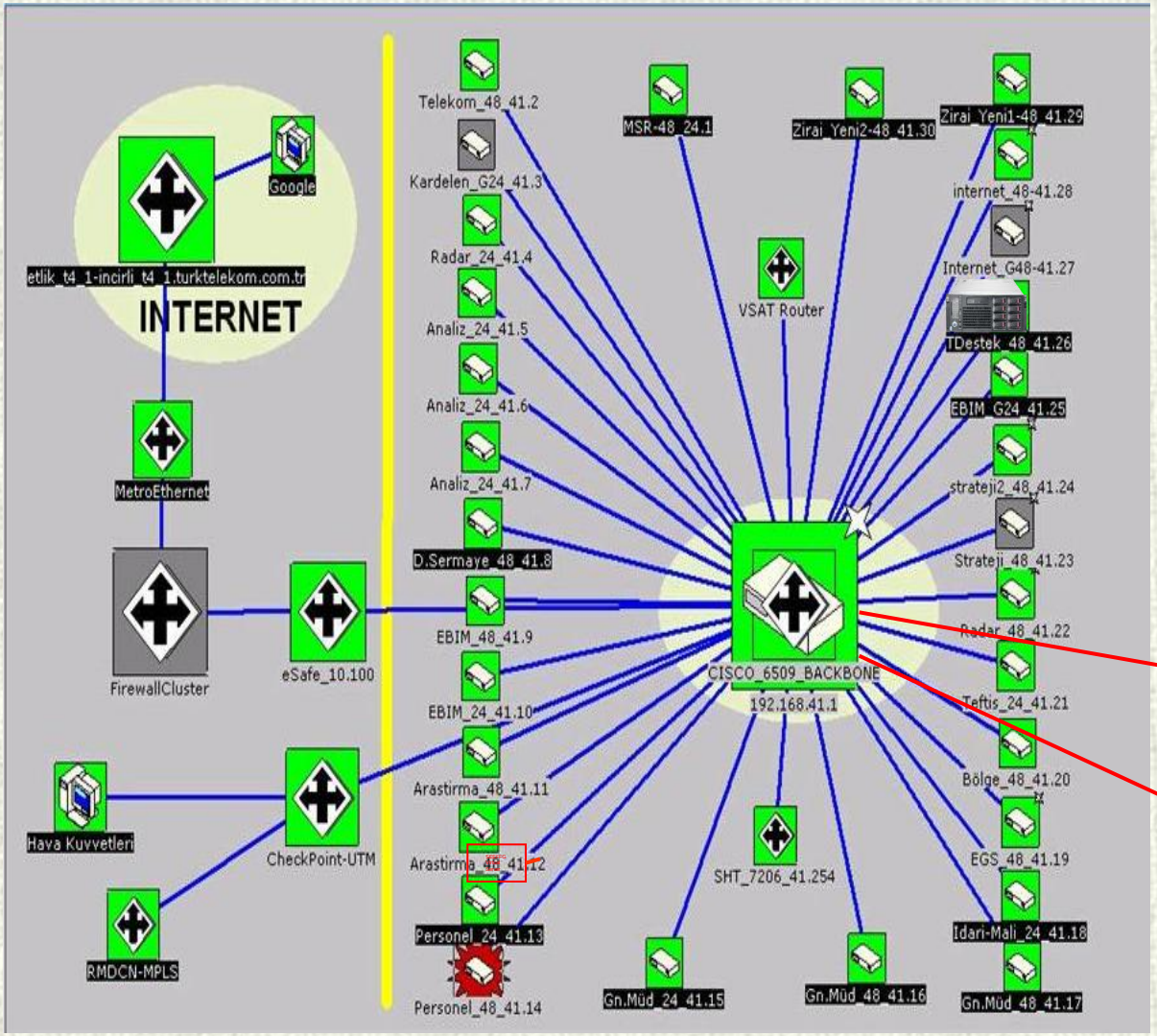
Introduction (2 of 2)

- Goal of the system computational component design is to produce estimates of impending FF threat for small basins in a region that involves several countries.

- Threat is defined as the difference between actual rainfall and Flash Flood Guidance (FFG) that is amount of rainfall that is just enough to cause bankfull flows at the outlet of the draining streams of small basins.

- Compute FFG, it is necessary to estimate the soil water deficit for each basin and the storage in the channel network up to the bankfull flows.

