Transitioning to a Sectoral Risk-Based and Innovation Paradigm – The CIMH Experience

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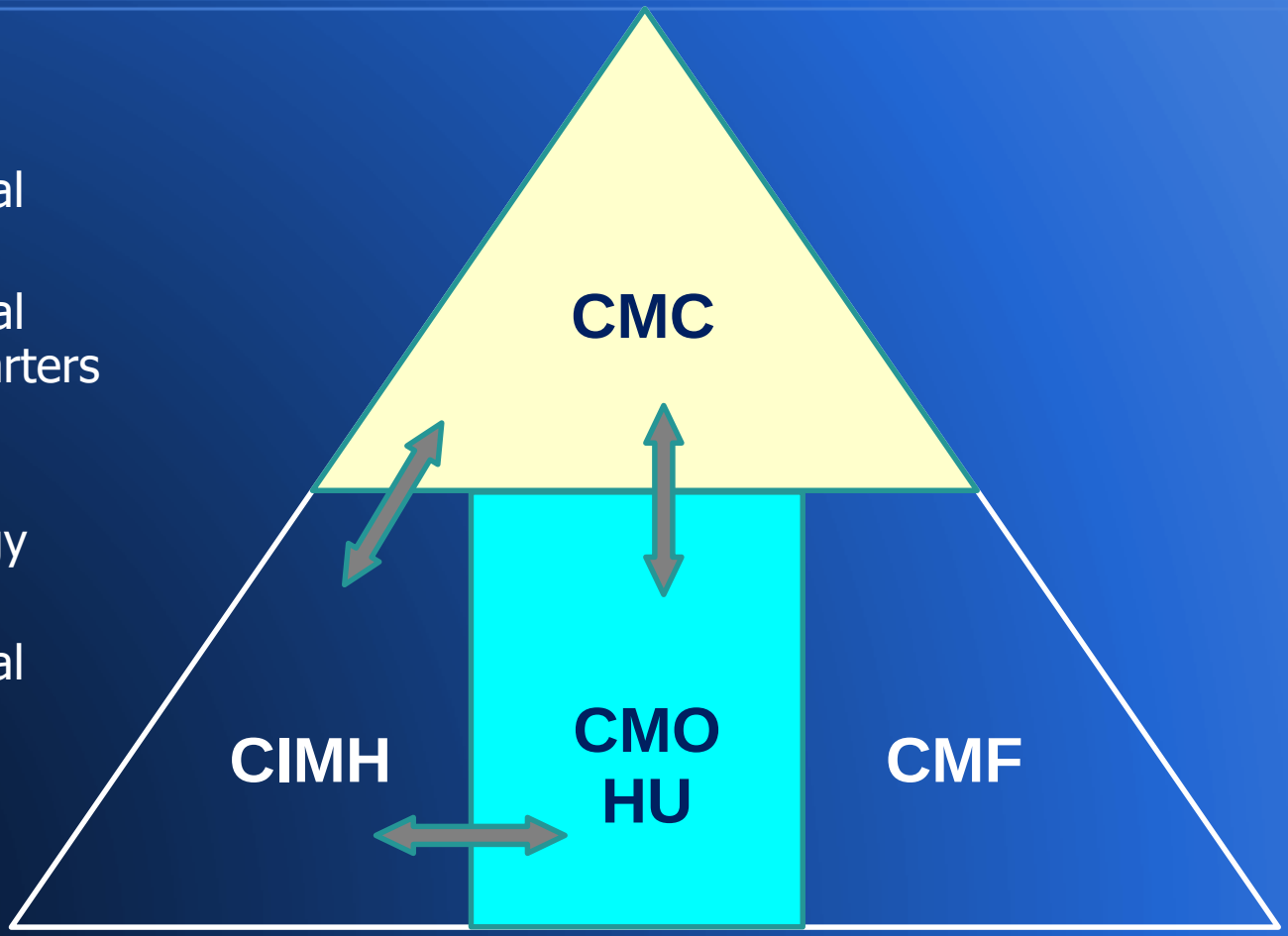
Understanding Risk Caribbean
2019

Caribbean Meteorological Organization

Organs

- Caribbean Meteorological Council (CMC)
- Caribbean Meteorological Organization – Headquarters Unit (CMO-HU)
- Caribbean Institute for Meteorology & Hydrology (CIMH)
- Caribbean Meteorological Foundation (CMF)



The CIMH, formerly the Caribbean Meteorological Institute (CMI), has been **delivering uninterrupted service to the Caribbean for 50 years** … Guaranteed longterm partner.

The Caribbean Meteorological Organization

Membership

- Anguilla
- Antigua and Barbuda
- Barbados
- Belize
- British Virgin Islands
- Cayman Islands
- Dominica
- Grenada
- Guyana
- Jamaica
- Montserrat
- St. Kitts/Nevis
- Saint Lucia
- St. Vincent and the Grenadines
- Trinidad and Tobago
- Turks and Caicos Islands

CIMH Mandate: "… 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 CMO Member States. This is ***achieved through training, research, investigations and the provision of related specialized services and advice***".

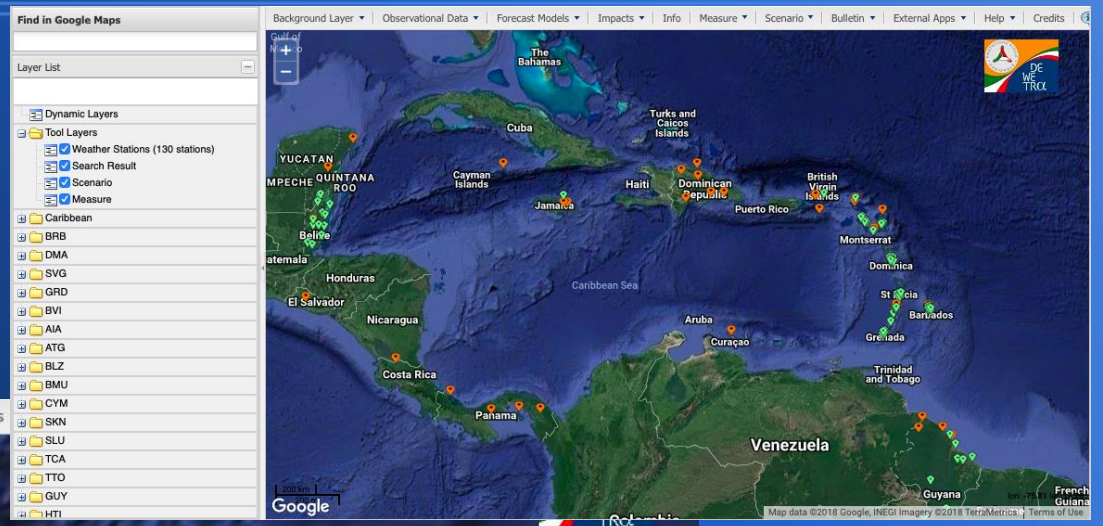
Functions of the Caribbean Institute for Meteorology & Hydrology

