



Report of the Second Steering Committee Meeting (SCM 2) of the Haiti and Dominican Republic Flash Flood Guidance System (HDRFFGS)

Santo Domingo, Dominican Republic, 12-14 February 2018

FINAL REPORT



March 2018

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Report of the Second Steering Committee Meeting (SCM 2) of the Haiti and Dominican Republic Flash Flood Guidance System (HDRFFGS)

1. Introduction and Opening of the Meeting

The meeting was opened by the Permanent Representative of Dominican Republic with WMO Ing. Gloria Maria Bienvenida CEBALLOS GOMEZ. She indicated that forecasters who had been trained were using the system and were successfully forecasting flash floods. She highlighted that the HDRFFGS was being successfully used and was of great importance in assisting with provision of early warnings, as it has been raining continuously throughout the season.

Mr. Paul PILON, on behalf of the Secretary-General of WMO Mr. Petteri TAALAS, welcomed everyone to the SCM 2 of the HDRFFGS. He recalled that the HDRFFGS was designed to improve the timely delivery of flash flood information and guidance to the populations at risk by strengthening national capabilities to forecast and warn populations at risk from flash flooding and other hydrometeorological hazards. Although the core aspects of the project focus on the implementation of technology and scientific approaches undertaken mainly by the countries' National Meteorological and Hydrological Services (NMHSs), it was highlighted that the guiding indicator for the ultimate success of the project is the effectiveness of the outreach to citizens and reducing their risk of being affected by flash floods in a disastrous way.

Mr Eylon Shamir (HRC) said that he was pleased to see the progress that were being made on the implementation of HDRFFG project as the project helps participating countries cope with flash flood events by enhancing their flash flood early warning capabilities. Mr Paul Pilon (WMO) recalled the objectives of the meeting and its expected results and welcomed the participants to provide their active inputs into shaping this important regional Flash Flood Guidance System project. He also thanked ONAMET for all its efforts including hosting the meeting, thereby helping to make a positive atmosphere for the meeting.

The meeting was chaired by the Deputy Director of ONAMET, Ing. Andrés Miguel CAMPUSANO LASOSE, who also welcomed everyone to the meeting. He highlighted the role of the Regional Centre for the HDRFFGS and mentioned that the Dominican Republic was pleased to be able to assist Haiti in the implementation and operational aspects of the project. The Chair pointed out the importance of involving various local and national agencies in the work associated with the FFGS. He noted that 3 different agencies were present at his meeting from the Dominican Republic, notably ONAMET, INDRHI and the national agency responsible for disaster management, COE.

2. Organization of the Steering Committee Meeting

The meeting was attended by representatives of National Meteorological and Hydrological Services (NMHSs) from the Dominican Republic and Haiti. Other participants included one representative from the national agency responsible for disaster management in the Dominican Republic (COE), as well as representatives from WMO and HRC, The list of participants is provided in Annex 1, while the final meeting agenda is given in Annex 2.

Information was provided by WMO on the purposes of the meeting. These included: a review of project status and its work plan; linkages with the SWFDP and CIFDP-Caribbean; a review of FFGS products and advances in the development of new system functionalities; illustrations of how to use of FFGS products in operation through case study presentation and hands-on exercises of the past flood events; importance of and how to undertake verification studies of flash flood warnings; and stressing the importance of close collaboration with national disaster management agencies. A number of presentations were given on the above topics. As well, there were facilitated discussions that led to specific conclusions and recommendations being made by the meeting.

All presentations are available on the WMO website (www.wmo.int)¹.

3. Proceedings of the Meeting in Brief

SWFDP and FFGS Linkages

Mr PILON showed a global map of SWFDP and FFGS projects and stressed that efforts were being taken to mesh SWFDP with FFGS projects, whenever possible. Examples given included the SARFFG and the new projects for SWFDP and FFGS for Southeast Asia. Mr PILON, on behalf of colleagues in the WMO Weather and Disaster Risk Reduction Services (WDS) Department, provided the meeting with a brief status of the current SWFDP in the Eastern Caribbean which is being led by the Regional Forecast Support Facility (RFSF) Martinique, the Caribbean Institute of Meteorology and Hydrology (CIMH) located in Barbados for the provision of technical support, and the Regional Specialized Meteorological Centre (RSMC) Miami, remaining the lead for tropical cyclones and hurricanes. The Global Centres involved in the project include MeteoFrance/ECMWF, NOAA/NCEP and Environment and Climate Change Canada. The latter is providing seed funding for the development of the project.