Network Topology of TSMS



- CISCO backbone,
- Star network topology,
- 35 Edge switch,
- 102 Servers including BSMEFFGS, and SEEFFGS servers

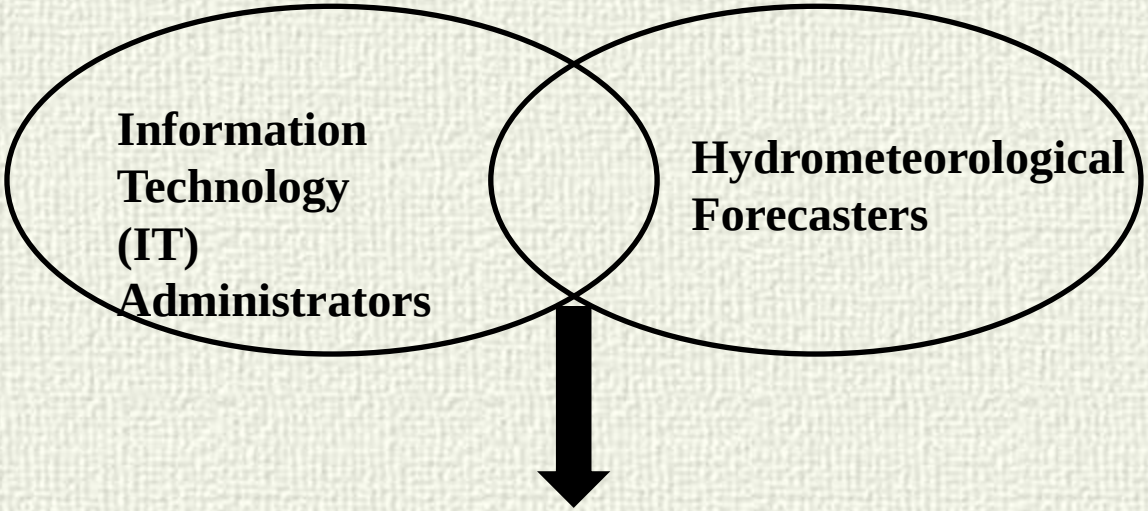
BSMEFFGS Server Configuration

Brand	HP Proliant DL380
CPU	Intel Xenon i7 E5-2620
Processor clock speed	2.0 GHz
CPU cores	6
Hard disk capacity	7.5 TB
RAM	32 GB(2x16GB Registered DIMMs, 2133 MHz)
Operating system	LINUX, Centos release 6.4
GPU	Matrox MGS G200EH graphic card support

- BSMEFFG and SEEFFG servers have the same configurations. Each system has two servers- Computation Server and Dissemination Server.

Operational System Maintenance (1 of 3)

- **How do I know if the systems are running appropriately or identify problematic incidents?**
- **How do I determine when intervention is necessary?**



Cooperation between overlapping responsibilities of forecasters and IT staff is essential to operational sustainability.

Operational System Maintenance (2 of 3)

Daily system review is very important for sustainability:

- Frequent and systematic review of the servers conditions will lead to intuitive and quick recognition of anomalies
- Exercise proactive analysis and preemptive correction rather than incidental reaction.

Daily review includes:

- Visual inspection of data and products using web interface
- Checking warning and error summary logs (daily summaries)
- Checking availability of real-time data and products (inventories)
- Checking sufficient storage free space and verifying normal consumption
- Checking processing loads and hourly processing completion.

Operational System Maintenance (3 of 3)

Routinely checking available resources:

- **Data**: successful acquision from real-time servers
- **Storage**: available disk space for downloads and products
- **Processing**: stable processing loads.

Checking system activity for anomalies:

- Warning and error message summaries (processing logs)
- TEMP directory contents
- Irregular data accumulation or unexpectedly absent contents

BSMEFFGS Operational Concept

Computational Server (1 of 2)

The computational core at the RC runs;

- Mesoscale Meteorological Models,
- High resolution hydrologic model for the region that produce various diagnostic indices, forecast of precipitation, soil water deficit and FF potential for small streams on the basis of global meteorological model forecasts, satellite estimates of precipitation with high resolution and short latency and real time operational rain gauge and surface weather station reports. (HRC Tech.Note 53)

BSMEFFGS Operational Concept

Computational Server (2 of 2)