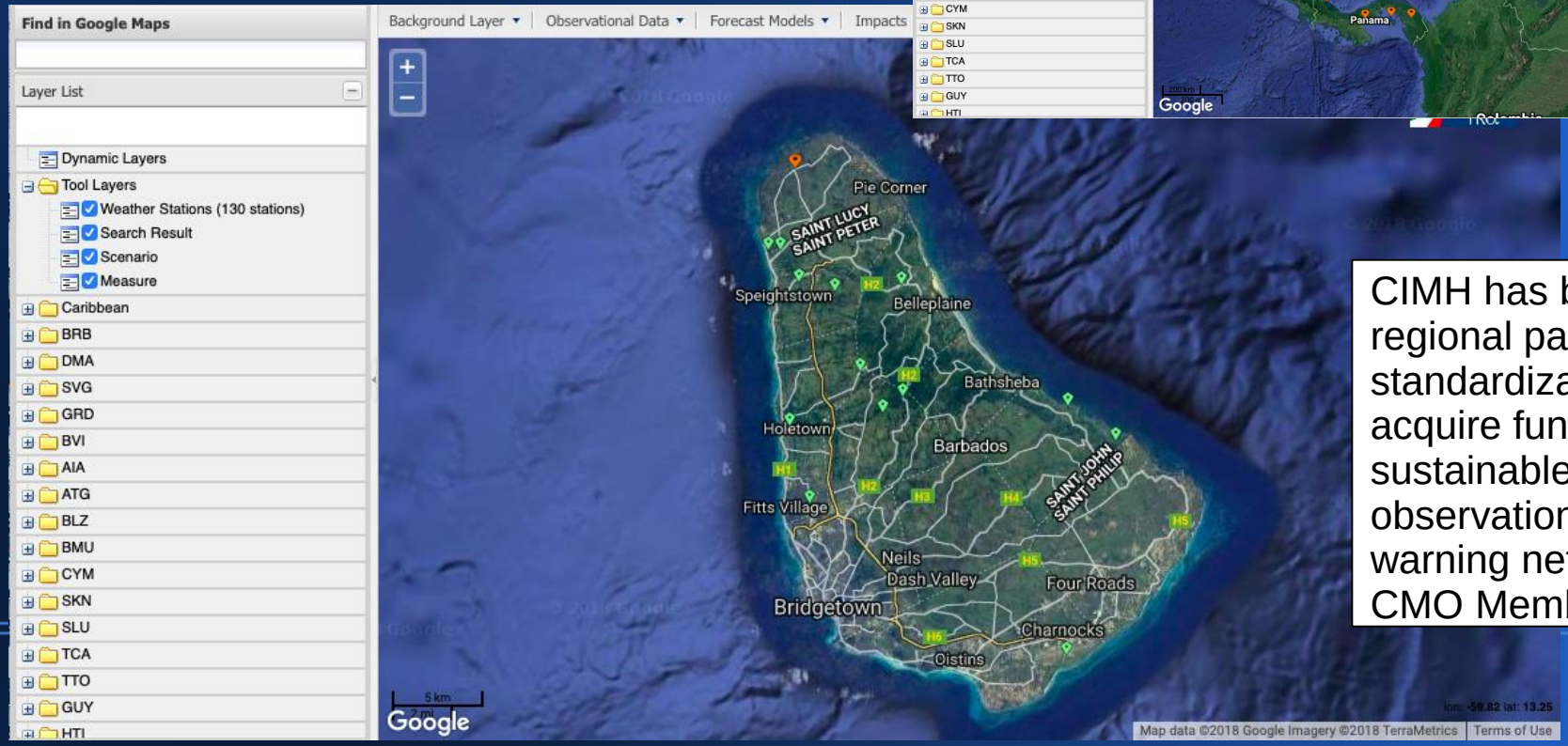
- WMO Regional Training Centre - Train various categories of meteorological and hydrological personnel including forecasters
- Operate as a centre of research in meteorology, hydrology and associated sciences
- Regional Climate Data Centre - Data collection, storage, & dissemination
- Regional Instrument Centre – Develop, maintain, repair, and calibrate meteorological & hydrological instruments
- Regional Centre of Excellence for Training in Satellite Meteorology
- WMO Regional Climate Centre
- Caribbean Centre for Climate and Environmental Simulations

- WMO Pan American Centre for Sand & Dust Storm Warning Advisory and Assessment System (SDS-WAS)
- Advisor to regional governments on matters related to meteorology, climate & hydrology
- Provide specialized services to industry

Understanding Risk - Enhanced Real-time Observation Networks

- Networks support early warning;
- Data are supporting evidence-based decision-making to enhance weather and climate resilience;
- Regional/national network standardization is resulting in economies of scale leading to cost saving that are being reinvested to increase network sustainability.

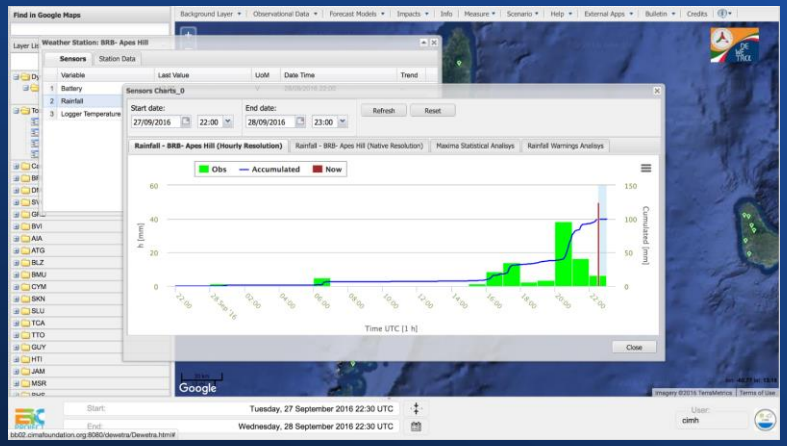




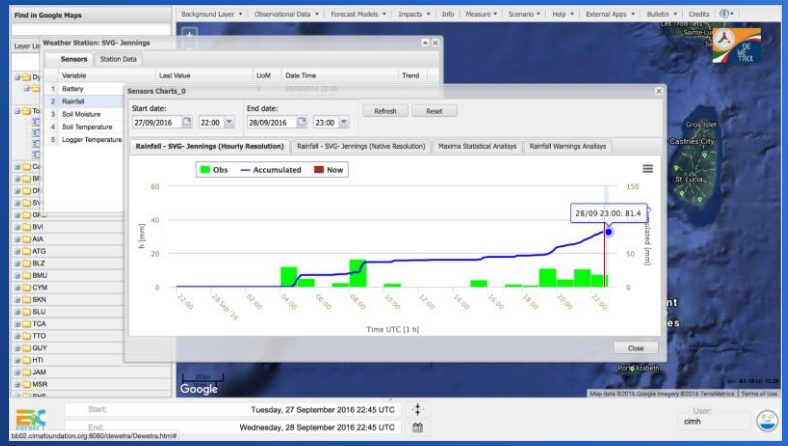
CIMH has been working regional partners to promote standardization and to acquire funds to facilitate the sustainable expansion of the observation and early warning networks across CMO Member States.

