Press Release EUREC4A (Jan. 2020)

From January 6 - February 22, 2020, Caribbean ocean and atmospheric scientists will be working with several hundred international counterparts and support personnel drawn from over forty institutions located primarily in France, Germany, the USA, and the UK to execute the "Elucidating the Role of Clouds-Circulation Coupling in Climate (EUREC^{4}A)" field campaign which, though focused east of Barbados, extends as far south as Suriname. EUREC^{4}A represents one of the most significant and complex ocean-atmosphere field campaigns in the Atlantic Ocean in several decades and supports the World Climate Research Programme's Grand Science Challenge on Clouds, Circulation and Climate Sensitivity.

EUREC^{4}A is designed to test mechanisms through which clouds in the trade-winds are hypothesized to change in ways that amplify global warming. It's measurements will significantly enhance scientific understanding of the role of Trade-wind cumuli, which represent the most frequent cloud occurrence on Earth and are commonly observed in the Caribbean. Data collected during the field campaign will form the basis for significant improvements to our understanding of tropical meteorology which will lead to significant enhancements to the predictive capability of existing regional and global weather and climate forecasting models. Outputs from these models will risk-inform disaster risk reduction and sector planning activities globally as well as inform investments to enhance long term climate resilience activities in key socio-economic sectors.

EUREC^{4}A is motivated bypreviously successful field campaigns near Barbados including the Next-generation Aircraft Remote Sensing for VALidation studies (NARVAL)-1 and NARVAL-2 conducted by theMax Planck Institute for Meteorology (Hamburg, Germany) and CIMH in January 2013 and August 2016 respectively and the success of the Barbados Cloud Observatory (BCO), a globally unique data collection platform jointly operated by the Max Planck Institute for Meteorology, the CIMH and the Museum of Barbados. The BCO has collected, and made freely available, an extensive and unique set of daily atmospheric measurements across multiple instrument platforms since its establishment in 2009 at Deebles Point, St. Philip.

Two related field campaigns will run concurrent with the EUREC^{4}A campaign and contribute to its overarching goals

- The Atlantic Tradewind Ocean–Atmosphere Mesoscale Interaction Campaign (ATOMIC) is a NOAA (US) funded field study to investigate atmospheric shallow convection and air-sea interaction in the tropical North Atlantic east of Barbados. During January–February 2020, this NOAA-led effort will deploy instruments from a research ship and an aircraft to measure key cloud and air-sea interaction processes that are needed to improve understanding and prediction of the impacts of shallow convection on weather and climate conditions. (https://www.esrl.noaa.gov/psd/atomic/)
- EUREC4A-OA is an European (primarily French German) funded effort aiming for a better understanding of the coupling of the ocean and atmosphere. It's measurements

offers the opportunity to evaluate and improve an emerging generation of coupled models capable of resolving phenomena on scales of a few kilometers. These models recognized that both shallow convection and its mesoscale signature influence and are influenced by their interaction with the ocean. EUREC^{4}A-OA will investigate interactions between the ocean and atmosphere using four ships located in the Atlantic from east of Barbados down to the Guyanas. The ships, possibly complemented by Caribbean vessels, will investigate a range of oceanic phenomena include the thermal structure of the Atlantic, ocean eddies and ocean chemistry. The ships will also investigate the drivers of sargassum in the Atlantic Ocean near the Caribbean island chain. (http://eurec4a.eu/index.php?id=5201&L=0)

The EUREC^{4}A field campaign will be supported by a suite of platforms (see http:/eurec4a.eu for detailed information). Regional personnel are being incorporated into all data collection platforms to the extent possible. The platforms include

- Four research ships including two ships from Germany (the Meteor and the Maria S Merian) and one ship each from the USA (Ronald H. Brown) and France (Atalante) respectively. A 5th ship will be provided by the Barbados Coast Guard as required.
- Four research aircraft including one each from the UK (Twin Otter from the British Antarctic Survey), the USA (WP-3D Orion "Hurricane Hunter" from NOAA), Germany (Gulfstream G550 “high altitude and long-range research aircraft” from DLR) and France (ATR-42 from SAFIRE). A 5th aircraft will be made available upon request from the CARICOM Regional Security System.
- New and established aerial drone technologies will be incorporated into the data collection system — Boreal (France), and CloudKite (Germany) are specialized research platforms,and will be complemented by a handful of small drones that can be launched from the ship-decks. Experimental drone platforms from the CIMH and Poland will also be incorporated into the drone data collection framework.
- New and novel marine drone platforms will also be integral to the data collection platforms including Saildrone, Seaglider and Autonaut technologies.