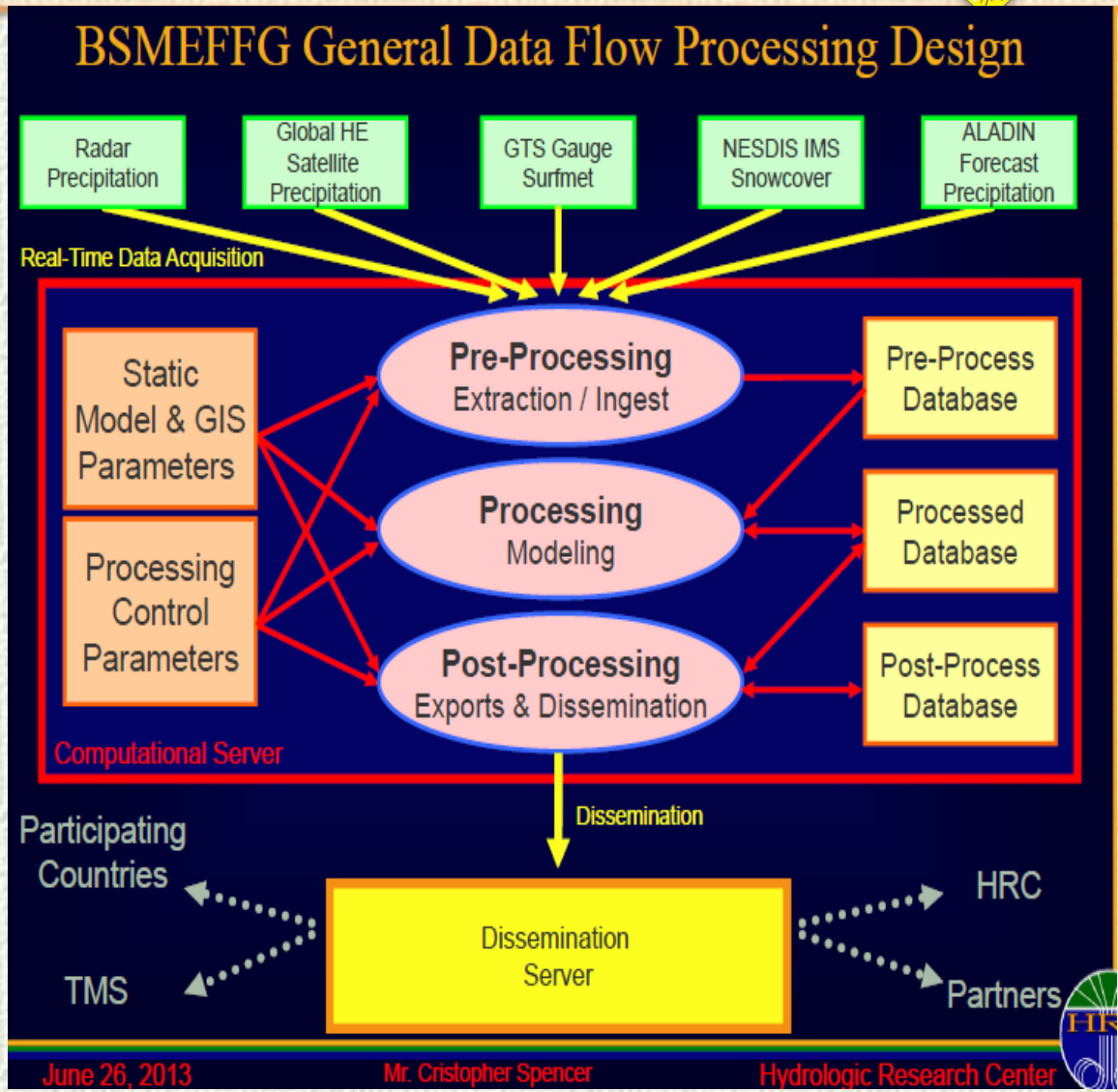
- To compute the FFG, it is necessary to estimate the soil water deficit for each of small basins and the storage in the channel network up to the bankfull flows.

- When these two storages are filled for a small basin under continuing rain, then there is high potential for FF development.
(HRC Tech.Note 53)

