



**The Caribbean Climate Outlook Forum (CariCOF)  
2022-23 Dry Season Pre-CariCOF training workshop  
Christ Church, Barbados, 22<sup>nd</sup> to 23<sup>rd</sup> November, 2022**

**WORKSHOP REPORT**

The 2022-23 Dry Season pre-CariCOF forecasters’ training was held on November 22<sup>nd</sup> and 23<sup>rd</sup> in Christ Church, Barbados, ahead of the Forum held on November 24<sup>th</sup> and 25<sup>th</sup>. The CariCOF, including the training workshop, was organised by the Caribbean Institute for Meteorology and Hydrology (CIMH) and hosted by the Barbados Meteorological Services (BMS).

The training workshop was facilitated by Dr. Cédric Van Meerbeek, Dr. Teddy Allen 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), and Dr. Simon Mason of the International Research Institute for Climate and Society (IRI).

The workshop was made possible through CREWS Programme and the Intra-ACP Climate Services and Applications Programme funded through the European Union, and further received financial support from the World Meteorological Organization (WMO), NOAA. The agenda is found in [Appendix 1](#).

**Commented [CVM1]:** Was this the case?

**Day 1, Tuesday, 22<sup>nd</sup> November 2022 – Heat stress in the Caribbean, online tools for climatological analyses, preparing the 2022-23 dry season climate outlooks**

The workshop participants were warmly welcomed by the BMS, while opening remarks were given by Mr. Trotman of the CIMH. After this, Dr. Van Meerbeek 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 of the workshop on heat stress in the Caribbean, led by Dr. Di Napoli of the UoR with ample support from Dr. Allen of the CIMH. In her presentation, Dr. Di Napoli mentioned that heat stress was first identified as a major health issue for the Caribbean in 2003, with heat awareness of the linkage between heat and health growing. She gave an overview of the climatology of heat stress, its drivers, and trends of human biometeorology indices.

Focusing on the Heat Index (HI), which combines temperature and humidity, Dr. Di Napoli highlighted that the HI is an effective index for heat danger. Heat danger can be described as the onset of more and more

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dangerous heat disorders under conditions of prolonged exposure and/or physical activity in the heat. Then she went on to defining the Universal Thermal Climate Index (UTCI) as a sophisticated index of heat stress. Besides temperature and humidity, the UTCI incorporates wind speed and radiation. Heat stress, which can be defined as physiological responses put in place by the human body to maintain its core temperature within the range of optimal physiological performance, could thus be estimated using the UTCI.

Since there are only very few long weather station records available on humidity and radiation on calculate the UTCI, Dr. Di Napoli used ERA-5 reanalysis data to present a regional climatology of heat stress, as well as trends. Importantly, during the warmest season of the year (August-September-October), a strong upward trend in nighttime is noted across the region, but an even stronger trend is seen in daytime heat stress in the Eastern Caribbean. She continued by disentangling the components of that upward trend, suggesting that the trend in Mean Radiant Temperature was very highly correlated with the increase in UTCI across the region, whereas wind speed was negatively correlated with the UTCI.

The second part of the session answered the question whether a heat danger and heat stress index could complement each other. The answer was affirmative, in that dangerous heat disorders occur when human body's responses to heat are most stressful. Dr. Di Napoli ended her presentation by showing examples of potential elements of heat stress early warning, including heat stress and heat danger indices. The presentation was delivered in an interactive way, with the audience given and taking ample opportunity to ask questions and receive the answers they requested.

After the session on heat stress concluded, Dr. Allen took the floor to demonstrate how the NASA Giovanni freely accessible online tool could be used to explore gridded rainfall data with the NASA Giovanni web portal. By means of example, the participants were shown how hurricane rainfall trails can be tracked, with the output filtered to clarify the picture.