Understanding Risk - Enhanced Real-time Observation Networks

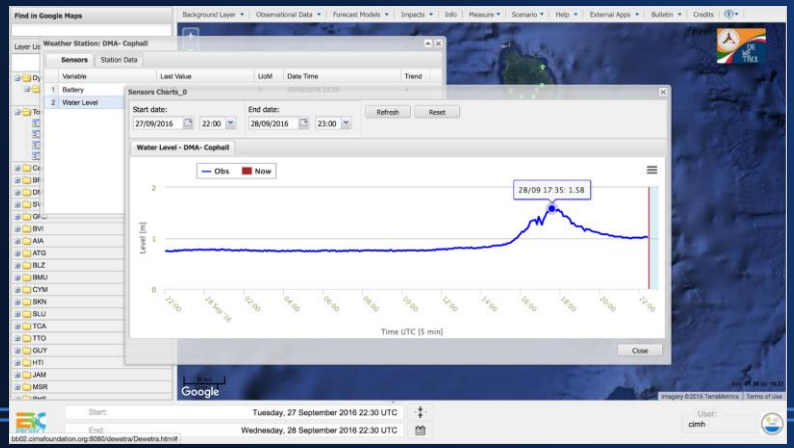
Caribbean Dewetra Platform – Tropical Storm Matthew



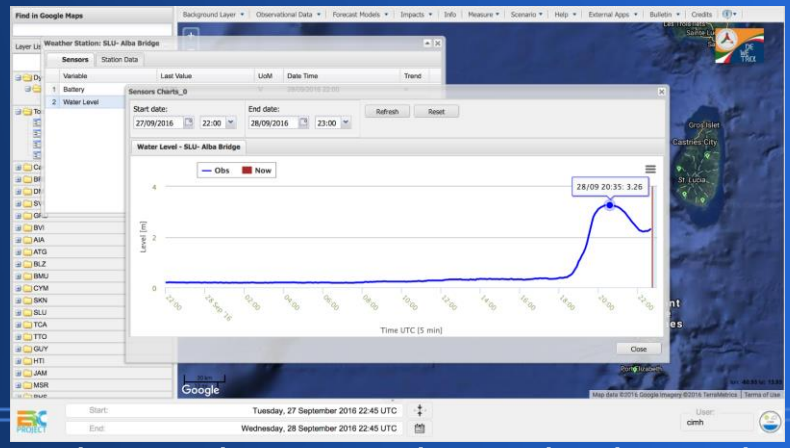
Observed rainfall at the station located at Apes Hill, Barbados



Observed rainfall at the station located at Jennings, Saint Vincent



Observed stage at the station located at Cop Hall, Dominica

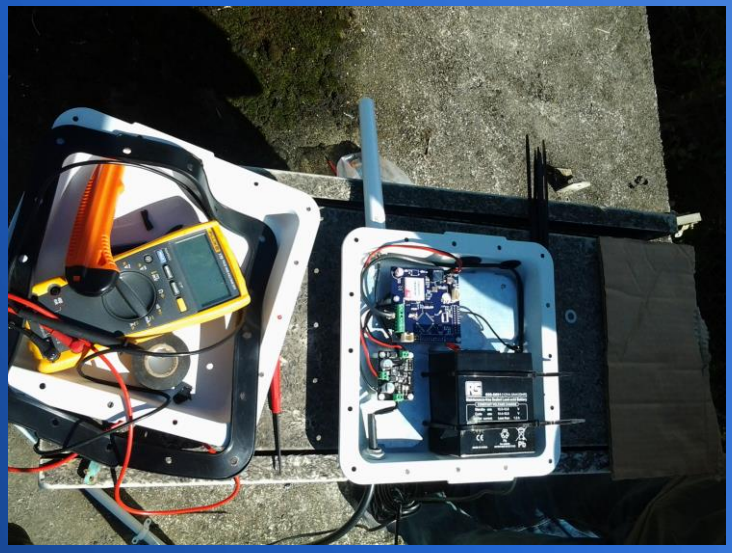


Observed stage at the station located at Alba Bridge, Saint Lucia

Understanding Risk - Enhanced Real-time Observation Networks

CIMH has been working with the international research community to develop and test low cost reliable hydro-meteorological stations that:

- Augment existing national and regional hydro-meteorological networks;
- Support monitoring in high-risk environments.



- Station designs are open and, as a result, the stations can be reproduced and managed at the local and/or community level;
- Stations can be rapidly deployed to re-establish compromised network;
- Some States are exploring the idea of using stations to rapidly expand their network in a sustainable manner.

Understanding Risk – From Data Services to Integrated Climate Services

CIMH has a long history of collecting, quality assuring, archiving and disseminating climate data for many CMO Member States that support:

- National projects including climate adaptation and other forms of risk mitigation actions;
- Academic research;
- Commercial activity.

In 2007, CIMH transitioned from a data services to a model based on developing sectoral products and services from its extensive data archive and data collection networks with the initial focus being its core competencies:

- Agro-meteorological services;
- Water related services;

Transition predated the WMO led Global Framework for Climate Services (GFCS) launched at the 2009 3rd World Climate Conference.

Caribbean Drought and Precipitation Monitoring Network (CDPMN) developed to address the emerging drought risk in the region. Launched in 2009 ahead of schedule due to the emerging regional societal impacts from the 2009-2019 drought.

- CIMH is currently the only WMO designated Regional Climate Centre in North America, Central America and the Caribbean – develops new products/services to mitigate risk.
- CIMH coordinates the Caribbean Climate Outlook Forum (CariCOF) with support from the international community – delivers climate information to at risk sectors.

Understanding Risk – From Data Services to Integrated Climate Services


PROGRAMME FOR BUILDING REGIONAL CLIMATE CAPACITY IN THE CARIBBEAN (BRCCC PROGRAMME)

First (1st) Meeting of the Consortium of Regional Sectoral EWISACTs Coordination Partners

Meeting Report


THE PROGRAMME FOR BUILDING REGIONAL CLIMATE CAPACITY IN THE CARIBBEAN (BRCCC PROGRAMME)

Second (2nd) Meeting of the Consortium of Regional Sectoral EWISACTs Coordination Partners

Meeting Report

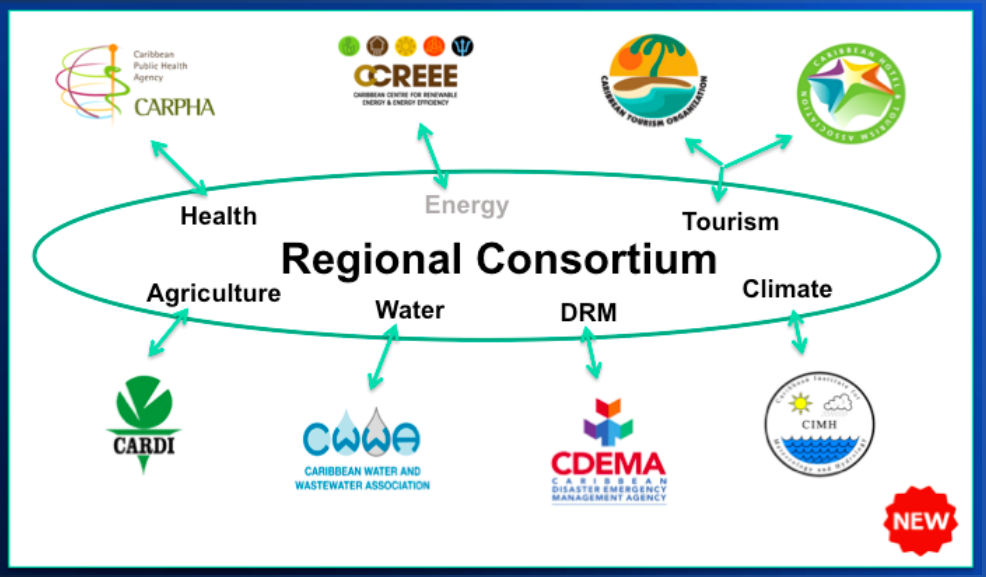

THE PROGRAMME FOR BUILDING REGIONAL CLIMATE CAPACITY IN THE CARIBBEAN (BRCCC PROGRAMME)

Third (3rd) Meeting of the Consortium of Regional Sectoral EWISACTs Coordination Partners

Meeting Report

Regional EWISACTs Consortium

The Consortium is a key regional mechanism to advance the design, development and delivery of tailored climate products and services in the agriculture and food security, disaster risk management, energy, health, tourism and water sectors.



- CIMH expects the CCREEE to sign the Regional Consortium in the near future;
- CIMH is working with partners to extend the EWISACTs Consortium for a further 3 years through a modification to the governing MoU;
- Roadmap for the development and delivery of climate services in the region under development.