BSMEFFGS Operational Concept

Dissemination Server of BSMEFFG General Data Flow

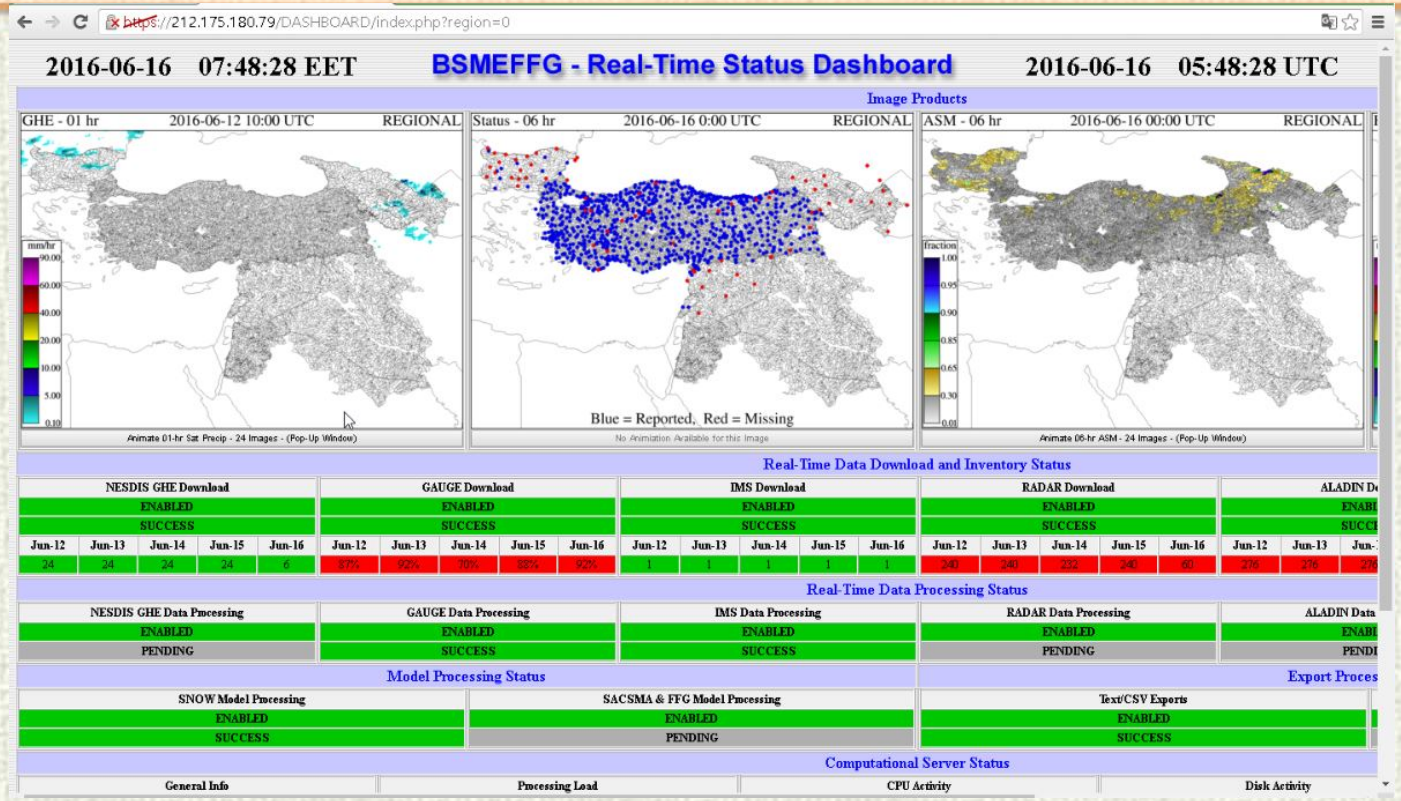
- The FFG System is primarily responsible for all data acquisition, pre-processing, model processing. After the FFGS has completed these processes, the resulting products are disseminated.
- Dissemination server allows additional post-processing to autorized users for not only real-time, but also previous historical products through a secure web interface.
- All authorized users can log in to dissemination server to access the BSMEFFG products.



(Christopher Spencer,2013)

BSMEFFGS Operational Concept

Status of RC Operations to Monitor SEEFFG and BSMEFFG Systems (1 of 4)