In the afternoon, the first session, facilitated by Dr. Combley, focused on rethinking the format, look and feel of the main CariCOF climate outlook statement product: the CariCOF Climate Outlook Newsletter. The rationale for the considerable changes presented was threefold:

- 1. Modernize**  
*A more modern look/feel for a new generation of users with discoverable content to web searches.*
- 2. Usability Improvements**  
*New ways to track how/if products are being viewed; Website traffic as a proxy for usage.*
- 3. Streamline Production**  
*Create product content once, use many times for different curated bulletins/newsletters; reduce workload over time.*

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Among the proposed changes, the newsletter would transform in terms of media solution, i.e., turning from a 2-pager, rigid structure, easy-to-print bulletin, which is somewhat restrictive for emphasizing hazards that are of particular importance at any given point in time.

Additional advantages include:

1. improved usability and discoverability, leading to enhanced RCC dedicated web page analytics;
2. a workflow that can be streamlined across the various content creators and authors of the bulletin;

It is suggested that such benefits would result from the move to an e-newsletter in HTML/Web enabled email format.

After this introduction, Dr. Combley went on to present the components, format and flexible content of a rethought CariCOF Newsletter. She ended the session with a number of questions for the participants to reflect on and provide their views on by the next day.

- Which enhancements do you feel will be most beneficial, and why?
- How will the new product pages with interpretations improve your ability to serve your national stakeholders?
- How can the video assist in improving understanding of the climate outlook? What should be included?

As a (chronologically) regular part of the pre-CariCOF training workshops, the remainder of the afternoon evolved around producing, presenting and consensus-building on the climate outlooks to be presented at the CariCOF Forum.

This included a presentation by the RCC-Washington given by Ms. Recalde on their sub-seasonal to seasonal climate forecast products relevant to the two weeks following the CariCOF events, as well as NOAA Climate Prediction Center's seasonal hazard forecasts relevant to the Caribbean region.

Next, Dr. Allen led the presentation and consensus-building of the CariCOF's 2022-23 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.

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## Day 2, Wednesday, 23<sup>rd</sup> November, 2022 – The use of updates in CPT for the seasonal and S2S prediction of climate extremes

The second day of the workshop changed focus to the ongoing development of statistically downscaled, hazard-specific and sub-seasonal to seasonal forecasting using the Climate Predictability Tool. This session was facilitated by Dr. Mason, Dr. Van Meerbeeck and Ms. Janice Reid.

In the morning session, an interactive presentation *cum quo* demonstration was made by Dr. Mason, focusing on new features the latest versions of the CPT tool, namely versions 17 and 18. CPT 17 evolved to include skill masking of forecasts, as well as masking of mostly/entirely dry seasons where relevant; and statistical regression options relevant to climate variability features such as drought as estimated by the Standardized Precipitation Index; counts of events such as wet spells, hurricanes or heatwave days in a season; and the chance of occurrence of at least one significant event within a specified period, e.g. the chance of a flash flood triggering excessive rainfall event. CPT 18 evolved to contain double cross-validation as forecasting method – which may be useful for sub-seasonal to seasonal forecasting – as well as expanded retro-active forecasting options; improved missing data estimation; enhanced features to download of gridded data, with the option of regridding before downloading; and the option to look at the standardized predictor data and predictand data for any year. Furthermore, CPT18 further enables the production of probability of exceedance curves; the option to calculate goodness index to ignore all areas with negative skill; and improved ease in adding additional datasets for download from CPT.

Part of the benefits of this session, beyond the learning aspect, was the feedback on bugs and remaining inefficiencies, as well as the formulation of any further recommendations regarding functionality for CPT to become fit-for-purpose for sub-seasonal to seasonal forecasting.

In the afternoon, Dr. Combley collected feedback on the three questions regarding the proposed transformation of the CariCOF Newsletter. She would next implement the suggested edits to the new template and revert back to CIMH with a revised template.

