



An initiative of the African, Caribbean and Pacific Group,
funded by the European Union, and implemented by:



CARIBBEAN INSTITUTE FOR METEOROLOGY AND HYDROLOGY

EXPANDED WEATHER AND CLIMATE FORECASTING AND INNOVATIVE PRODUCT AND SERVICE DEVELOPMENT AND DELIVERY IN THE CARIBBEAN PROJECT

CONSULTANCY SERVICES FOR WEATHER RESEARCH AND FORECASTING MODEL TRAINING

REQUEST FOR EXPRESSIONS OF INTEREST

The Caribbean Institute for Meteorology and Hydrology (CIMH) has received financing from the Caribbean Development Bank (CDB) in an amount equivalent to EUR773,025 towards the cost of Expanded Weather and Climate Forecasting and Innovative Product and Service Development and Delivery in the Caribbean Project and intends to apply a portion of the proceeds of this financing to eligible payments under a contract for which this invitation is issued. Payments by CDB will be made only at the request of the CIMH and upon approval by CDB, and will be subject in all respects to the terms and conditions of the Financing Agreement. The Financing Agreement prohibits withdrawal from the financing account for the purpose of any payment to persons or entities, or for any import of goods, if such payment or import, to the knowledge of CDB, is prohibited by a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations. No party other than the CIMH shall derive any rights from the Financing Agreement or have any claim to the proceeds of the Financing.

The CIMH, the Implementing Agency, now wishes to procure consultancy services for the Weather Research and Forecasting (WRF) Model Training.

The objective of the consultancy is to build regional capacity to implement the WRF Modeling Platform at the national level to support operational hydro-meteorological forecasting. Further details can be found in the attached Terms of Reference (Appendix 1). The duration of the assignment is expected to be for a period of *4 months*.

The CIMH now invites interested eligible consulting firms to submit Expressions of Interest for the provision of these consultancy services.

Consultants shall be eligible to participate if:

- (a) in the case of a body corporate, it is legally incorporated or otherwise organised in an eligible country, has its principal place of business in an eligible country and is more than 50 per cent

beneficially owned by citizen(s) and/or *bona fide* resident(s) of eligible country(ies) or by a body(ies) corporate meeting these requirements;

- (b) in the case of unincorporated firms, the persons are citizens or *bona fide* residents of an eligible country; and
- (c) in all cases, the consultant has no arrangement and undertakes not to make any arrangements, whereby any substantial part of the net profits or other tangible benefits of the contract will accrue or be paid to a person not a citizen or *bona fide* resident of an eligible country.

Eligible countries are outlined in Appendix 2 below.

The attention of interested Consultants is drawn to paragraph 1.9 of CDB's Guidelines for the Selection and Engagement of Consultants (2011), setting forth CDB's policy on conflict of interest.

In the assessment of submissions, consideration will be given to technical competence, qualifications and experience, local and regional experience on similar assignments, financial capability and existing commitments. All information must be submitted in English. Further information may be obtained from the first address below between 8:00 and 16:00 hours Monday to Friday.

Submissions in PDF format of the Expressions of Interest must be received at the email address, projects@cimh.edu.bb and copied to procurement@caribank.org, no later than 16:00 AST on Monday, 4th March, 2019. The email containing each submission should include the name and address of the applicant and shall be clearly marked "**Expression of Interest – Consultancy Services for Weather Research and Forecasting Model Training.**"

The selection method shall be Consultants' Qualifications Selection. Therefore, following the assessment of submissions, firms shall be assessed and compared, and the best qualified and experienced firm shall be selected. Only the selected firm shall be asked to submit a combined technical and financial proposal and, if such proposal is responsive and acceptable, be invited to negotiate a contract. The CIMH reserves the right to accept or reject late applications or to cancel the present invitation partially or in its entirety. It will not be bound to assign any reason for not selecting any applicant and will not defray any costs incurred by any applicant in the preparation and submission of Expressions of Interest

1. *Address 1*

Project Officer

Caribbean Institute for Meteorology and Hydrology

Husbands.

St. James BB23006

Barbados

Tel: 1-(246) 425-1362/63

Fax: 1-(246)-424-4733

Email: projects@cimh.edu.bb

2. *Address 2*

Procurement Officer

Procurement Policy Unit

Caribbean Development Bank

P.O. Box 408, Wildey

St. Michael

BARBADOS, W.I.

Tel: + (246) 431-1600

Fax: + (246) 426-7269

Email: procurement@caribank.org

TERMS OF REFERENCE

**CONSULTANCY FOR THE WEATHER RESEARCH AND FORECASTING MODEL
TRAINING**

1. INTRODUCTION

Meteorological services globally are being challenged by an increasing number of hydro-meteorological and climate related disasters. The socio-economic losses from these disasters are in the order of billions of United States dollars, and loss of life in the hundreds to thousands depending on the regions impacted. The magnitude of the losses from these events is driving the call for improved integrated early warning systems that address fundamental questions such as (a) where will the event occur? (b) what will be the nature of the event? (c) what is the expected start time and duration of the event? and (d) what are the expected impacts and losses from the event?