The meeting was informed that there was a development planning meeting of the Regional Association (RA) IV Expert Group on SWFDP in Fort-de-France, Martinique, 13-15 December 2016. The MeteoFrance office in Martinique agreed to host the RFSF in Martinique for the SWFDP-Eastern Caribbean and will provide guidance to NMHSs and their National Meteorological Centres of the Island States and Territories. A meeting of the RA IV Expert Group in SWFDP met in Miami, USA, 23-26 May 2017 to develop the project's implementation plan.

The future activities of the project in 2018 include:

- a SWFDP Workshop on Numerical Weather Prediction (NWP) interpretation and service delivery at the Caribbean Institute of Meteorology and Hydrology (CIMH), Barbados during 12-15 March 2018;
- the development of a project website, which is in progress by RFSF Martinique;
- a SWFDP training workshop (later in 2018); and
- the start of its demonstration phase (later 2018).

Participants discussed the possible benefits of linkages between the SWFDP-Caribbean project and the HDRFFGS. Participants also recalled that the new functionality of the standard FFGS allows up to 5 NWP modelling streams to be ingested for analyses in the FFGS, which could take advantage of products from the SWFDP-Eastern Caribbean.

¹ The cited material for the Haiti and Dominican Republic Flash Flood Guidance project can be located by referring to the activities of the Flash Flood Guidance System within Floods/Flood Forecasting heading under the Hydrology and Water Resources Programme: http://www.wmo.int/pages/prog/hwrf/flood/ffgs/index_en.php and clicking on the location of the desired project on the map of the world.

CIFDP-Caribbean and FFGS Linkages

Mr Israel ACOSTA LANTIQUA provided a presentation outlining the CIFDP project in the Caribbean and noted the importance of coupled modelling, particularly when storm surge compounds riverine flooding. He indicated that work was underway with Mr Yuri SIMONOV, a CHy expert, with support of the WMO Secretariat, to explore application of the Commission's efforts to help assess national capabilities in End-to-End Early Warning Systems for Flood Forecasting. He noted that the preliminary assessment was almost complete, but that some additional effort will be needed on this effort. Once completed, the material will help guide the selection of possible modelling approaches to enhance the provision of early warnings of riverine flooding. It was also noted that the HDRFFGS could provide information that could be used by a parallel modelling system, for the five identified basins. Some funding has been secured to help advance this modelling and early warning effort. Mr ACOSTA LANTIQUA indicated that INDRHI is very supportive of this initiative and will be working closely with CHy and the WMO Secretariat on this matter as success would undoubtedly advance national services capabilities in providing early warnings of riverine flooding.

Mr ACOSTA LANTIQUA also provided some views on some possible research that could be undertaken using the the Streamflow Prediction Tool that is being developed and maintained by the U.S. Army Engineering Research and Development Center. It would appear that the final system would be somewhat similar to GloFAS, but based on this new Tool.

Case Studies of Flash Flooding for Dominican Republic and Haiti

Mr ACOSTA LANTIQUA provided a case study of hurricanes Irma and Maria. He showed storm tracking, forecast products, including from the HDRFFS, and rainfall totals. He also showed how the operation of reservoirs helped reduce the peak discharge on some streams. Flash flood warnings had been issued and reports confirmed of their occurrence. It was noted that INDRHI currently does not operate 24/7, while ONAMET does so, which implies that when very short fuse events such as flash floods could possibly occur, careful coordination is needed between organizations.

The three participants from Haiti provided a case study of a recent event that occurred in early January 2018 that resulted in damages in both the north and south of the country, which resulted from a stalled system. It was noted that various NWP forecasts (e.g., MeteoFrance and Norwegian models) were assessed as well as the products of the HDRFFGS. Mr SHAMIR brought up the products of the HDRFFGS for January 4th. Participants analyzed the various products and concluded that the system provided important information upon which to base warnings. It was noted that forecaster judgment is always needed to assess the situation and to complement system products with local forecaster knowledge. It was also noted that in the case of Haiti, several organizations are collecting data and effort is needed to access these and too make them available to the HDRFFGS to improve QPE products. During discussions, the need for in situ rainfall observations was stressed several times. It was noted that the Unité Hydrométéorologique has 6 active real-time rain gauges, while access to an additional 29 operated by others might be possible. At this point in time, no such data are being made available through the WMO Global Telecommunication System (GTs) and assistance is needed to help build the flow of data to the HDRFFGS.

