

# Flash Flood Guidance System Operations

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## **Flash Flood Guidance System for Flash Flood Alerts and Warnings**

February 2018  
Nay Pyi Taw



# Flash Flood Guidance System Operations

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## Flash Floods

- Response time is 6 hours or less
- A local hydrometeorological phenomenon that requires both:
  - Hydrological and Meteorological expertise for real time forecasting/warning
  - Knowledge of local up to the hour information for effective warning (24 - 7 operation)



# FFGS Terminology

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- **Flood** - occurrence of a flow event that overtops the natural or artificial banks in a reach of river channel.
- **Flash Flood** – a flood that follows shortly after rainfall event.
- **Bankfull Flow** - a flow in which the water level is at the top of its banks and further rise would result in inundation of the flood plain.
- **Flash Flood Guidance (FFG)** – the volume of spatially uniform precipitation of a given duration (1-6 hours) over a certain small catchment that is required to cause minor flooding in the draining outlet of the catchment.
- **Threshold Runoff** – rainfall depth in a given duration that is needed for the flow at the basin outlet to exceed bankfull flow when the basin is in near saturation conditions.
- **Flash Flood Threat** – rainfall of a given duration in excess of the corresponding Flash Flood Guidance value



# Large River Flooding vs. Flash Flooding

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## Large River Flooding

- Catchments response affords long lead times
- Entire hydrograph can be produced with low uncertainty give that a good quality data is available
- Local information is less valuable
- A hydrologic forecasting problem , primarily
- Affords time for coordination of flood response and damage mitigation

## Flash Flooding

- Catchment response is very fast and allows short lead times (<12 hour)
- Prediction of occurrence is of interest
- Local information is valuable
- A truly hydro-meteorological forecasting challenge
- Coordination of forecasting and response is challenging over short times



## Flash Flood Guidance System Operations

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- Developed specifically to address the types of problems and concerns for areas vulnerable to flash floods and with little or no appropriate data available for evaluating flash flood occurrence
- **Diagnostic Tool for Flash Flood Alerts and Warnings** – to be used with other tools and other (local) information and data
  - Satellite or radar data
  - Precipitation forecasts
  - System input data
  - Local information on precipitation, streams, recent flooding
  - Knowledge of flash flood prone areas (history)
- Not a forecast system but products can be used for forecasts



# Flash Flood Guidance System Operations

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## Diagnostic Tool for Flash Flood Alerts and Warnings

- System has capability to indicate the likelihood of flooding of small streams over large regions
- Can be a regional system but each user (province) has unlimited access to data/information to make their own evaluations and decisions
- System uses bias-corrected remotely-sensed precipitation estimates and real time soil moisture estimates to produce **flash flood guidance and flash flood threat** for small catchments – not based on precipitation only



# Flash Flood Guidance System Operations

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## Diagnostic Tool for Flash Flood Alerts and Warnings

- Flash Flood Guidance – volume of rainfall of a given duration (1-6 hours) over a given small catchment that is just enough to cause bankfull flow at the outlet
- Flash Flood Threat – rainfall of a given duration in excess of the corresponding Flash Flood Guidance value










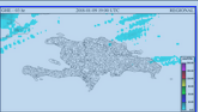


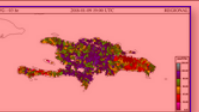






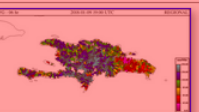


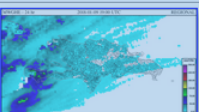
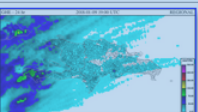




# Diagnosics

## HDRFFG - Haiti and Dominican Republic Flash Flood Guidance System

Current Date: 2018-02-09 19:59 UTC      Product Date: 2018-01-09 19:00 UTC  
 Year: 2018   Month: 01   Day: 09   Hour: 19   REGION: REGIONAL   OPTION: MEDIAN   Submit  
 -1 Month   -1 Day   -6 Hours   -1 Hour   +1 Hour   +6 Hours   +1 Day   +1 Month  
 Prev 6-hr Interval (18 UTC)   Reset to Current   Next 6-hr Interval (00 UTC)

### Product Console - Main Table

DT	MWGHE Precipitation	GHE Precipitation	Gauge MAP	Merged MAP	ASM	FFG	IFFT	PFFT
01-hr	 2018-01-09 19:00 UTC Text: view	 2018-01-09 19:00 UTC Text: view	 2018-01-09 19:00 UTC Text: view	 2018-01-09 19:00 UTC Text: view	 2018-01-09 19:00 UTC Text: view	 2018-01-09 19:00 UTC Text: view	 2018-01-09 19:00 UTC Text: view	 2018-01-09 19:00 UTC Text: view
03-hr	 2018-01-09 19:00 UTC Text: view	 2018-01-09 19:00 UTC Text: view	 2018-01-09 19:00 UTC Text: view	 2018-01-09 19:00 UTC Text: view		 2018-01-09 19:00 UTC Text: view	 2018-01-09 19:00 UTC Text: view	 2018-01-09 19:00 UTC Text: view
06-hr	 2018-01-09 19:00 UTC Text: view	 2018-01-09 19:00 UTC Text: view	 2018-01-09 19:00 UTC Text: view	 2018-01-09 19:00 UTC Text: view		 2018-01-09 19:00 UTC Text: view	 2018-01-09 19:00 UTC Text: view	 2018-01-09 19:00 UTC Text: view
24-hr	 2018-01-09 19:00 UTC Text: view	 2018-01-09 19:00 UTC Text: view	 2018-01-09 19:00 UTC Text: view	 2018-01-09 19:00 UTC Text: view				
Composite Product: text, CSV, CSVT					SFTP data transfer (requires SFTP Client): EXPORTS/REGIONAL/2018/01/09			