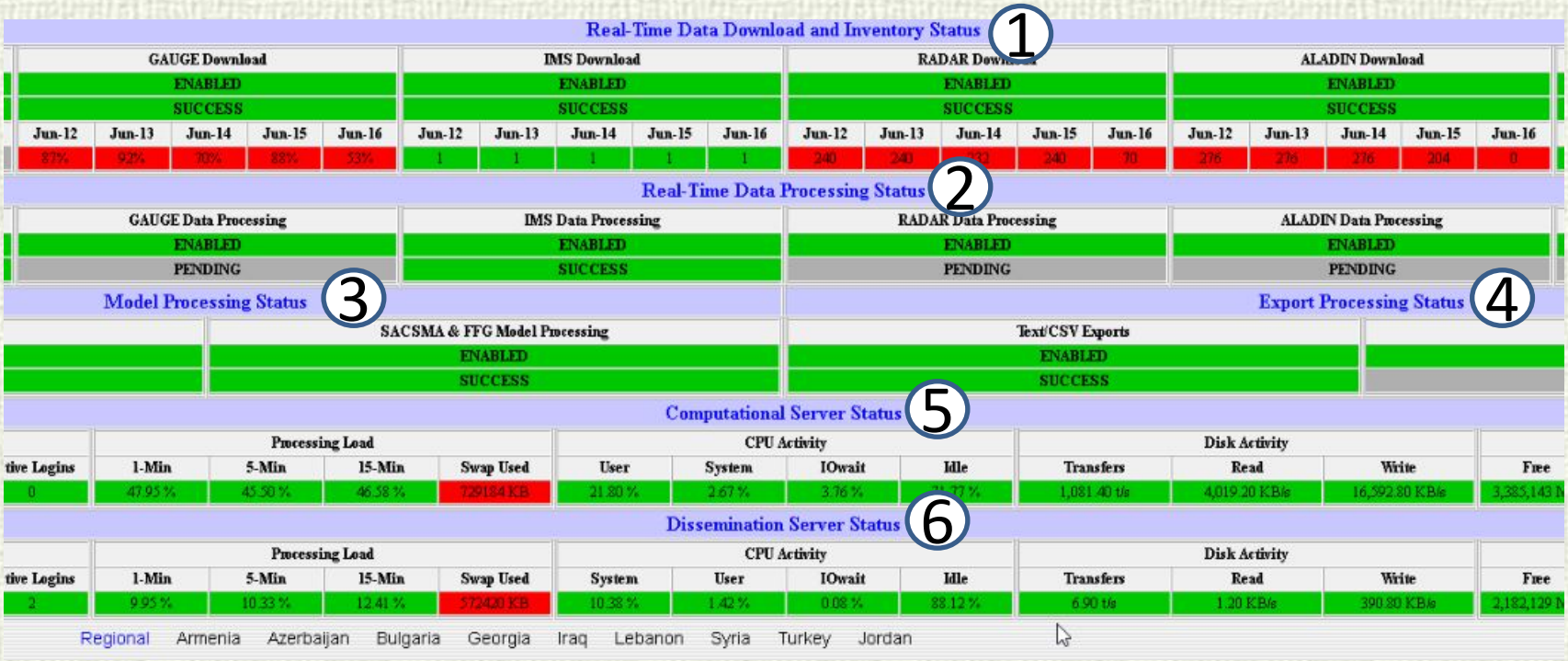
- BSMEFFG Real-Time Status Dashboard is used by IT staff and forecasters to check system activities and system status.
- Dashboard acts as a summary status page. At the top of the console, four products such as GHE-01hr, Status-06hr, ASM-06 and FMAP-06hr are displayed. An user can animate these products except station data status by clicking on the animation bar showing the time series of the products.

BSMEFFGS Operational Concept

Status of RC Operations to Monitor SEEFFGS and BSMEFFGS (2 of 4)

On the Dashboard Interface, There are six items:

1. Real-Time Data Download and Inventory Status
2. Real-Time Data Processing Status
3. Model Processing Status
4. Export Processsing Status
5. Computational Server Status
6. Dissemination Server Status



BSMEFFGS Operational Concept

Status of RC Operations to Monitor SEEFFGS and BSMEFFGS (3 of 4)

Real-Time Data Download and Inventory Status

NESDIS GHE Download				GAUGE Download					IMS Download					RADAR Download					ALADIN Download					NESDIS MWGHE Download				
ENABLED				ENABLED					ENABLED					ENABLED					ENABLED					ENABLED				
SUCCESS				SUCCESS					SUCCESS					SUCCESS					SUCCESS					SUCCESS				
May-04	May-05	May-06	May-07	May-03	May-04	May-05	May-06	May-07	May-03	May-04	May-05	May-06	May-07	May-03	May-04	May-05	May-06	May-07	May-03	May-04	May-05	May-06	May-07	May-03	May-04	May-05	May-06	May-07
24	24	24	21	92%	84%	87%	87%	71%	1	1	1	1	1	190	181	180	240	210	276	276	276	276	216	24	24	24	24	20

- Real-Time Data Download and Inventory Status shows the status of MWGHE, NESDIS GHE, GAUGE, and IMS Downloads.
- In case of gauge data, how many of the stations have reported.Blue: reported, black: waiting.
- Various example of inventory status are shown : **gray**, to indicate inventory totals that are not yet complete with respect to the current hour but in still within a 'wait' state where the expected latency of the pending acquisition has not yet expired; **green**, to indicate a complete inventory of expected files; and **red** to indicate a confirmed absence of expected data.

BSMEFFGS Operational Concept

Status of RC Operations to Monitor SEEFFGS and BSMEFFGS (4 of 4)

- Computational Server Status and Dissemination Server status give information on processing load, CPU activity, disk activity and storage availability.