The importance of close working relations with national disaster management agencies was also stressed, particularly in the discussion that followed presentations. Such closer collaborations will help validate how well the forecast system and forecasters are performing, while at the same time, helping to ensure populations at risk receive more effective warnings and that emergency measures can be more effectively taken.

Overview of FFGS Training, Products and Use

Mr SHAMIR provided an overview of the Flash Flood Hydrometeorological Training Programme and noted that a Step 4 training event is scheduled to occur 19-21 June 2018. The importance of this training was highlighted as it allowed those having successfully completed Steps 2 and 3 training to be evaluated. Those successfully completing the Step 4 training become certified WMO FFGS Trainers. Such trainers can be called upon to offer Step 5 sustainability training for their own or other NMHSs.

Mr Shamir provided a brief review of the FFGS concept, data requirements, products, and their operational use. He also demonstrated the console, dashboard and Map Server interface and mentioned the Flash Flood Risk Assessment that had been undertaken.

The presentation of Mr SAYIN built upon that of the national case studies and that of Mr SHAMIR by demonstrating the operational capabilities of the Black Sea and Middle East Flash Flood Guidance (BSMEFFG) system and its use of the derived products for a specific case study. Mr SAYIN also presented on the process of verification and stressed its need for future development of the system and forecaster skill.

Closing of the Planning Workshop

Recommendations were discussed and agreed upon by all participants prior to the conclusion of the meeting, and they appear below in Section 4. Closing remarks were made by Mr Andrés Miguel CAMPUSANO LASOSE (ONAMET), who stressed that if we all work together, we should achieve our objective of having enhanced predictive capability. He stressed that protecting lives of people and of their pets is of extreme importance during severe weather events. Thanks were also extended to all attendees for their active participation in the meeting and spirited involvement in the discussions, which contributed to the successful conclusion of the meeting.

4. Recommendations from the Second Project Steering Committee Meeting of the HDRFFGS

The 2nd Steering Committee Meeting of the HRDFFGS was held in Santo Domingo, Dominican Republic from 12 to 14 February, 2018. The meeting was attended by representatives of the National Meteorological and Hydrological Services of Haiti and Dominican Republic, as well as from the Hydrologic Research Center (HRC) and the WMO Secretariat.

The meeting discussed the development and implementation of the HDRFFGS and made the following recommendations:

1) The UHM (Unité Hydrométéorologique), the National Meteorological and Hydrological Service of Haiti, should undertake efforts to make available as soon as possible its real-time precipitation data using either the WMO GTS or the Project's FTP site so that data can be used for dynamic adjustment of satellite precipitation products within the HRDFFGS.

2) The UHM (Unité Hydrométéorologique), the National Meteorological and Hydrological Service of Haiti, should undertake efforts to make available real-time precipitation data operated by other organizations within Haiti once they have been made available to UHM. These real-time precipitation data would be made available using either the WMO GTS or the Project's FTP site so that data can be used for dynamic adjustment of satellite precipitation products within the HRDFFGS.

3) Technical assistance should be provided to UHM (Unité Hydrométéorologique) on making their real-time precipitation data available using either the WMO GTS or the Project's FTP site.

- 4) Training should be provided the UHM (Unité Hydrométéorologique) on the maintenance and trouble-shooting of automated real-time precipitation stations.
- 5) Additional efforts should be undertaken within Haiti and Dominican Republic to enhance communication of warnings particularly related to flooding including their potential impacts to their respective national disaster management agencies.
- 6) Efforts are needed to strengthen national capacities in UHM (Unité Hydrométéorologique) for streamflow discharge monitoring and data management and processing, as there are currently no operational stations and such data are required for the provision of early warnings of riverine flooding, noting that there is a World Bank Group funded effort currently underway.
- 7) Efforts are needed to strengthen national capabilities in Haiti and Dominican Republic in enhancing their capabilities in the provision of early warnings of riverine flooding and in the provision of hydrological services, particularly taking advantage of products stemming from the HDRFFGS.
- 8) Following the successful implementation of the standard FFGS project in Haiti and Dominican Republic, a proposal should be developed by the Project Steering Committee on further development of the early warning capabilities of the NMHSs in areas where populations are greatest at risk (e.g, landslide susceptibility mapping, riverine flood forecasting, urban flash flood forecasting).
- 9) Participating National Centres of Haiti and Dominican Republic should commence to undertake verification studies of the HDRFFG for their respective countries and should share their results with the Regional Centre and other National Centre, HRC and WMO.
- 10) The FFGS Step 4 training, which is 3-day event, should be undertaken during the period 15 May to 1 June 2018, pending official confirmation of the NMHS of Dominican Republic to host the event. [Please note that subsequent to the conclusion of the meeting, HRC has confirmed that it cannot undertake the training during this proposed period. Due to existing heavy scheduling of events, the Step 4 training must proceed on the original planned dates of 19-21 June 2018.]
- 11) The participating NMHSs should increase informal communications at the working level to assist in the provision of early warnings of hydrometeorological hazards, including flash floods, in their respective countries.