### Surfmet Gauge Observations at 2018-01-09 19:00 UTC







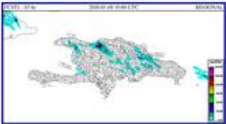


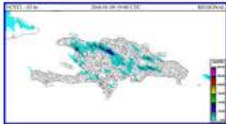


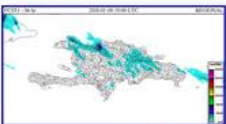
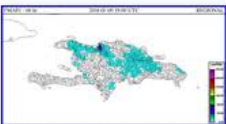

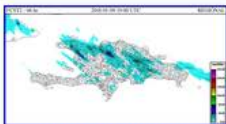
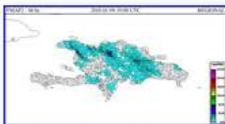

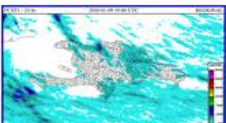
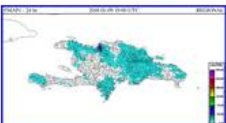
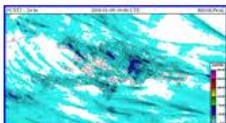
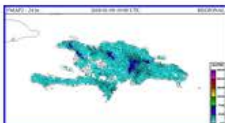
Station Identifier	Station Name	Accumulated Precipitation (mm/01hr)	Average Temperature (C)	Region	Latitude	Longitude	Elevation	Enable Precipitation Flag
No reports for region	No reports for region	No reports for region	No reports for region	No reports for region	No reports for region	No reports for region	No reports for region	No reports for region





# Prognostics

## Product Console - Model Forecast Products

DT	HIRESW ARW Forecast	HIRESW ARW FMAP	HIRESW ARW FFFT	HIRESW NMMB Forecast	HIRESW NMMB FMAP	HIRESW NMMB FFFT
01-hr	 <p>2018-01-09 19:00 UTC Text: <a href="#">view</a></p>	 <p>2018-01-09 19:00 UTC Text: <a href="#">view</a></p>	 <p>2018-01-09 19:00 UTC Text: <a href="#">view</a></p>	 <p>2018-01-09 19:00 UTC Text: <a href="#">view</a></p>	 <p>2018-01-09 19:00 UTC Text: <a href="#">view</a></p>	 <p>2018-01-09 19:00 UTC Text: <a href="#">view</a></p>
03-hr	 <p>2018-01-09 19:00 UTC Text: <a href="#">view</a></p>	 <p>2018-01-09 19:00 UTC Text: <a href="#">view</a></p>	 <p>2018-01-09 19:00 UTC Text: <a href="#">view</a></p>	 <p>2018-01-09 19:00 UTC Text: <a href="#">view</a></p>	 <p>2018-01-09 19:00 UTC Text: <a href="#">view</a></p>	 <p>2018-01-09 19:00 UTC Text: <a href="#">view</a></p>
06-hr	 <p>2018-01-09 19:00 UTC Text: <a href="#">view</a></p>	 <p>2018-01-09 19:00 UTC Text: <a href="#">view</a></p>	 <p>2018-01-09 19:00 UTC Text: <a href="#">view</a></p>	 <p>2018-01-09 19:00 UTC Text: <a href="#">view</a></p>	 <p>2018-01-09 19:00 UTC Text: <a href="#">view</a></p>	 <p>2018-01-09 19:00 UTC Text: <a href="#">view</a></p>
24-hr	 <p>2018-01-09 19:00 UTC Text: <a href="#">view</a></p>	 <p>2018-01-09 19:00 UTC Text: <a href="#">view</a></p>		 <p>2018-01-09 19:00 UTC Text: <a href="#">view</a></p>	 <p>2018-01-09 19:00 UTC Text: <a href="#">view</a></p>	



# Flash Flood Guidance System Operations

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## Diagnostic Tool for Flash Flood Alerts and Warnings

### System Benefits

- Early awareness of impending local flash flood threats for all potentially vulnerable areas
- System that provides an indication of – **flash flood potential** and **flash flood threat**
- Provide rapid assessments for the **occurrence** of a flash flood, assisting with early warnings
- Allow for the more rapid mobilization of response agencies (rather than a system that provides detailed forecasts of the magnitude – which add uncertainty and complexity to warning development)



# Flash Flood Guidance System Operations

## Diagnostic Tool for Flash Flood Alerts and Warnings

### Flash Flood Potential

- Potential based on static indicators – basin characteristics
  - Soil type
  - Land cover/land use
  - Slope
  - Stream characteristics – hydraulic depth, bankfull width
- Potential based on dynamic indicators – e.g. soil moisture

