



CariCOF 2023-24 Dry Season - Seasonal Forecast Training Workshop Roseau, Dominica

27th – 28th November, 2023

WORKSHOP REPORT

The 2023 Dry Season pre-CariCOF forecasters' training was held on November 27th and 28th in Roseau, Dominica, ahead of the Forum held on November 29th and 30th, as well as the inaugural National Climate Outlook Forum of Dominica on December 1st. The CariCOF, including the training workshop, was organised by the Caribbean Institute for Meteorology and Hydrology (CIMH) and hosted by the Dominica Meteorological Service.

The training workshop was facilitated by Dr. Cédric Van Meerbeeck, Dr. Teddy Allen, Dr. Wazita Scott, Dr. Roché Mahon, Ms. Jodi-Ann Petrie and Ms. Janice Reid of the World Meteorological Organization (WMO) Caribbean Regional Climate Centre (Caribbean RCC) at the Caribbean Institute for Meteorology and Hydrology (CIMH), as well as Dr. Simon Mason of Columbia University in New York's International Research Institute for Climate and Society (IRI), and Ms. Cristina Recalde from the US National Oceanic and Atmospheric Administration / Climate Prediction Center (NOAA/CPC).

The workshop was made possible through two Intra-ACP projects, namely the Enhancing Climate Resilience in CARIFORUM Countries as part of the Global Climate Change Alliance+ (GCCA+) programme and the ClimSA Caribbean project as part of the Climate Services and Applications Programme (ClimSA), both funded through the European Union. Further received financial support from the World Meteorological Organization (WMO) and the US National Oceanic and Atmospheric Administration. The agenda is found in [Appendix I](#).

Day 1: Monday November 27th, 2023 – Quantifying the relationship between extreme wet spell and flash flood occurrence

The workshop participants were warmly welcomed by the Dominica Meteorological Service, while opening remarks were given by Mr. Trotman of the CIMH. After this, Dr. Van Meerbeeck of the CIMH provided a brief background to the work that spurred the sessions in this training workshop, followed by the workshop objectives and an overview of the workshop agenda.

During the first technical session, a presentation was given by Dr. Scott about the development of CAROGEN version 2, an upgraded system that expands on the work currently done using the CARicof Outlook GENERator (CAROGEN v1) which has been in use since 2017. CAROGEN v1 is an online platform that is geared towards





automation of seasonal forecasting for Caribbean countries developed and maintained by the CIMH. Version 2 will enhance the user experience and expand on CAROGEN's functionality in multiple ways. Most importantly,

- (1) it will integrate an API designed to further enhance automation from the user perspective while reducing efforts to set up the system on a monthly basis;
- (2) it will be designed to enable sub-seasonal forecasting;
- (3) it will expand on the number of seasonal forecast products to encompass the entire current range of CariCOF forecasts, as well as enable the easy development and integration of seasonal forecast products of choice to be developed in future;
- (4) it will enable automated regional seasonal forecast verification using WMO recommended verification metrics.

The second presentation during the first technical session was made by Dr. Van Meerbeeck, who looked back at the record-breaking 2023 Caribbean heat season, including a host of monthly and (preliminary) seasonal records in terms of air temperature and heatwave day frequency. These records were then put in the context of global and regional drivers of excessive heat, including Global Warming – with a quantitative breakdown of its most important drivers –, record-breaking North Atlantic Ocean Temperatures, and the occurrence of a strong El Niño event. The last part of the presentation focused on some positive aspects of the societal preparation for and response to the record-breaking heat. To name a couple of examples, many media houses picked up the stories on the extreme heat forecasted for the Caribbean Heat Season, on anticipatory measures taken by agencies such as UNICEF to help families, schools, sports and recreation facilities, and governments protect children and other vulnerable groups, and on innovative coping mechanisms at the household level.