**Second Steering Committee Meeting (SCM 2) of the Haiti and Dominican Republic Flash Flood Guidance System (HDRFFGS)
February 2018, Santo Domingo, Dominican Republic**

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**SECOND STEERING COMMITTEE MEETING (SCM 2) of the
HAITI AND DOMINICAN REPUBLIC FLASH FLOOD GUIDANCE (HDRFFG)
PROJECT**

Santo Domingo, Dominican Republic

12–14 February 2018

Agenda

Day I

09:00-09:15 *Registration*

09:15-09:30 *Opening Session*

Welcome speeches by ONAMET, WMO and HRC

09:30 – 10:00 *Purposes of the meeting (WMO)*

10:00 – 10:15 *Photo session*

10:15-10:45 *Coffee Break*

10:45 – 11:00 *Selection of the session chair, review of the agenda, and participants self-introductions (All)*

10:45 – 11:15 *Overview of the global FFGS (WMO)*

11:15 – 11:30 *HDRFFG regional project implementation status (HRC)*

11:30 – 12:00 *HDRFFGS data requirements (HRC)*

12:00 – 12:30 *Basin Delineations for DR and Haiti and their verification (All)*

12:30 – 14:00 *Lunch Break*

14:00 – 14:30 *Geomorphological relations (All)*

15:00 – 15:30 *Facilitated discussions on the data requirements (All)*

15:30-16:00 *Coffee Break*

16:00 – 16:30 *Linkage between SWFDP-Caribbean and HDRFFGS*

16:30 - 17:00 *Possible linkage between HDRFFGS and CIFDP (INDRHI)*

DAY II

09:00 – 09:30 Overview of day I (Chair)

09:30 – 10:00 A Flash Flood Case Study for Dominican Republic (ONAMET)

10:00 - 10:30 A Flash Flood Case Study for Haiti (UHM)

10:30 – 11:00 Coffee Break

11:00 –11:30 HDRFFGS forecaster console and dashboard (HRC)

11:30 – 12:30 Overview of the HDRFFGS products (HRC)

- Precipitation products (GHE, NWGHE, merged MAP)
- Soil Moisture (ASM)
- Flash Flood Guidance (FFG)
- Mesoscale NWP
- Forecast MAP
- Baseline Threat Products
- Flash Flood Threat (IFFT, PFFT, FFFT)

12:30 -14:00 **Lunch Break**

14:00 -14:30 How to prepare flash flood warnings: Methodology (WMO)

- Weather analysis and forecasting
- Mesoscale and Nowcasting Analysis
- Weather RADAR and Satellite images
- Interpretation of FFG Products

14:30 - 15:00 A Flash Flood Case Study for frontal depressions (WMO)

15:00 - 15:30 A Flash Flood Case Study for convection (WMO)

15:30 - 16:00 Coffee Break

16:00 - 17:00 Hands-on Exercise for Past Events in the region (All)

(example “daily operations”)

- Daily Weather Briefing
- Interpretation of the HDRFFGS products
- Discussion

Day III

09:00 – 09:30 Overview of previous day (Chair)

09:00 – 10:00 Verification of flash flood warnings (WMO)

10:00 – 10:30 Advances in FFG System (HRC)

- Multi-Model QPF Ingestion in FFGS
- Landslides
- Urban flooding early warning system
- Riverine Routing

- Use of seasonal and sub-seasonal climate model data

10:30 – 11:00 **Coffee Break**

11:00 – 11:30 Flash Flood Hydrometeorologist Training Programme (HRC)

11:30 – 12:00 Enhancing collaboration with the Disaster Management Agencies and Water Management Agencies (All)

12:00 – 12:30 Roles and Responsibilities of the Regional Centre and NMHSs (WMO)

12:30 – 14:00 **Lunch Break**

14:00 – 14:30 Cooperation Agreement between ONAMET and WMO (WMO)

14:30 – 15:00 Review of Work Plan (HRC)

- Adjustments and next steps

15:00 – 15:30 Final Discussions, conclusion and recommendation for further development (All)

15:30 – 16:00 Closing statements & closure of the meeting (All)

- **End of Meeting** -