CTO and CHTA sign the LoA, September 16th, 2016

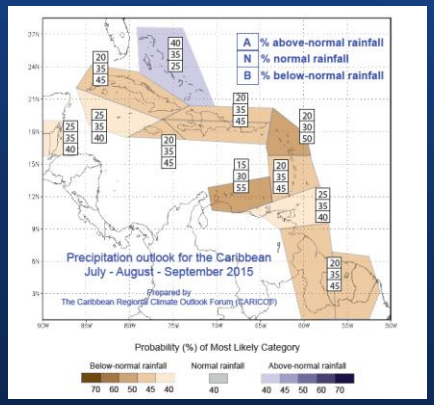

CWWA signs the LoA, October 26th, 2016

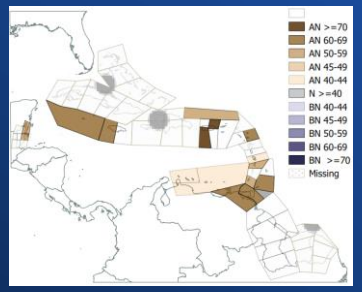
CARDI and CDEMA sign the LoA, December 6th, 2016

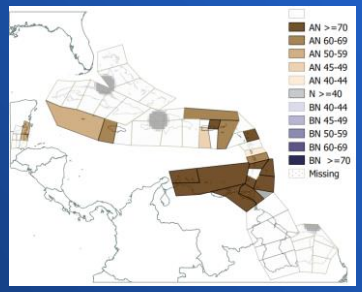

CARPHA and CIMH sign the LoA, April 26th, 2017

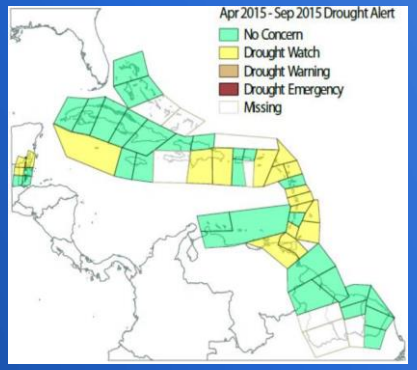
Understanding Risk – From Data Services to Integrated Climate Services

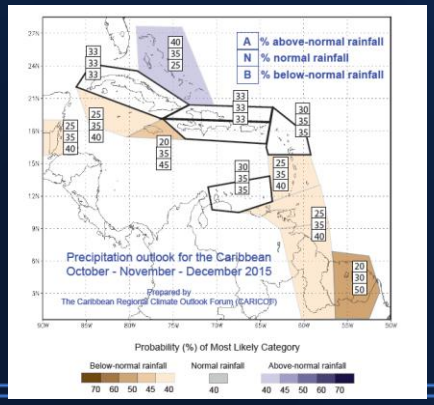
Examples of CIMH Consensus Long-range Climate Forecasts

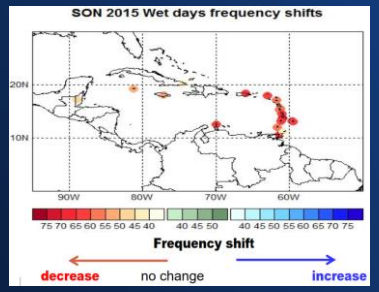


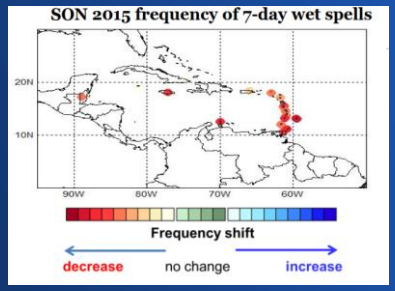


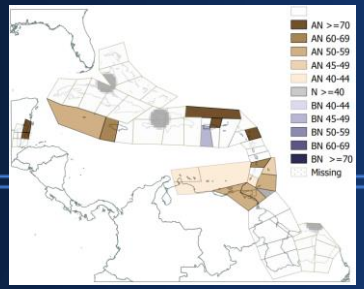


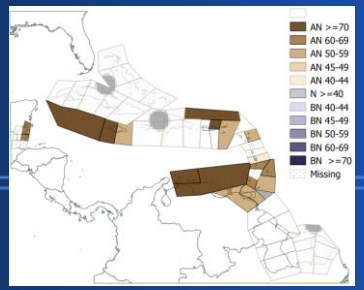


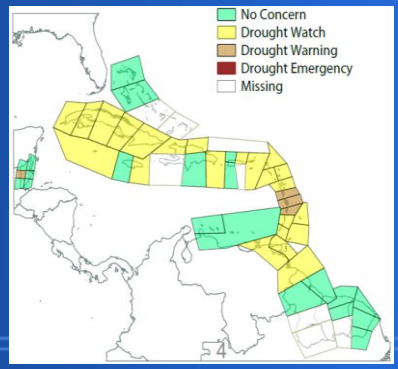






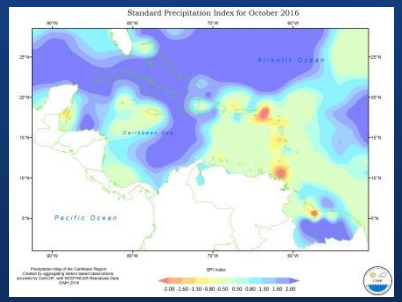


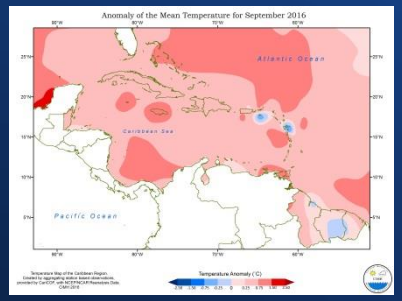


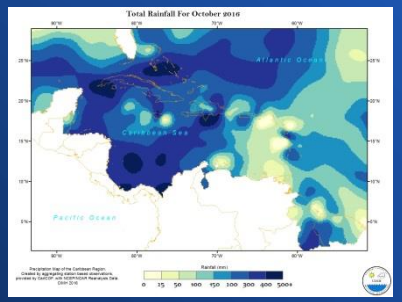


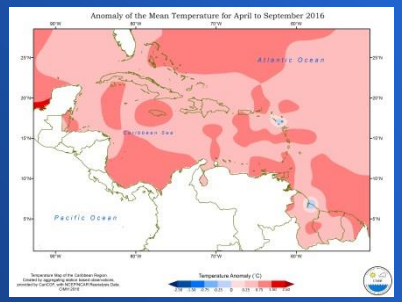
Understanding Risk – From Data Services to Integrated Climate Services

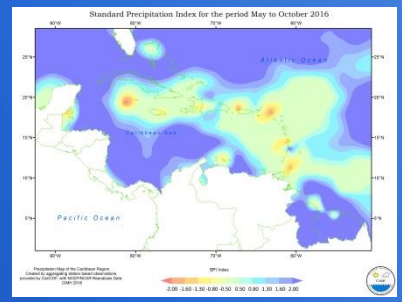
Examples of CIMH Climate Monitoring Products

