CLIMATE SYSTEMS, TECHNIQUES AND RESOURCES FOR IMPROVED DECISION-MAKING, EDUCATION AND SUSTAINABILITY PROJECT

DRAFT TERMS OF REFERENCE

CONSULTANCY SERVICES FOR A CLIMATE MODELLING CONSULTANT

1. BACKGROUND

1.01 The Caribbean comprises nations that are diverse in terms of geographical size, population, political stability as well as economic drivers. This diversity is however dwarfed by the common vulnerability to the impacts of climate variability and change (CVC) that each of the territories experience; and which places the Caribbean amongst the most vulnerable, across all socio-economic and livelihood sectors. Throughout the region, shifts in duration, frequency and intensity of extreme weather and climatic events have already caused serious economic losses in climate sensitive sectors (for example, in 2004, the impact of Hurricane Ivan on Grenada resulted in the nation's agriculture and spice industry gross domestic products earnings being set back by 7-10 years). Continued and projected climatic changes not only place the Caribbean amongst the most vulnerable to the impacts and CVC, but threatens the region's economy, growth and aspirations for sustainable development.

1.02 At the start of the 21st century, there were still challenges adequately characterising and understanding the past and impending threats of CVC to the region due to a paucity of information on account of (a) the general lack of climate change studies at scales matching the geographical size of territories within the region; (b) minimal or no peer-reviewed sector-specific or related studies on the influence of climate change; and (c) the absence of continuous in-situ meteorological data. This led Caribbean scientists and relevant stakeholders to embark on a drive to improve data availability from both in-situ meteorological stations and climate model projections as well as working towards the provision of climate change data and information at spatial and temporal scales more relevant to the region for use in decision-making, risk reduction and improving overall resilience. This drive resulted in the production of the set of first relevant and semi-scale specific regional climate model outputs using the Intergovernmental Panel on Climate Change's (IPCC's) Special Report on Emission Scenarios (SRES) as well as the subsequent Representative Concentration Pathways (RCPs) scenarios. The results of these endeavours were used by the Caribbean and other Small Island Developing States in:

(a) their campaign to have the end of century global warming target be limited to 1.5°C above pre-industrial levels;
(b) the production of several of the region's national communications to the United Nations Framework Convention on Climate Change;
(c) a wide array of publications on the impact of climate variability and climate change on varying sectors, such as agriculture;
(d) the development and implementation of numerous capacity building and training workshops geared at improving the climate knowledge and capacity in the region; and
(e) the preparation of the State of the Caribbean Climate (SOCC) Report, through support from the Caribbean Development Bank (CDB) [1] to The University of the West Indies (UWI), Mona. The report, which was published online in 2020, analysed the current and future state of the region's climate using the best available science and data at the time.

[1] This was made possible through financing from the European Union (EU) within the framework of the African, Caribbean, Pacific, EU, Natural Disaster Risk Management in CARIFORUM countries.

1.03 The SOCC Report has been viewed as a landmark activity for the region, as it provided the most in-depth view of Caribbean States in terms of the impacts of CVC and has been a go-to resource for anyone conducting climate-related endeavours within the Caribbean. Importantly, the report contributed to an increase in the basic knowledge and understanding of CVC of Borrowing Member Countries (BMCs) of the CDB by providing decision-makers with the best available climate science information at the time in an easily digestible document. Notwithstanding this, the Caribbean is once again lagging the globe in terms of the scenarios used to inform climate change, adaptation and mitigation efforts as the globe has now moved away from the use of both SRES and RCP scenarios to Shared Socioeconomic Pathways (SSPs). There is therefore urgent need for the region to close this gap, so that it strengthens its efforts to appropriately respond to the threat of climate change.

1.04 Recognising the importance of addressing the aforementioned gaps, the CDB, under the European Union-funded Caribbean Action for Resilience Enhancement Programme, has provided grant resources to the UWI, Mona to implement the "Climate Systems, Techniques, and Resources, for Improved Decision-making, Education and Sustainability (STRIDES)" project. The Climate STRIDES project seeks to engender enhanced climate resilience in the region through the provision of systems, tools and resources that improve decision making capacity, general awareness and influence behaviour change in the face of a changing climate. Under the Climate STRIDES project, an updated volume of the SOCC Report will be prepared and made available for stakeholder validation, training, awareness and sensitisation.

2. OBJECTIVE

2.01 The objective of this consultancy is to provide accurate and localised high resolution climate projections to support climate-related decision-making in the BMCs of CDB and the wider Caribbean. The high-resolution dataset is expected to provide the Caribbean with updated SSP and RCP scenarios.

3. SCOPE OF WORK

3.01 The scope of this project encompasses the following tasks related to regional climate models and high-resolution climate projections for the BMCs of CDB and the wider Caribbean:

(a) Installation of Latest Regional Climate Models: The Consultant will conduct comprehensive research to identify the most appropriate and up-to-date regional climate models suitable for the specific requirements of the BMCs of CDB. Once identified, the selected regional climate models will be installed and configured on designated computing infrastructure. Rigorous testing will be performed to verify the successful installation and functionality of the climate models.