Key to addressing the questions posed above is the hydro-meteorological forecast. Within the last two decades, hydro-meteorological forecasts have undergone significant improvements that have improved their accuracy. It is now an industry expectation to produce accurate hydro-meteorological forecasts 72-96 hours in advance. Central to this improvement are significant advancements in numerical weather prediction models, advances in computing platforms and decreasing computational costs.

Within the Caribbean, the Caribbean Institute for Meteorology and Hydrology (CIMH) has been playing a critical role in deploying numerical weather prediction models to improve hydro-meteorological forecasts at national and regional levels. Starting in 2006, the CIMH first deployed operationally the MM5 numerical weather prediction model across the Caribbean region at 18 kilometre (km) and 54 km resolutions. The benefits of this implementation to regional forecasting was significant especially for tracking and predicting fairly large scale weather systems. In 2008, the CIMH added the Weather Research and Forecasting (WRF) Model also running at 18km and 54km resolutions into its modeling platform. This inclusion allowed inter-model comparisons to be performed by hydro-meteorological forecasters to further improvements in weather forecasts issued by National Meteorological and Hydrological Services (NMHSs) in the Caribbean.

The 18 km and 54 km resolution model outputs were particularly suited to regional level forecasting but were too coarse to capture local weather features at the watershed scale for most island states in the Caribbean. In 2010, immediately following the Haiti earthquake, the CIMH deployed a 4 km resolution model local to Haiti using the WRF ARW platform. The goal of the implementation was to predict severe hydro-meteorological events at the watershed level as part of an early warning system that may adversely impact search, rescue and recovery efforts. Outputs from the platform were incorporated into the planning activities of many organisations operating in Haiti including the International Red Cross and Red Crescent Societies.

In 2011, building on the experience of Haiti, the CIMH introduced twice daily 4km 48 hour WRF ARW region-wide simulations which allowed NMHSs to track rainfall in their areas of responsibility at the watershed level. Since 2011, run times for the WRF-based simulations have decreased from approximately 20 hours to approximately 4 hours as new computational hardware has been acquired. Improvements in computational efficiency coupled with the decreasing cost of computational platforms is providing a compelling case for NMHSs in the Caribbean to consider running their own sub 4 km local area numerical

weather prediction models. Indeed, the Belize National Weather Service currently runs a 5 km resolution version of WRF over Belize. Other NMHSs have indicated a desire to follow this trend but using CIMH outputs to drive their local forecast models.

To facilitate countries with their numerical weather prediction ambitions, the CIMH as the World Meteorological Organisation (WMO) Regional Training Centre for the Caribbean is obligated to provide them with the required level of training needed to successfully integrate numerical weather prediction into their forecasts through (a) in-class training in the Senior Level Meteorology Technicians' course; and (b) an online continuing professional development course focused on teaching NMHSs forecasters how to integrate numerical weather predictions into forecasts. This proposal seeks to advance this process by providing NMHSs with the requisite skills to use the WRF to build their own local area numerical weather prediction models.

2. The Caribbean Institute for Meteorology and Hydrology (CIMH)

The CIMH is an institution of the Caribbean Community and the technical organ of the Caribbean Meteorological Organisation (CMO). The mandate of the CIMH is to assist in improving and developing the meteorological and hydrological services as well as, providing the awareness of the benefits of meteorology and hydrology for the economic well-being of the 16 CMO Member States. This is achieved through training, research, investigations, and the provision of related specialised services and advice.

In achieving its mandate, the CIMH has established an affiliation with the UWI where its primary responsibility is the delivery of the Bachelor of Science Programme in Meteorology in the Faculty of Pure and Applied Sciences. The CIMH is also recognised by the World Meteorological Organisation (WMO) as: (i) the WMO regional training centre in the Caribbean for meteorology and hydrology and related disciplines; (ii) a regional instrument centre for the Caribbean; (iii) centre of excellence in satellite meteorology training; and (iv) the WMO regional climate centre (in demonstration phase) for the Caribbean.

In addition, the CIMH is a repository for the climate data from CMO Member States. The institute is also an important Caribbean Centre for research and development related to meteorology, hydrology, agrometeorology and climate in the Caribbean. It is active in such areas of hydrological risk impacts forecasting and agricultural risks forecasting and has had strong collaborations with other regional institutions, national organisations in CMO Member States and the international community.