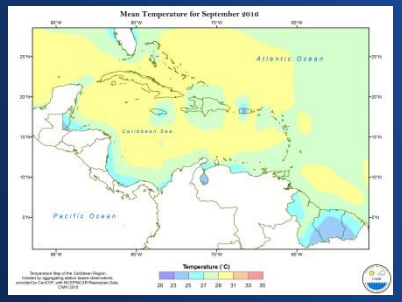


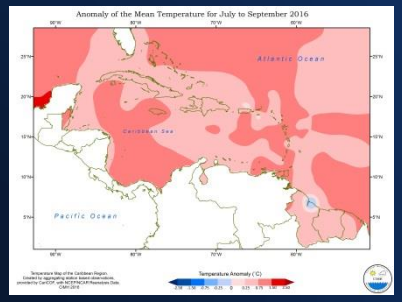


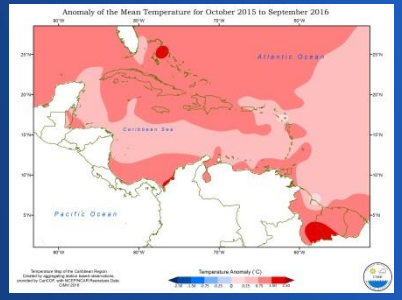


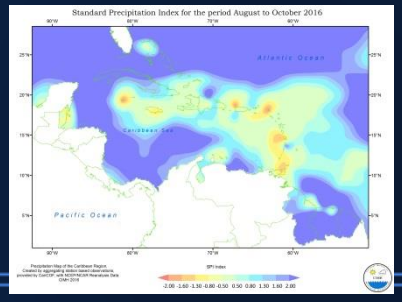


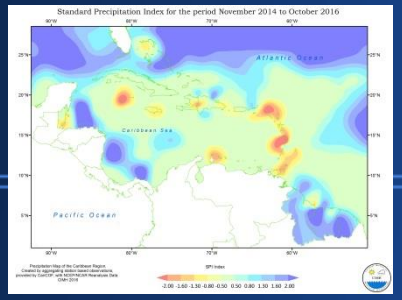


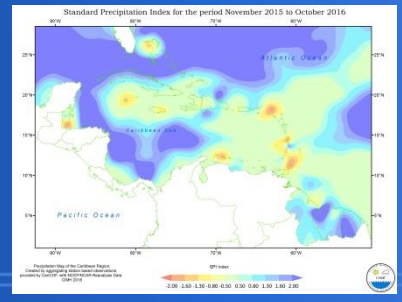






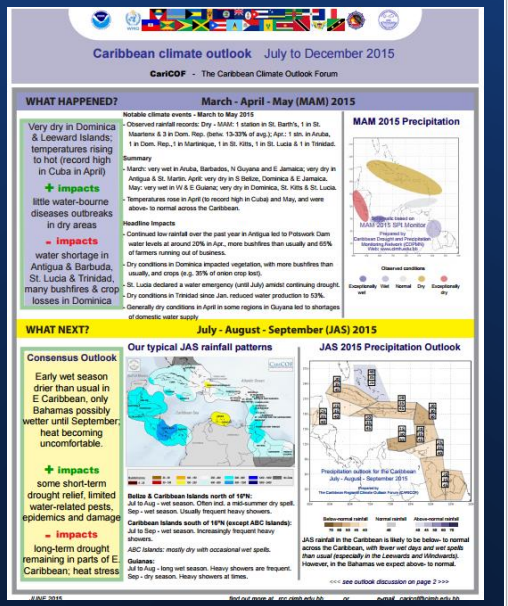




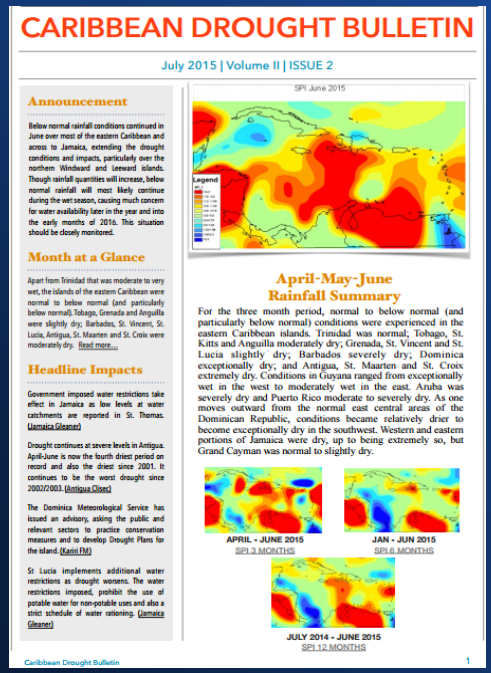


Understanding Risk – From Data Services to Integrated Climate Services

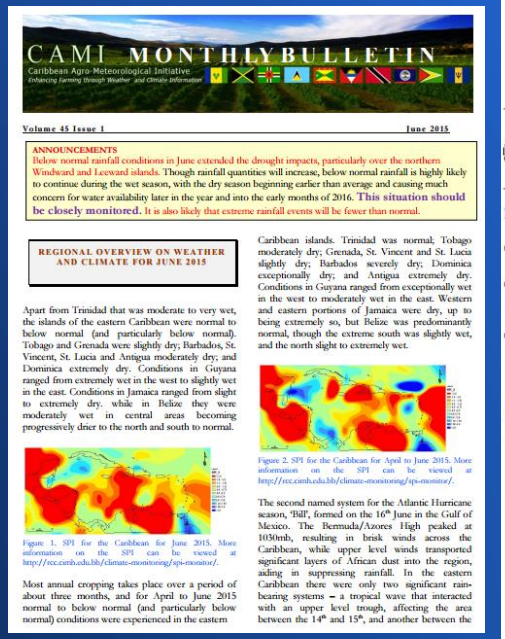
Examples of CIMH Communicating Climate Risk Information to Sectors