- Computational Server Status and Dissemination Server Status for BSMEFFGS:

Computational Server Status

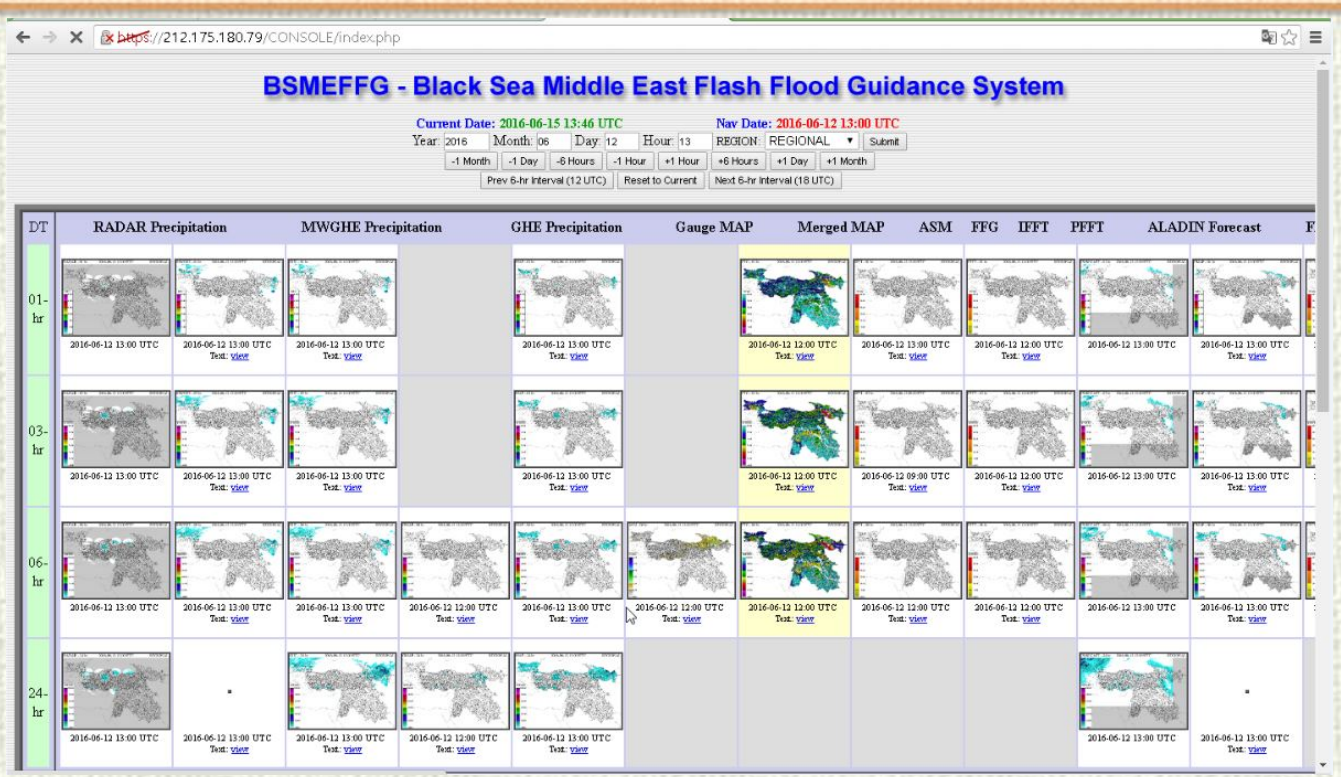
General Info				Processing Load				CPU Activity				Disk Activity			Storage			
IP Address	Hostname	Uptime	Active Logins	1-Min	5-Min	15-Min	Swap Used	User	System	IOwait	Idle	Transfers	Read	Write	Free	Used	% Used	Days to Filled
192.168.2.78	BSMEFFG-CS	771.29 days	0	49.16 %	44.04 %	44.12 %	784796 KB	22.80 %	1.29 %	9.14 %	66.76 %	547.40 t/s	9,809.60 KB/s	15,851.20 KB/s	3,550,197 MB	3,895,459 MB	53 %	693 days

Dissemination Server Status

General Info				Processing Load				CPU Activity				Disk Activity			Storage			
IP Address	Hostname	Uptime	Active Logins	1-Min	5-Min	15-Min	Swap Used	System	User	IOwait	Idle	Transfers	Read	Write	Free	Used	% Used	Days to Filled
192.168.2.79	BSMEFFG-DS	620.50 days	2	20.95 %	18.41 %	14.70 %	602404 KB	20.44 %	0.50 %	0.00 %	79.06 %	4.00 t/s	0.00 KB/s	60.00 KB/s	2,441,181 MB	5,005,501 MB	68 %	477 days