(b) Acquisition of Regional Climate Model Boundary Data (SSP and RCP): The Consultant will identify relevant datasets corresponding to SSP and RCP that are compatible with the installed regional climate models. Subsequently, the necessary boundary data for each scenario will be procured/sourced to cover the geographical area of interest in the BMCs of CDB. Validation processes will be conducted to ensure the accuracy and compatibility of the acquired boundary data with the selected climate models.

(c) Generation of High-Resolution Climate Projections: Using the installed regional climate models and the acquired boundary data for the SSP and RCP scenarios, the consultant will conduct model runs to generate high-resolution climate projections to a temporal and spatial scale in concordance with the UWI Mona designated project leads. These climate projections will encompass key climate variables, including but not limited to temperature, precipitation, wind

patterns, and other relevant parameters for future time periods. To ensure the reliability and consistency of the generated climate projections, thorough quality control checks will be performed.

(d) Post-Processing of Climate Projections: The generated climate projections will be subject to post-processing to derive additional variables and indices that are specifically relevant to the needs and interests of the BMCs of CDB. Furthermore, the Consultant will develop user-friendly visualisation tools to effectively present the climate projections in a comprehensible format for various stakeholders and decision-makers. In some instances, these tools will be prepared in collaboration with the GIS Consultant. Additionally, the Consultant will employ statistical analyses to identify trends, patterns, and potential climate impacts within the BMCs of CDB. The successful completion of these tasks will facilitate the provision of accurate and localised climate projections to support informed decision-making and climate-related planning in the BMCs of CDB.

(e) Contribution to the updated SOCC Report: The Consultant is expected to lead the drafting of the Climate Projections chapter of the SOCC Report as well as provide assistance, guidance and reviews of other sections of the document, as necessary.

3.02 The Climate Modelling Consultant will also perform other project-related duties, as assigned by the CSGM Principal Investigator and/or the Climate STRIDES Project Coordinator.

4. QUALIFICATIONS AND EXPERIENCE

4.01 The Consultant should possess the following minimum qualifications and experience:

(a) At least a Bachelor of Science degree in Physics, Electronics, Renewable Energy, Computer Science or a related discipline.
(b) A minimum of three years of professional experience working with a research team, as evidenced by published works (posters, academic papers, etc.) within Climate Change, Climate Modelling, or associated field.
(c) At least three similar completed assignments generating high-resolution climate projections for countries within the Caribbean.
(d) Strong background in climate science, meteorology, atmospheric sciences, or related fields, as evidenced by evidenced by participation in climate or environmental-focused projects.
(e) Demonstrated experience in installing, configuring, and running regional climate models (e.g., WRF, CMIP suite of models).
(f) Proficiency in acquiring and processing large-scale climate datasets.
(g) Expertise in post-processing climate model output and performing statistical analyses.
(h) Familiarity with climate modelling software and programming languages commonly used in climate research.

5. REPORTING REQUIREMENTS AND DELIVERABLES

5.01 The climate modelling consultant will be assigned to the Climate Studies Group Mona at the University of the West Indies and will report to the CSGM Principal Investigator and the Project Coordinator for the Climate STRIDES project.

5.02 The Climate Modelling Consultant is expected to produce the following deliverables:

(a) Report detailing the successful acquisition boundary data to be used to generate the suite of high-resolution climate projections by Month 2.
(b) Report on climate model selection and installation that details the research conducted to identify the most suitable regional climate models for the BMCs and the detailed process involved in their installation and configuration in Months 3-4.
(c) First Draft of the climate projections and scenarios chapter of the State of the Caribbean Climate Report by Month 5.
(d) First Draft of the climate projections and scenarios chapter of the State of the Caribbean Climate Report by Month 7.
(e) Reviews of draft versions of the full SOCC Report by Month 8.
(f) A presentation tailored for stakeholders and decision-makers, summarising the findings for climate projections, and potential impacts by Month 9.
(g) Finalized sections of the updated SOCC Report, inclusive of all supporting data, spreadsheets, models, references etc. by Month 10.
(h) Reviews of the graphic designed versions of the full SOCC Report by Month 12.
(i) A set of user-friendly tools designed to present the climate projections in an easy to digest and understand format for various stakeholders and decision-makers by Month 13. Output will also be integrated into web platform showcasing results for BMCs.
(j) Post-processing and analysis report detailing the post-processing of climate projections to derive additional climate variables and indices, including statistical analyses conducted to identify trends, patterns, and potential climate impacts within the BMCs. This report will also describe the development of user-friendly visualisation tools by Month 15.
(k) A report detailing the new suite of high-resolution climate projections available for the Caribbean, this may take the form of a peer-reviewed publication by Month 15.

6. DURATION

6.01 The estimated duration for completing the tasks outlined in this consultancy - including time for research, installation, data acquisition, model runs, post-processing, and reporting is approximately 15 months.

7. PLACE OF WORK

7.01 The Climate Modelling Consultant will be assigned to the Climate Studies Group Mona within the Department of Physics at the University of the West Indies, Mona. The Consultant is required to be resident in Jamaica for the duration of the assignment and is expected to report for in-person work at least three workdays per week. Eligible applicants outside of Jamaica will be required to cover any relocation expenses.