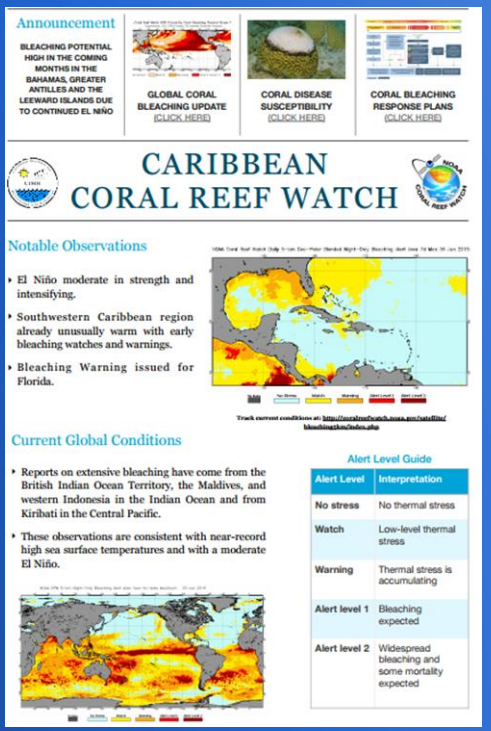
CariCOF Newsletter



Bulletin of the Caribbean Drought and Precipitation Monitoring Network



Regional Agroclimatic Bulletin



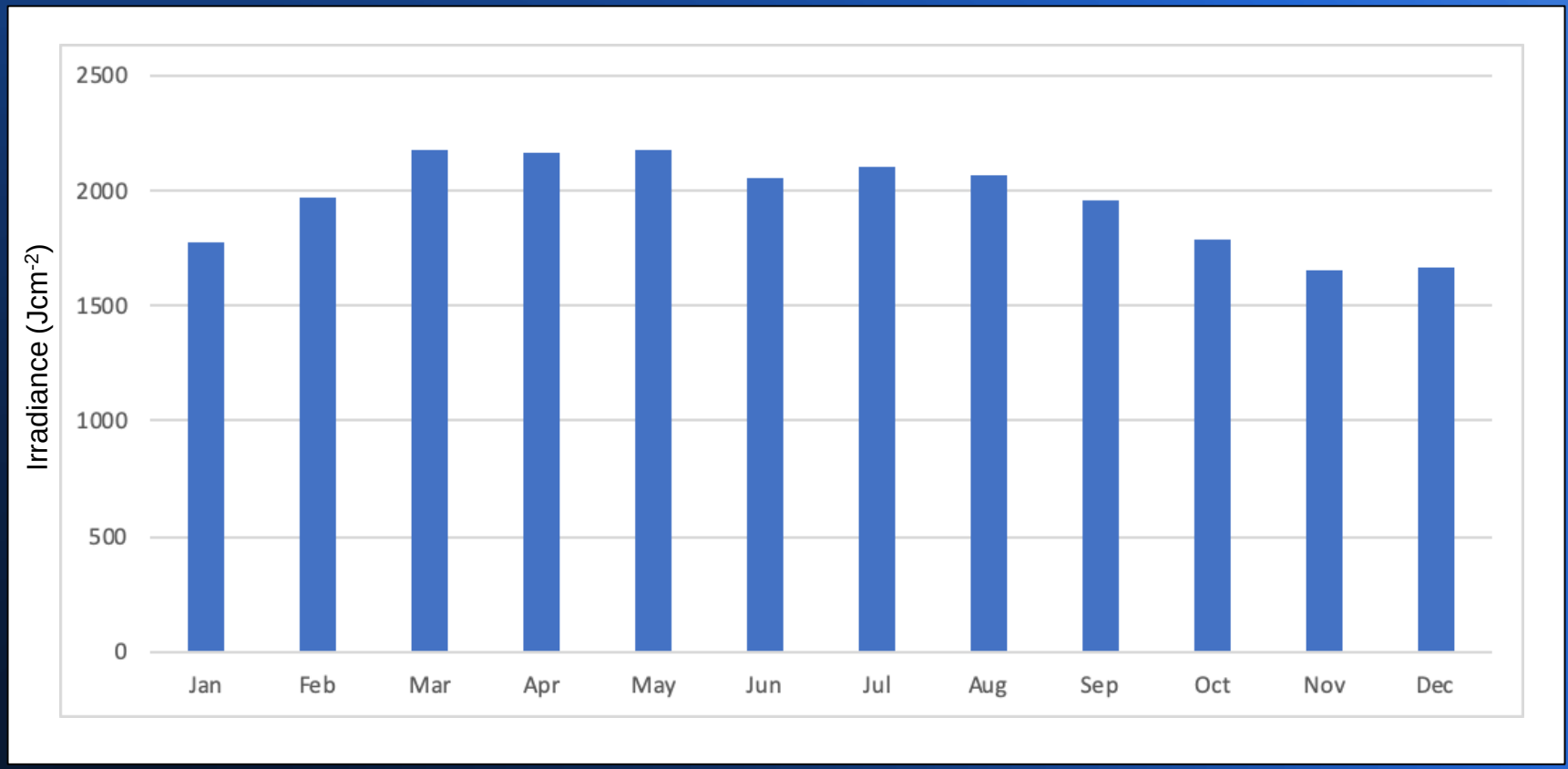
Caribbean Coral Reef Watch

Understanding Risk – Energy Sector

Over the last 2 years, CIMH has been working with the regional energy to assess and mitigate sector risk that may limit investments, impact the performance of investments and the cost of resources with focus areas being renewable energy and fossil fuels.

Energy Sector	Hydro-climatic Vulnerabilities
Fossil Fuels	• High winds, high waves/storm surge and flooding limiting production, and transport; • Climate shocks in external markets limit availability.
PV Solar	• High winds damaging installations; • Cloudiness and high aerosols concentrations limiting incoming radiation; • Elevated temperatures reducing PV panel performance; • Flooding and landslides potentially damaging poorly sited installations.
Wind	• High winds limiting turbine operations and safety of operations;
Hydro-electric	• Drought limiting water in reservoirs and flows to intakes; • Flash flooding due to rapid onset deep convective events; • High temperatures causing high evaporation rates; • Landslides impacting reservoirs and water siltation of intake waters
Geothermal	• Drought limiting volume of water available for injection; • Landslides (i) directly impacting site facilities; (ii) indirectly impacting the quality of water to be injected (high siltation); and (iii) limiting access to the sites
Ocean Technologies	• Sea level rise limiting infrastructure performance • High winds damaging infrastructure; • Significant wave heights/storm and surge damaging infrastructure; • Coastal flooding from runoff flooding infrastructure or limiting access to the site.

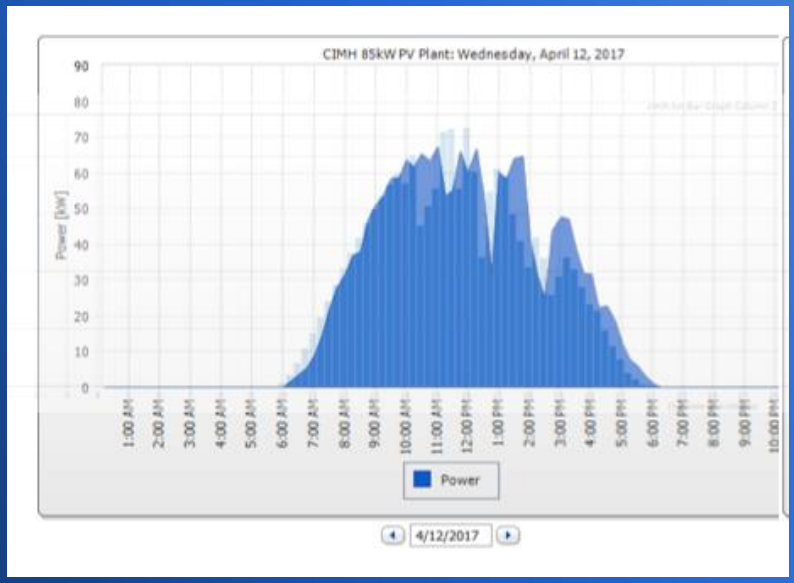
Understanding Risk – Energy Sector



1970 -2017 Data Archived at the World Radiation Data Centre

Understanding Risk – Energy Sector

Section of CIMH PV production array
(supports CIMH's renewable energy research)