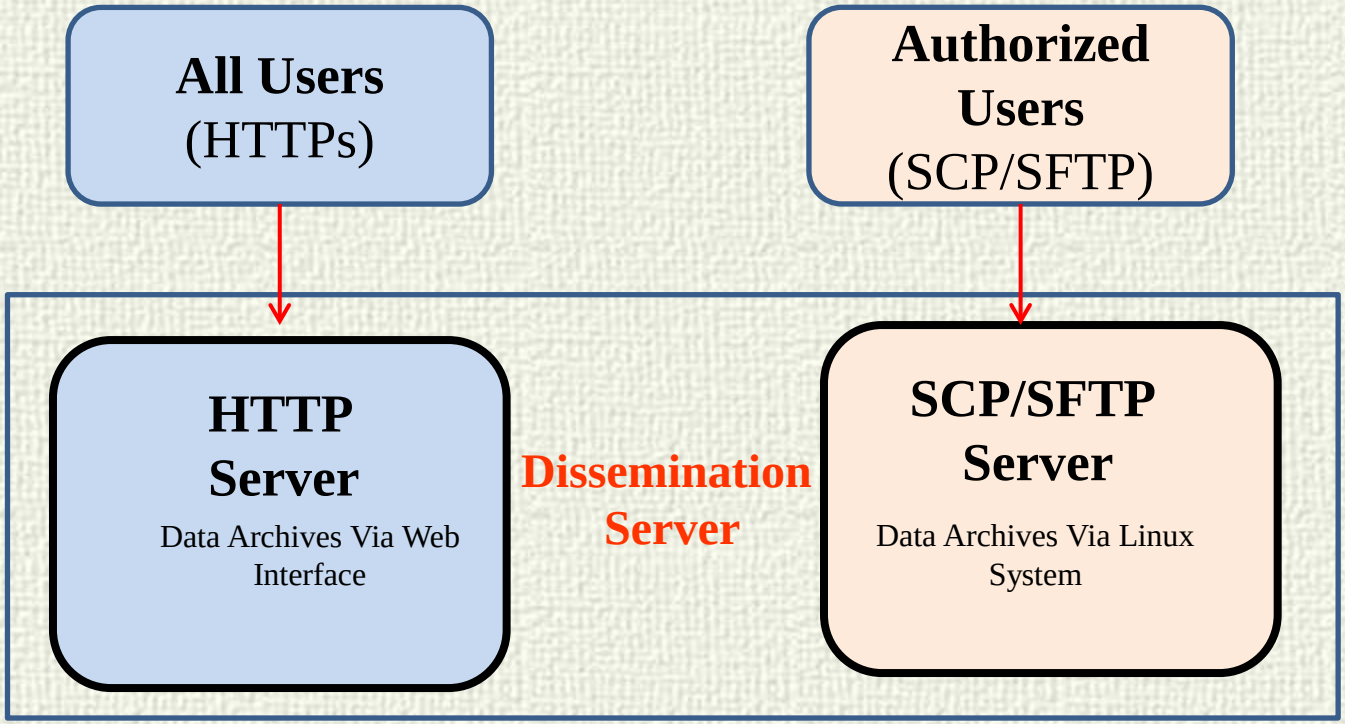
- As an example: 53 percent of disk storage is used and disk storage will be full after 693 days for Computational Server Status, respectively 68 % and 477 days for Dissemination Server Status.