Right after, Dr. Mason made a presentation on the scientific research and development behind excessive rainfall forecasts and flash flood potential, noting that flash floods form just a specific type of pluvial or riverine flood, triggered within a period of 6 hours or less of excessive rainfall. His presentation pointed to what we need to forecast meteorologically. Dr. Mason then focused on what, generically, are the prospects for forecasting excessive rainfall anywhere in world and on the potential sources of predictability at different timescales, including the timescales relevant to the CariCOF.

In the final part of the afternoon session, Dr. Mason's presentation was followed by a demonstration of a revised CariCOF methodology for forecasting seasonal flash flood potential using CPT. This demonstration

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done by Ms. Reid, under the guidance of Dr. Van Meerbeeck, followed a step-by-step approach to enable participants to replicate the experiments and downscale/tailor them to their sub-region of interest. This demonstration *cum quo* hands-on exercise helped identify a number of software bugs related to differences in computer configurations. Dr. Mason confirmed that those errors would be ironed out post workshop.

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## Appendix 1: TRAINING WORKSHOP AGENDA

Day 1, Tuesday, 22<sup>nd</sup> November 2022 – Heat stress in the Caribbean, online tools for climatological analyses, preparing the 2022-23 dry season climate outlooks

TIME	SESSION	PRESENTER/FACILITATOR
09:00 – 09:15	Welcome and opening remarks	Barbados Meteorological Services Adrian Trotman, CIMH
09:15 – 09:30	Workshop Objectives	Cedric Van Meerbeeck, CIMH
09:30 – 10:15	Heat stress in the Caribbean – Climatology, drivers, and trends of human biometeorology indices	Claudia Di Napoli, University of Reading; Teddy Allen, CIMH
10:15 – 10:30	<b>COFFEE BREAK</b>	
10:30 – 11:00	Heat stress in the Caribbean – potential applications for heat-health early warning in the Caribbean	Claudia Di Napoli, University of Reading; Teddy Allen, CIMH
11:00 – 12:15	Online climate analysis tools – NASA Giovanni	Teddy Allen, CIMH
12:15 – 13:30	<b>LUNCH</b>	
13:30 – 14:00	Rethinking the CariCOF Climate Outlooks Newsletter – options for a fresher look and optimal content	Shanna Combley, CIMH
14:00 – 14:15	RCC-Washington S2S forecasts and seasonal hazard forecasts	Cristina Recalde, NOAA
14:15 – 15:00	Preparing the 2022-23 Dry Season climate outlooks	All
15:00 – 15:15	<b>COFFEE BREAK</b>	
15:15 – 16:00	Preparing the 2022-23 Dry Season climate outlooks – reaching a consensus	All
16:00	<i>END OF DAY 1</i>	

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**Day 2, Wednesday, 23<sup>rd</sup> November, 2022 – The use of updates in CPT for the seasonal and S2S prediction of climate extremes**

TIME	SESSION	PRESENTER/FACILITATOR
09:30 – 10:15	Recent updates in CPT – Generalised Linear Regression options, multi-model ensembling and other updates	Simon Mason, IRI
10:15 – 10:30	<b>COFFEE BREAK</b>	
10:30 – 12:15	Recent updates in CPT – Regression options for forecasting heat impact potential from heatwaves – hands-on exercise	Janice Reid & Cedric Van Meerbeek, CIMH
12:15 – 13:30	<b>LUNCH</b>	
13:30 – 14:10	Rethinking the CariCOF Climate Outlooks Newsletter – options for a fresher look and optimal content	Shanna Combley, CIMH
14:10 – 14:40	Excessive Rainfall forecasts and flash flood potential – ongoing research and development	Simon Mason, IRI
14:40 – 15:00	Excessive Rainfall forecasts and flash flood potential – updating CariCOF’s seasonal forecasting methodology	Cedric Van Meerbeek & Janice Reid, CIMH
15:00 – 15:15	<b>COFFEE BREAK</b>	
15:15 – 16:00	Excessive Rainfall forecasts and flash flood potential – hands-on exercise	Janice Reid & Cedric Van Meerbeek, CIMH
16:00	<i>END OF WORKSHOP</i>	

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