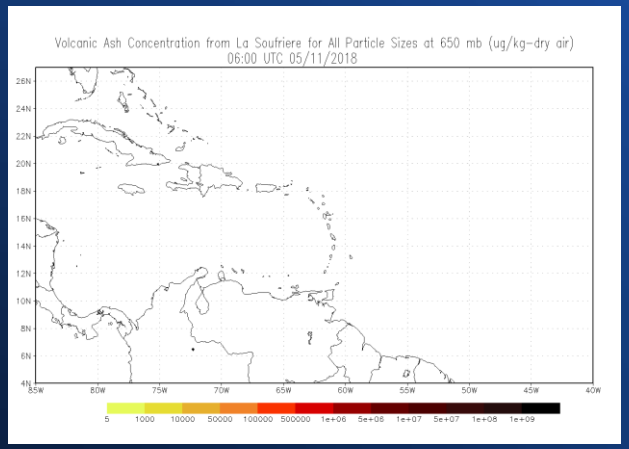
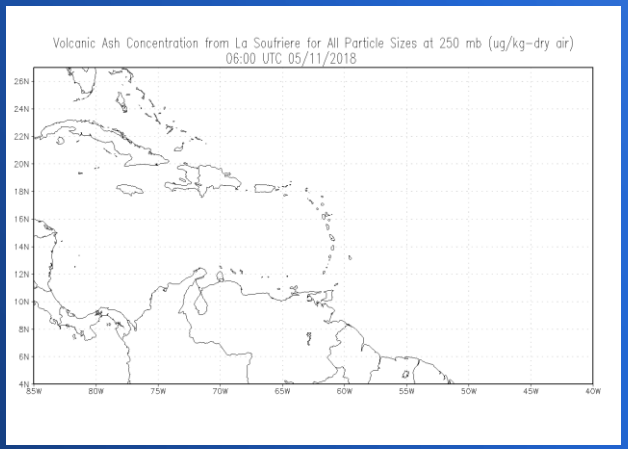
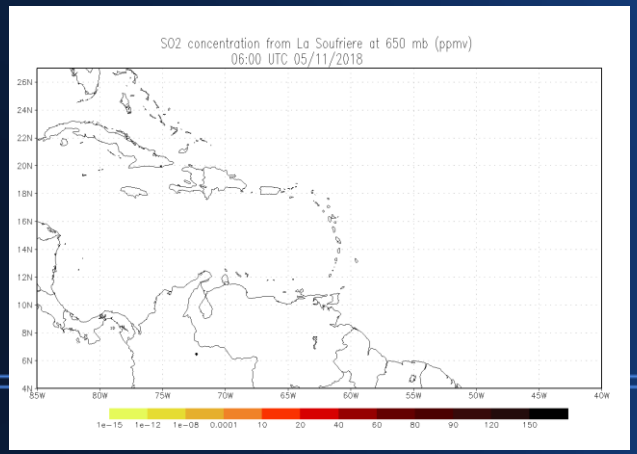
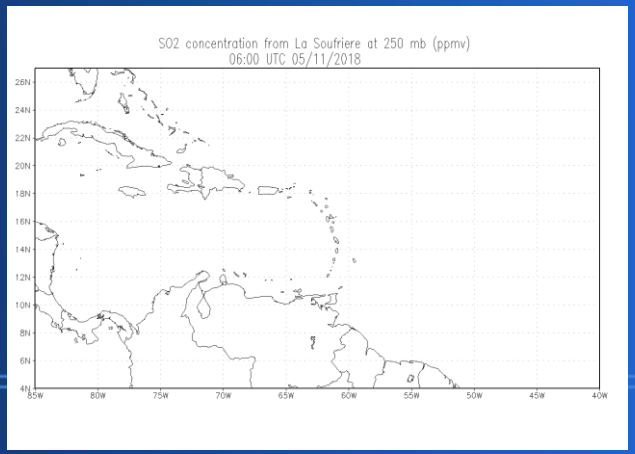
Comparison of CIMH daily PV production (background) to CIMH numerically simulated day ahead forecast

Accurate and reliable weather and climate information supports greater infusion of weather and climate based renewable energy in a sustainable matter. CIMH currently focused on:

- Wind, water and solar based systems;
- Some interest in wave/marine-based systems;
- Time scales range from nowcasting to seasonal resources predictions;
- Weather and climate disruptions on traditional energy resources.

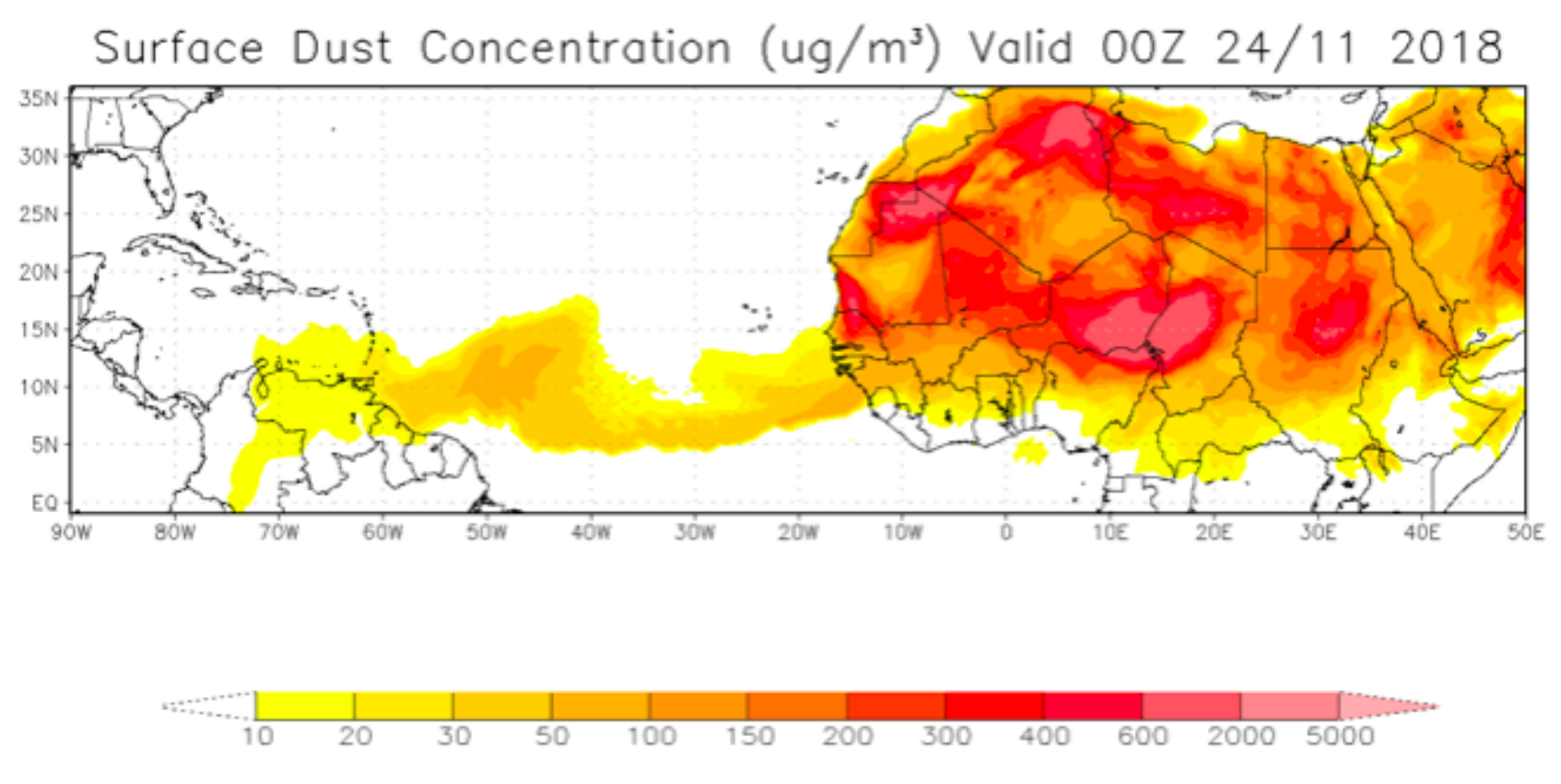
Understanding Risk – Energy Sector

Volcanic Hazard

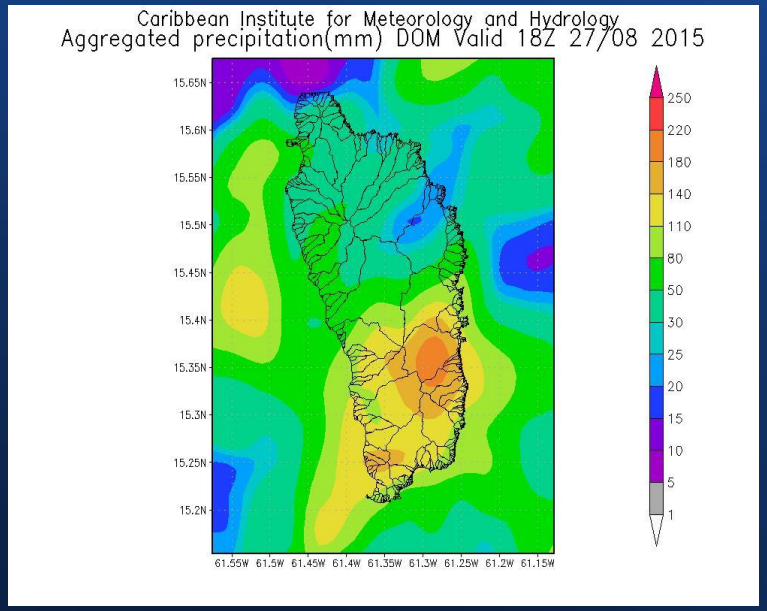
	650 mb	250 mb
Ash Transport		
SO_2 Transport		