After the morning's health break, the second technical session was led by Dr. Mason whose presentation focused on updates made to the Climate Predictability Tool (CPT) version 18 (and a few new features of CPT 17), many of which requested by the Caribbean to facilitate the sub-seasonal and seasonal forecasting of rainfall extremes, as well as, heat extremes. Most notably, the updates relate to masking. Skill-masking, in particular, is a useful option for situations when forecast skill is low, and forces CPT to issue a climatological forecast when skill is negative.

In addition, some features that were introduced at the 2023 Wet/Hurricane Season CariCOF were reviewed, specifically:





1. The inclusion of a new goodness index, Kendall’s tau-c, that is specifically designed for situations in which the predictand data contain ties (as is commonly the case with counts, such as, storm counts, or numbers of extreme rainfall events).
2. Automatic recognition of when the normal category is undefined. If absolute thresholds are set to be identical for the above- and below-normal categories, or if probabilistic thresholds are defined so that the normal category has a 0% probability, CPT now presents forecasts in a two-category format.
3. New-look versions of the Help pages that are easier to navigate and search, and are available online (<https://cpthelp.iri.columbia.edu/>) as well as built into the software itself.

Hands-on training exercises would follow on day 2 of the workshop.

After lunch, a (chronologically) regular part of the pre-CariCOF training workshops was facilitated by Dr. Allen with support from Dr. Van Meerbeeck and Ms. Janice Reid, namely producing, presenting and consensus-building on the climate outlooks to be presented at the CariCOF Forum. Dr. Allen led the presentation and consensus-building of the CariCOF’s 2023-24 Dry Season climate outlooks, including seasonal monitoring and forecasting information products, but also of global monitoring and forecasting products, such as seasonal forecasts from the WMO Global Producing Centres, the IRI, the Copernicus Climate Change Service and the Asia Pacific Climate Center. Among the presented CariCOF technical outlook products were the precipitation and temperature outlook maps, the drought outlook, the wet days and wet spells outlook, the dry spells outlook and the flash flood potential outlook.

Towards the end of the workshop day 1, Dr. Mahon and Ms. Petrie provided a brief introduction into the Multi-hazard tournament to be held during the ensuing CariCOF Stakeholder Forum of 29-30 November. Their presentation highlighted the format and game play of the tournament and provided instructions to help the forecasters prepare for the tournament.

Day 2: Tuesday November 28th, 2023 – Sub-seasonal forecasting of extreme rainfall and dry spells

The second training workshop day reprised the CariCOF’s ongoing work on developing sub-seasonal forecasting capabilities within Caribbean NMHSs and at the Caribbean RCC on extreme rainfall and dry spells. The day 2 sessions were facilitated by Dr. Mason, Dr. Van Meerbeeck, Dr. Scott, Ms. Recalde and Ms. Janice Reid.

The first session included three refresher presentations that looked at:





- (1) Forecasting of extreme rainfall and dry days, features of weather-within-a-season, presented by Dr. Van Meerbeek;
- (2) Global sub-seasonal and seasonal forecast products that can serve as predictor sets for regional sub-seasonal and seasonal forecasts, respectively, presented by Dr. Mason;
- (3) An overview of the NOAA/CPC's sub-seasonal forecast product range, including the sub-seasonal forecasts operationally provided by the RCC-Washington, presented by Ms. Recalde.

After the morning's health break, an introduction to sub-seasonal forecasting was presented. Most of the material was a reiteration of previous training on sub-seasonal forecasts, with emphases on understanding Wheeler-Hendon diagrams, and the availability of sub-seasonal model outputs. The termination of the SubX programme was noted, although the commitment of NOAA via the RA-IV Regional Climate Centre should guarantee long-term access to the CFSv2 model sub-seasonal forecasts (the GEFS model has been discontinued). Plans to make sub-seasonal forecasts available from ECMWF were also discussed.

Then, hands-on exercises were run on the preparation of daily rainfall data from key weather stations maintained by the NMHSs represented in the workshop to serve as predictand data for sub-seasonal forecasts of rainfall extremes and dry day counts. In the afternoon, the first session then contained hands-on exercises created to provide participants with experience in sub-seasonal forecasting using the CFSv2. The exercises involved making experimental real-time forecasts for week-2 and weeks 3 and 4. Forecasts were for total rainfall, frequencies of exceeding 30 mm in one day, and numbers of dry days. These exercises were facilitated by Dr. Mason, Dr. Van Meerbeek, Dr. Scott and Ms. Reid.

