Haiti-Dominican Republic Flash Flood Guidance (HDRFFG) System: Overview of Past Project

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HDRFFG Initial Planning Meeting 07-09 Sep 2015
ONAMET
Santo Domingo, DR
As part of humanitarian response to the catastrophic earthquake of January 2010, HRC was asked to implement Flash Flood Guidance System (FFGS) to support local and international agencies during subsequent hurricane season.

May 2010 – HRC begins development

July 2010 – Operation of HDRFFG System in real time (no local gauge information)

Aug 2010 – First training held in Martinique

Nov 2010 – Hurricane Tomas

2010 to present – HDRFFG System operational at HRC and products available to NMHSs through secure website.
**INPUT DATA IN REAL-TIME**
- Satellite Precipitation
  NOAA/NESDIS Geostationary Satellite Hydro-Estimator (4x4 km²), hourly totals
- Forecast Precipitation
  NOAA/NCEP High Resolution Mesoscale Model Forecast (0-48hrs)

**DEVELOPMENT DATA**
- Digital elevation data (90m resolution, SRTM)
- Digital soils data (FAO)
- Climatological estimate of temperature for Reference Evapotranspiration
- Rain gauge data from D.R. for limited bias analysis (2006-2010, hourly)

**OUTPUT PRODUCTS IN REAL-TIME**
- Catchment based, mean areal estimates (median area of 72km²)
- Hourly updates
  - Mean Areal Precipitation (1, 3, and 6-hour durations)
  - Average Soil Water Fraction
  - Flash Flood Guidance / Flash Flood Threat (1, 3, and 6-hour durations)
  - Forecast Mean Areal Precipitation (1, 3, and 6-hour durations)
Forecaster Interface designed to provide operational NHMS forecasters with up-to-date information on key variables for rapid assessment of flash flood risk.
HDRFFG (v.0) System Products

1. Observed Precipitation
2. Hydrologic State
3. Forecast Precipitation

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<table>
<thead>
<tr>
<th>DT</th>
<th>Satellite</th>
<th>Merged MAP</th>
<th>ASM</th>
<th>FFG</th>
<th>IFFT</th>
<th>PFFT</th>
<th>Forecast</th>
<th>FMAP</th>
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HDRFFG (v.0) System Products

Observed Precipitation
Observed Precipitation

HDRFFG (v.0) System Products

Estimate of how much precipitation has fallen in the recent (1, 3, 6, and 24-) hours based on satellite observations of clouds (NOAA/NESDIS Global HydroEstimator product, GHE)
HDRFFG (v.0) System Products

HDRFFG - Haiti and Dominican Republic Flash Flood Guidance System

Current Date: 2016-09-02 19:45 UTC
Nav Date: 2015-08-27 00:00 UTC

Hydrologic State

Composite Product... (press DBR)

Surfnet Gauge Precipitation Accumulations ending on 2015-08-27 00:00 UTC

<table>
<thead>
<tr>
<th>Station Identifier</th>
<th>Station Name</th>
<th>Observation Date &amp; Time (UTC)</th>
<th>Rainfall (mm)</th>
<th>Temperature (°C)</th>
<th>Relative Humidity (%)</th>
<th>Atmospheric Pressure (mb)</th>
<th>Solar Radiation</th>
<th>Wind Direction</th>
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Hydrologic State

1. Average Soil Moisture (ASM)

An estimate of the level of saturation (fraction) in the upper soil layer.
An estimate of how much precipitation of a given duration over a small watershed is sufficient to produce a “flooding condition” at the stream draining that watershed.
Forecast Precipitation
HDRFFG (v.0) System Products

Estimate of how much precipitation is forecast in the next (1, 3, 6, and 24-) hours based on NWP model.
Forecast Precipitation

- NOAA/NCEP produced high resolution mesoscale models
- QPF is weighted combination of WRF-NMM and WRF-ARW models with differing configurations and parameterizations
- QPF provided to HRC for ingest into HDRFFG.

2010 assessment of QPF:
- run-to-run consistency was generally low
- Forecast skill limited in weakly-forced conditions
- Evaluation of QPF by HDR forecasters required
Fundamental Concept of FFG Use:

FFG: How much rain is needed

FMAP: How much rain is forecasted

Flash Flood Threat (FFT) Products

FFTs indicate basins where precipitation exceeds FFG
HDRFFG (v.0) System Products

HDRFFG - Haiti and Dominican Republic Flash Flood Guidance System

Current Date: 2016-09-02 19:45 UTC
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- FF Threat Products

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FFT products are an automated, system calculation of the difference between FFGs and MAPs for appropriate durations and times. This are *not* intended as a warning product! *The role of the operational forecaster in assessing the current situation (observed and forecast precipitation) is critical.*
HDRFFG (v.0) System Products
Prior HDRFFG Project Training

Two prior training sessions held which focused on use of the HDRFFG System by operational hydrometeorological forecasters.

**27-29 Aug 2013**: Hosted by ONAMET, Dominican Republic
- 22 participants from several agencies: ONAMET (Oficina Nacional de Meteorologia), CAASD (Corporacion de Acueducto y Alcantarillados), EGEHID (Empresa de Generacion Hidroelectrica), INAPA (Instituto Nacional Agua Potable y Alcantarillados), INDRHI (Instituto Nacional de Recursos Hidraulicos), and SGN (Servicio Geologico Nacional)

**24-26 Jun 2015**: Hosted by CNM, Haiti
- 14 participants from CNM (Centre National de Meteorologie) and SNRE (Service National des Ressources en Eau)
 HDRFFG Under WMO GFFGS Programme

- Establishment of Regional Center to support HDRFFGS
- Re-establish communication of real-time data
- Update HDRFFG System software to current WMO standard
  - GHE, MWGHE precipitation estimates
  - Potential for ingest of forecast precipitation from multiple models (as available)
- Training support under Flash flood Guidance System Hydrometeorologist Training Program
THANK YOU
for your kind attention

Image from floodlist.com