Expanding Weather and Climate Forecasting and Innovative Product and Service Development and Delivery in the Caribbean Project

The CIMH is implementing the 2-year ACP-EU-CDB NDRM in CARIFORUM Countries funded ***Expanding Weather and Climate Forecasting and Innovative Product and Service Development and Delivery in the Caribbean Project***. This project outcome is expected to increase predictive capacity of national and regional institutions for weather and climate forecasting. The project component 1 is to build regional capacity to implement the Weather Research and Forecasting (WRF) Modeling Platform at the national level to support operational hydro-meteorological forecasting.

3. CONSULTANCY AIM AND OBJECTIVES

The overall objective of this assignment is to build regional capacity to implement the WRF Modeling Platform at the national level to support operational hydro-meteorological forecasting. It is expected that operationalisation of the Platform will improve the accuracy of national hydro-meteorological forecasts.

It is also expected that persons trained under this effort will be able to use the WRF Platform to re-analyse historical weather systems to better understand their genesis and impacts to strengthen national level early warning processes and impacts forecasting efforts.

4. SCOPE OF WORK

Within the framework of the Expanded Weather and Climate Forecasting *and Innovative Product and Service Development and Delivery in the Caribbean Project* in the Caribbean Project, the scope of work is to provide training to persons to operationalise the WRF platform at the national levels. It is expected that attendees will be taught:

- (a) the basis of numerical weather prediction systems including the underlying equations and assumptions;
- (b) the basics of the WRF Modeling Platform with introductions to WRF-Chemistry Model, WRF-Hydrology Model etc.;
- (c) how to install either WRF-Advanced Research WRF and/or WRF-Non-hydrostatic Mesoscale Model Modeling Platforms, associated core software including Network Common Data Form and Open-Message Passage Interface and post-processing software;
- (d) how to run the WRF system – data download, data preprocessing, execution of the WRF Platform and post-processing of the model outputs;
- (e) how to select appropriate model parameterization schemes through calibration activities; and
- (f) how to interpret model outputs.

5. CONSULTANT DELIVERABLES AND INDICATIVE SCHEDULE

1.	An Inception Report (inclusive of work plan, minimum requirements for students to take part in the course, certification for course participants, hardware and software requirements for the course)
2.	A Training syllabus
3.	A Training Manual and the delivery of training to selected participants
4.	A Training Report

6. QUALIFICATIONS

The Consultant is required to have recognised credentials (with strong preference being given to candidates with MSc and PhD degrees) in either Meteorology, Physics and/or Applied Mathematics. Candidates with degrees in other related fields will be given consideration based on their experience. In addition, the Consultant must have:

- (a) more than ten years of experience delivering training in area of atmosphere modeling and the application of numerical models to hydro-meteorological and impacts forecasting;
- (b) at least five years experience implementing WRF Platforms;
- (c) awareness of the challenges associated with hydro-meteorological and impacts forecasting on Small Island Developing States (SIDS); and
- (d) experience working with developing countries and in particular SIDS.

7. DURATION

The contract is expected to be completed within 4 months.

EUROPEAN UNION ELIGIBILITY RULES
AFRICAN CARIBBEAN PACIFIC – EUROPEAN UNION
NATURAL DISASTER RISK MANAGEMENT

PARTICIPATION IN PROCEDURES FOR THE AWARDING OF
PROCUREMENT CONTRACTS OR GRANT CONTRACTS

1. Participation in procedures for the award of procurement contracts financed under the EU Contribution Agreement for the Implementation for the Action entitled: “Africa Caribbean Pacific – European – Caribbean Development Bank (ACP-EU-CDB) Natural Disaster Risk Management in CARIFORUM Countries” (ACP – EU NDRM Resources)”, is open to international organisations and all natural persons who are nationals of, or legal persons who are established in, an eligible country.

2. Eligible countries¹ are deemed to be:

(a) Caribbean Development Bank member countries:

Anguilla, Antigua and Barbuda, Barbados, Belize, Brazil, British Virgin Islands, Canada, Cayman Islands, China, Columbia, Dominica, Germany, Grenada, Guyana, Haiti, Jamaica, Italy, Mexico, Montserrat, St Kitts and Nevis, Saint Lucia, St Vincent and the Grenadines, Suriname, The Bahamas, Trinidad and Tobago, Turks and Caicos Islands, the United Kingdom and Venezuela.

(b) Members of the “African, Caribbean and Pacific (ACP) Group of States”²:

Africa:

South Africa³, Angola, Benin, Botswana, Burkina Faso, Burundi, Central African Republic, Cameroon, Cape Verde, Chad, Comoros Islands, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Djibouti, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Equatorial Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritius, Mauritania, Mozambique, Namibia, Niger, Nigeria, Uganda, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, Sudan, Swaziland, Tanzania, Togo, Zambia and Zimbabwe.