The hands-on exercises session continued after the afternoon's health break to maximise the time for the participants to familiarize themselves with sub-seasonal forecast experiments using CPT.

Dr. Mason and Dr. Van Meerbeek facilitated the final session. This session featured an abridged discussion on the next steps required to work towards operationalisation of sub-seasonal forecasting through the CariCOF and with assistance from CIMH for product development, automation, and training. The shorter amount of time spent on the discussion was made possible since many items were, in fact, already discussed through earlier sessions. The discussion also enabled the IRI to prioritise developments in CPT and otherwise in preparation of a forthcoming training workshop for water stakeholders on the use of climate early warning information at sub-seasonal and seasonal timescales.





APPENDIX I: Workshop Agenda

Day 1: Monday November 27th, 2023 – Quantifying the relationship between extreme wet spell and flash flood occurrence

- 09:00 – 09:20 Opening and welcome remarks (Dominica Meteorological Service; Adrian Trotman, CIMH)
- 09:20 – 09:30 Workshop objectives (Cedric Van Meerbeeck, CIMH)
- 09:30 – 9:40 Working towards CAROGEN v2 – Goals, survey and implementation (Wazita Scott, CIMH)
- 09:40 – 10:15 The record breaking 2023 Caribbean Heat Season – its drivers, some statistics, and positive outcomes (Cedric, CIMH)
- 10:15 – 10:30 *Break*
- 10:30 – 12:15 CPT version 18 updates to enable sub-seasonal and weather-within-season forecasts – hands-on session (Simon Mason, IRI; Cedric, Wazita and Janice Reid, CIMH)
- 12:15 – 13:30 *Lunch (provided)*
- 13:30 – 15:00 Preparing the 2023-24 Dry Season climate outlooks (Teddy Allen and Cedric, CIMH)
- 15:00 – 15:15 *Break*
- 15:15 – 15:45 Preparing the 2023-34 Dry Season climate outlooks (Teddy and Cedric, CIMH)
- 15:45 – 16:00 Brief introduction to the Multi-Hazard Tournament (Roché Mahon and Jodi-Ann Petrie, CIMH)

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Day 2: Tuesday November 28th, 2023 – Sub-seasonal forecasting of extreme rainfall and dry spells

- 09:00 – 10:15 Sub-seasonal predictability and predictions
(Cedric - extreme rainfall and dry days, CIMH;
Simon - global forecast products, IRI;
Cristina Recalde - RCC-Washington sub-seasonal forecast products, NOAA/CPC)
- 10:15 – 10:30 *Break*
- 10:30 – 12:15 Daily rainfall data preparation for sub-seasonal forecasts of extreme rainfall and dry spells in CPT 18 (Simon, IRI; Cedric, Wazita and Janice, CIMH)
- 12:15 – 13:30 *Lunch (provided)*
- 13:30 – 15:00 Producing a sub-seasonal forecast for extreme rainfall and dry spells – hands-on
- 15:00 – 15:15 *Break*
- 15:00 – 15:45 Discussion on next steps towards operational sub-seasonal forecasting in the CariCOF context
- 15:45 – 16:00 Closing Remarks (Adrian, CIMH)

END OF WORKSHOP

Learning objectives for the training workshop - sub-seasonal forecasting:

1. Learn the format of predictor files and predictand files for week 2 and weeks 3-4 forecasts as opposed to seasonal forecasts.
2. Learn to use CPT 18 to make a simple retroactive rainfall forecast for weeks 2 and 3-4.
3. Learn to use CPT 18 to use GCM model forecast ensemble members to predict the probability of
 - a) any day in weeks 2 and 3-4 exceeding 30 mm across Caribbean stations
 - b) the number of dry days in weeks 2 and 3-4 across Caribbean stations