BSMEFFG User Interface



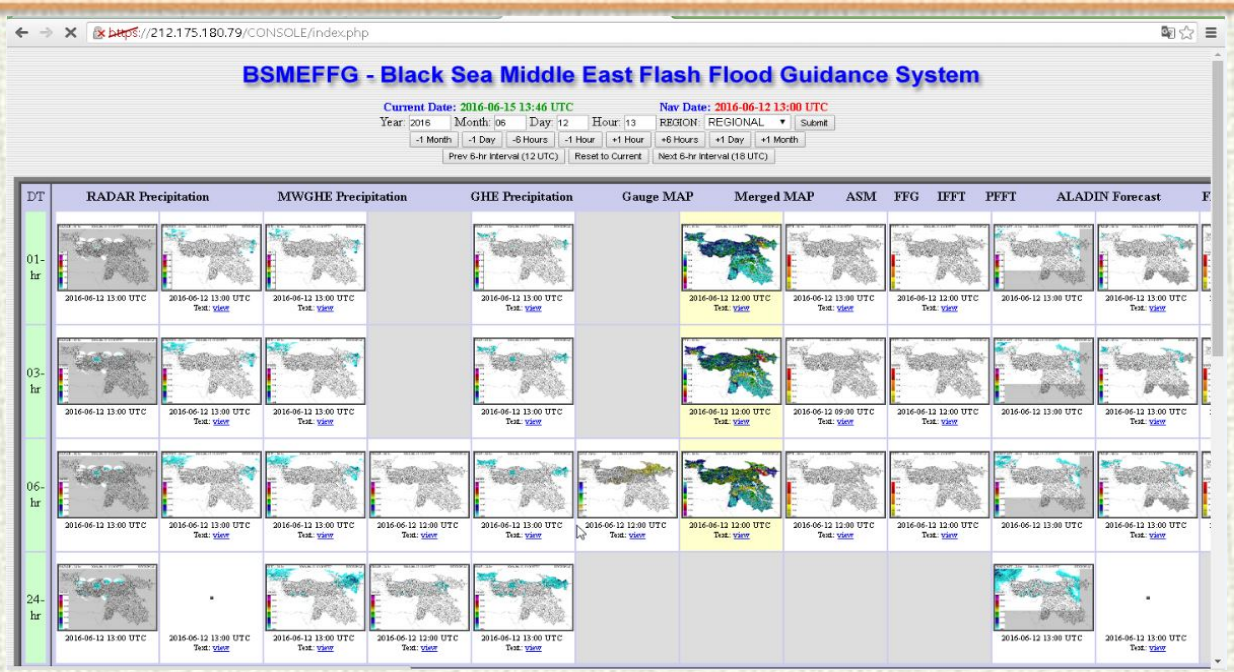
- access to downloadable data products for local acquisition to support forecaster application.
- Quick look for the products review in order to focus forecaster attention on urgent points of interest relating to potential flash flooding.
- quality control and operational management efforts of forecasters and IT staff (system administrators).

Methots Used to Access the BSMEFFGS Products



- Two methods are used to access BSMEFFFS products: HTTP and Secure Copy Protocol (SCP). Provided that having username and password, all users can access to BSMEFFGS user interface console from any computers to visualize the products by using server external IP, but only authorized users can access servers via Linux system.

1)Accessing to BSMEFFGS Products and data via Internet Browser (HTTP)



- In order to access to the BSMEFFGS user interface console of RC, users can run any web browser and enter the web address.
- Access the dissemination server interface with your Internet browser using the following URLs via Internet Browser;

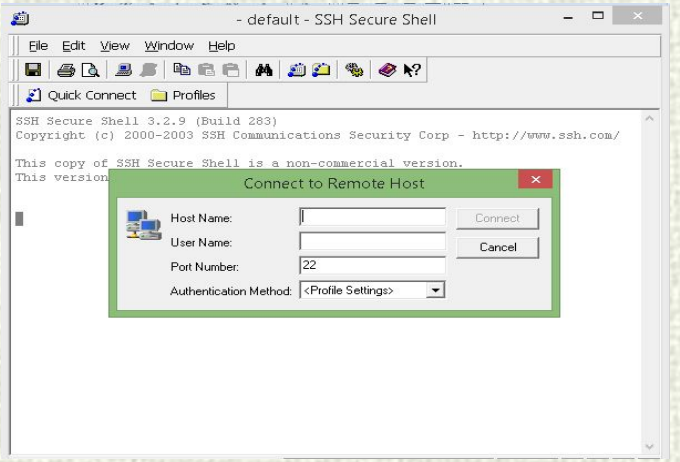
BSMEFFG Access URL Address — **Login**

https://212.175.180.79/CONSOLE/page_navigate_product_table.php — Turkey, Georgia

Universal DS Access password: bsmeffg:op-93

2) Accessing to BSMEFFGS Products and data via Secure Copy Protocol

BSMEFFGS Servers in RC	IP Address
TSMS Users (Internal IP)	192.168.23.170
External Users including member states (External IP)	212.175.180.124



- This was established at TSMS for communication of data between institutions of participating countries and RC.
- Only authorized users (Hydrometeorological Forecasters, Information Technology Administrators) can access the servers via Linux system.
- Access the BSMEFFGS servers, use SSH (Secure Shell) and telnet client such as putty, ssh etc.

Username:

Turkey
Armenia
Bulgaria
Azerbaijan
Bulgaria
Georgia
Lebanon
Syria
Jordan

T.C.
Orman ve Su İşleri
Bakanlığı

METEOROLOJİ

THANK YOU FOR YOUR ATTENTION