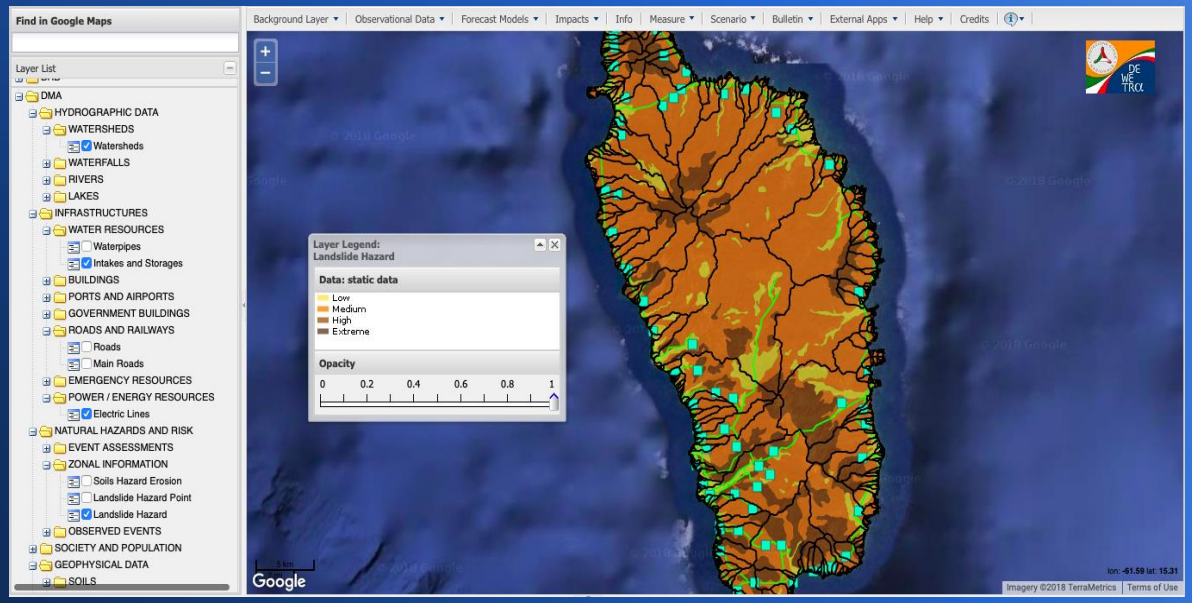
Understanding Risk – Energy Sector

Significant dust limits the amount of incoming solar radiation reaching the earth's surface. This limits the performance of PV systems. CIMH daily produces an 7-day Sahara dust forecast that can risk-inform PV energy forecast models.



Understanding Risk – Energy Sector





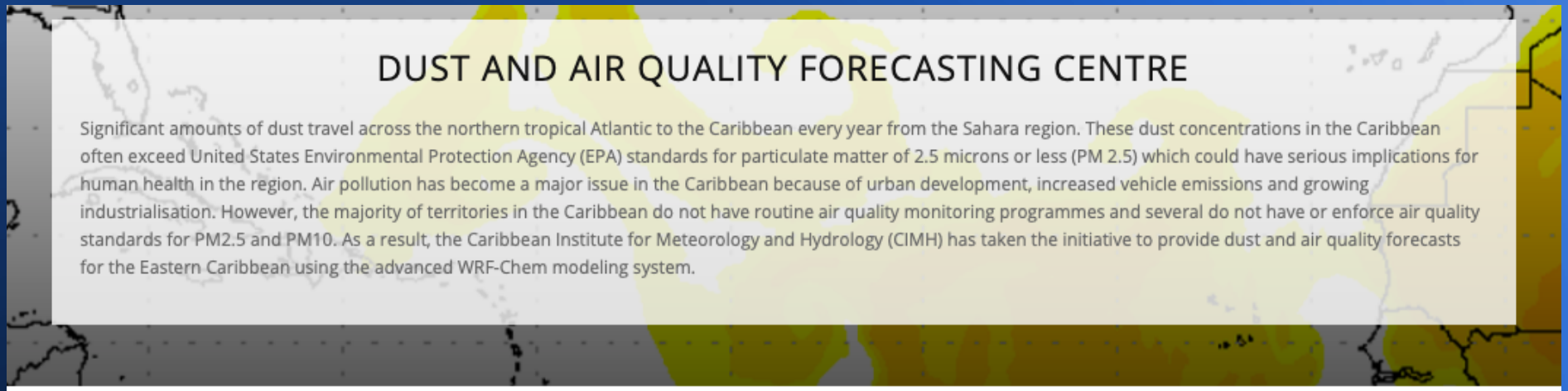
Landslide hazard map for Dominica showing watersheds, electrical utility lines (green) and location of intakes

Understanding Risk – Human and Environmental

The Caribbean Aerosol and Health Network (CAHN) of which CIMH is one of the 3 founding partners and the WMO Pan American Centre for Sand & Dust Storm Warning Advisory and Assessment System (SDS-WAS) coordinated by CIMH, in addition to the RCC, form the core mechanism through which CIMH addresses climate risk to the regional health sector.

http://sds-was.cimh.edu.bb

Understanding Risk – Human and Environmental



Understanding Risk – Human and Environmental

Saharan Dust Update for March 28-April 03, 2018

Current event

Models run and managed by the Caribbean Institute for Meteorology and Hydrology (CIMH) in its role as the Pan American Centre for the World Meteorological Organization (WMO) Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS) are showing a dust episode in which dust concentration amounts are demonstrably high.

Cayenne, French Guiana has already seen elevated levels of PM10[1] over 160 µg/m^3 dust concentrations. This is above the outdoor air quality guidelines of 50 µg/m^3 24-hour mean for particulate matter established by the World Health Organization (WHO).

Dust forecast

In the coming (1-3) days, we expect that dust and PM10 concentration levels will increase.

Models predict the highest dust and PM10 concentrations in Northern South America, while moderate amounts of dust and PM10 are predicted over Barbados and the Windward Islands.

Another dust episode is expected late next week.

Implications for Respiratory Illness

There may be an increase in symptoms in persons with asthma, and in persons prone to allergic rhinitis due to higher dust and PM10 concentrations. This situation may be exacerbated in territories where the ground surface is dry.

Stay informed

Health stakeholders are encouraged to consult the 7-day dust forecast in the coming days. Access this product here: http://dafc.cimh.edu.bb/dust-prediction/

Understanding Risk – Education and Training

CIMH has been the primary instrument for addressing the training needs of the National Meteorological and Hydrological Services in CMO Member States for over 50 years;

Training competencies have been evolving as hydrometeorological and climate risks in the region are better understood;

New techniques that improve hydro-meteorological forecasts are continuously integrated into the CIMH training programmes – e.g., numerical weather prediction, weather radar interpretation and satellite data interpretation among others;

New instruments for delivering effective training at a reduced cost in a sustainable manner are continuously being explored and implemented – e.g., online training.

Continuing Professional Development is now a key component of the CIMH training programme;

Evolving change in focus to impacts-based forecasting.