¹ Note some countries may be eligible by virtue of more than one category

² Cotonou Partnership Agreement of 23 June 2000 (as amended by the provisional application of Decision No 1/2000 of the ACP-EC Council of Ministers of 27 July 2000, Decision No 1/2000 of the ACP-EC customs cooperation committee of 18 October 2000, Decision No 1/2001 of the ACP-EC customs cooperation committee of 20 April 2001, Decision No 2/2001 of the ACP-EC customs cooperation committee of 20 April 2001, Decision No 3/2001 of the ACP-EC customs cooperation committee of 10 May 2001, Decision No 4/2001 of the ACP-EC customs cooperation committee of 27 June 2001, Decision No 5/2001 of the ACP-EC customs cooperation committee of 7 December 2001, Decision No 2/2002 of the ACP-EC customs cooperation committee of 28 October 2002, Decision No 1/2003 of the ACP-EC Council of Ministers of 16 May 2003, Council Decision (EC) of 19 December 2002, Decision No 1/2004 of the ACP-EC Council of Ministers of 6 May 2004, Decision No 2/2004 of the ACP - EC customs cooperation committee of 30 June 2004 and Decision No 4/2005 of the ACP-EC customs cooperation committee of 13 April 2005).

³ Natural and legal South African persons are eligible to participate in contracts financed by the 10th/11th EDF. However, the 10th/11th EDF does not finance contracts in South Africa.

Caribbean:

Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago.

Pacific:

Cook Islands, East Timor, Fiji, Kiribati, Marshall Islands, Micronesia, Nauru, Niue, Palau, Papua New Guinea, the Solomon Islands, Western Samoa, Tonga, Tuvalu, Vanuatu.

Overseas Countries and Territories:

Anguilla, Antarctic, Netherlands Antilles, Aruba, British Indian Ocean Territory, British Virgin Islands, Cayman Islands, Falkland Islands (Malvinas), French Polynesia, French Southern Territories, Greenland, Mayotte, Montserrat, New Caledonia, Pitcairn, Saint Helena, Saint Pierre and Miquelon, South Georgia and South Sandwich Islands, Turks and Caicos, Wallis and Futuna Islands.

- (c) A Member State of the European Union:

Austria, Belgium, Bulgaria, Croatia, Czech republic, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom.

An official candidate country of the European Union:

The Former Yugoslav Republic of Macedonia, Turkey, Iceland, Montenegro.

A Member State of the European Economic Area: Iceland, Lichtenstein, Norway.

- (d) All natural persons who are nationals of, or legal persons who are established in, a Least Developed Country as defined by the United Nations:

Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Dem. Rep. Congo, Equatorial Guinea, Eritrea, Ethiopia, Guinea, Guinea-Bissau, Haiti, Kiribati, Lao PDR, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, Djibouti, Solomon Islands, Somalia, South Sudan, Sudan, Tanzania, The Gambia, Timor-Leste, Togo, Tuvalu, Uganda, Vanuatu, Yemen, Rep. and Zambia.

- (e) Participation in procedures for the award of procurement contracts or grants financed from the Facility shall be open to all natural persons who are nationals of, or legal persons established in, *any country other than those referred to in paragraph 1, where reciprocal access to external assistance has been established*. Reciprocal access in the Least Developed Countries as defined by the United Nations (UN) shall be automatically granted to the OECD/DAC members: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States.

3. Services under a contract financed from the Facility may be provided by experts of any nationality, without prejudice to the qualitative and financial requirements set out in the Bank's procurement rules.

4. Supplies and materials purchased under a contract financed from the Facility must originate in a State that is eligible under paragraph 1. In this context, the definition of the concept of 'originating products' shall be assessed by reference to the Bank's prevailing procurement guidelines/procedures, and supplies originating in the EU shall include supplies originating in the Overseas Countries and Territories.

5. Whenever the Facility finances an operation implemented through an international organisation, participation in procedures for the award of procurement contracts or grants shall be open to all natural and legal persons who are eligible under paragraphs 1, care being taken to ensure equal treatment of all donors. The same rules apply for supplies and materials.

6. Whenever the Facility finances an operation implemented as part of a regional initiative, participation in procedures for the award of procurement contracts or grants shall be open to all natural and legal persons who are eligible under paragraph 1, and to all natural and legal persons from a country participating in the relevant initiative. The same rules apply for supplies and materials.

7. Whenever the Facility finances an operation co-financed with a third entity, participation in procedures for the award of procurement contracts or grants shall be open to all natural and legal persons eligible under paragraph 1, and to all persons eligible under the rules of the third entity. The same rules shall apply to supplies and materials.

Caveat: The Bank and EU eligibility requirements are subject to change by the Bank and the EU. The applicant is responsible for checking whether there have been any updates on the eligibility requirements, as well as the UN's list of Least Developed Countries.