Caribbean participation in the EUREC4A, ATOMIC and OA programmes is coordinated by a scientific and technical team from CIMH lead by its Principal, Dr. David Farrell. The team includes research meteorologists, instrument specialists and research interns. Other Caribbean participants are drawn from:

- The climate and environmental research staff at the University of the West Indies who will take part in various research activities including ship and airborne data collection activities.
- National Meteorological and Hydrological Services from Member States of the Caribbean Meteorological Organization who will imbed staff in teams to support (i) the delivery of specialized weather and marine forecasts to risk-inform the daily operational activities of the various data collection platforms and (ii) evaluation of the accuracy of high-resolution numerical weather prediction models from leading global and regional modeling centres that will be running models over the EUREC4A data collection domain.

- The Institute for Marine Affairs (Trinidad and Tobago) will participate as an observer in the campaign but is expected to utilize data collected for marine research.
- The Barbados Defence Force (BDF) which will contribute personnel and marine observation platforms to support data collection. In addition, the BDF will provide work space and equipment to support the launch of remote marine observation platforms that will support estimating ocean-atmosphere exchanges.
- The CARICOM Regional Security System (RSS) will contribute aircraft to support ocean and atmosphere observations important to the project.

The EUREC^{4}A campaign will make significant contributions to how the region monitors, manages and reports on its natural environment. The campaign is already inspiring and building the next generation of Caribbean ocean and atmospheric scientists through the integration of early career scientists and interns in its various field activities. This is leading to new research partnerships and collaborations that are facilitating and enhance knowledge and technology transfers. The significant amount of data being collected by the campaign will be made freely available through a number of public sources including CIMH. It is expected that regional scientists will utilize this data to advance hydro-meteorological, climate and ocean scientific research in the region over at least the next one to two decades paving the way for improved climate change projections for the latter part of the 21st century that will shape future climate adaptation strategies. The combination of expanded capacity and partnerships along with the significant increase in available data is expected to lead to an increase in research publications authored by scientists from the region.

The data collected under the campaign will also support either establishing new or updating existing baselines for ocean and atmospheric parameters. The data collected will allow the thermal and chemical structure of the Atlantic Ocean near the Caribbean to be determined and answer key science and policy questions including those related to how this structure influences atmospheric process; the sources and drivers of freshwater fluxes from South America to the Caribbean. Exposure to the EUREC^{4}A field campaign is expected to drive innovations that will transform the region's ocean and atmosphere data collection platforms. It is expected that some new and novel technologies that will be introduced to the region under the EUREC^{4}A campaign will be implemented and mainstreamed by regional and national agencies and institutions.

While the primary focus of EUREC^{4}A will be on the collections of scientific data, an important component of campaign will focus on youth engagement and innovation. In this regard, scientists engaged in campaign will work with the Barbados Ministry to Education to develop school engagement programmes. Such engagements will include student visits to research aircraft and ships and campaign scientists visiting schools to facilitate weather and climate awareness engagement discussions.

The EUREC^{4}A campaign will celebrate the 50th anniversary of the Barbados Oceanographic and Meteorological Experiment (BOMEX - https://www.eol.ucar.edu/field_projects/bomex) conducted in 1969 with a 3-day symposium (January 31 - February 2, 2020) at the CIMH and

other venues that will be announced in near future. The symposium will revisit BOMEX and its global significance through presentations and discussions from local and international scientists who participated in the campaign. In addition, the symposium will feature a cadre of leading ocean and atmospheric researchers who will discuss the current state-of-the-art in weather, climate and ocean science and future campaigns to address other emerging challenges essential to improving climate and hydro-meteorological predictions, impact-based forecasting and adaptation to climate change. In addition to these activities, regional and international participating scientists will engage in a series of public lectures in addition to conducting a series of capacity development workshops.

The organization and planning of the EUREC^{4}A campaign has benefited significantly from funding provided by the 16 Members of the Caribbean Meteorological Organization to facilitate the operation of the CIMH as a regional specialized Institution that supports training, research and development in the meteorology, climatology, hydrology, climate data collection and archiving. EUREC^{4}A has benefited from the generosity of the Government of Barbados which has facilitated the campaign through the timely actions of its various Ministries to facilitate the campaign and its willingness to facilitate the operation of key atmospheric monitoring platforms over the last 50 years including the Barbados Cloud Observatory, the University of Miami Sahara Dust Research Laboratory and the Advanced Global Atmospheric Gases Experiment (AGAGE) at Ragged Point, St. Philip. The campaign has also benefited from the willingness of regional governments (in particular, Barbados, Trinidad and Tobago, Guyana and Suriname) to allow the various campaign assets to collect data in their respective Exclusive Economic Zone.