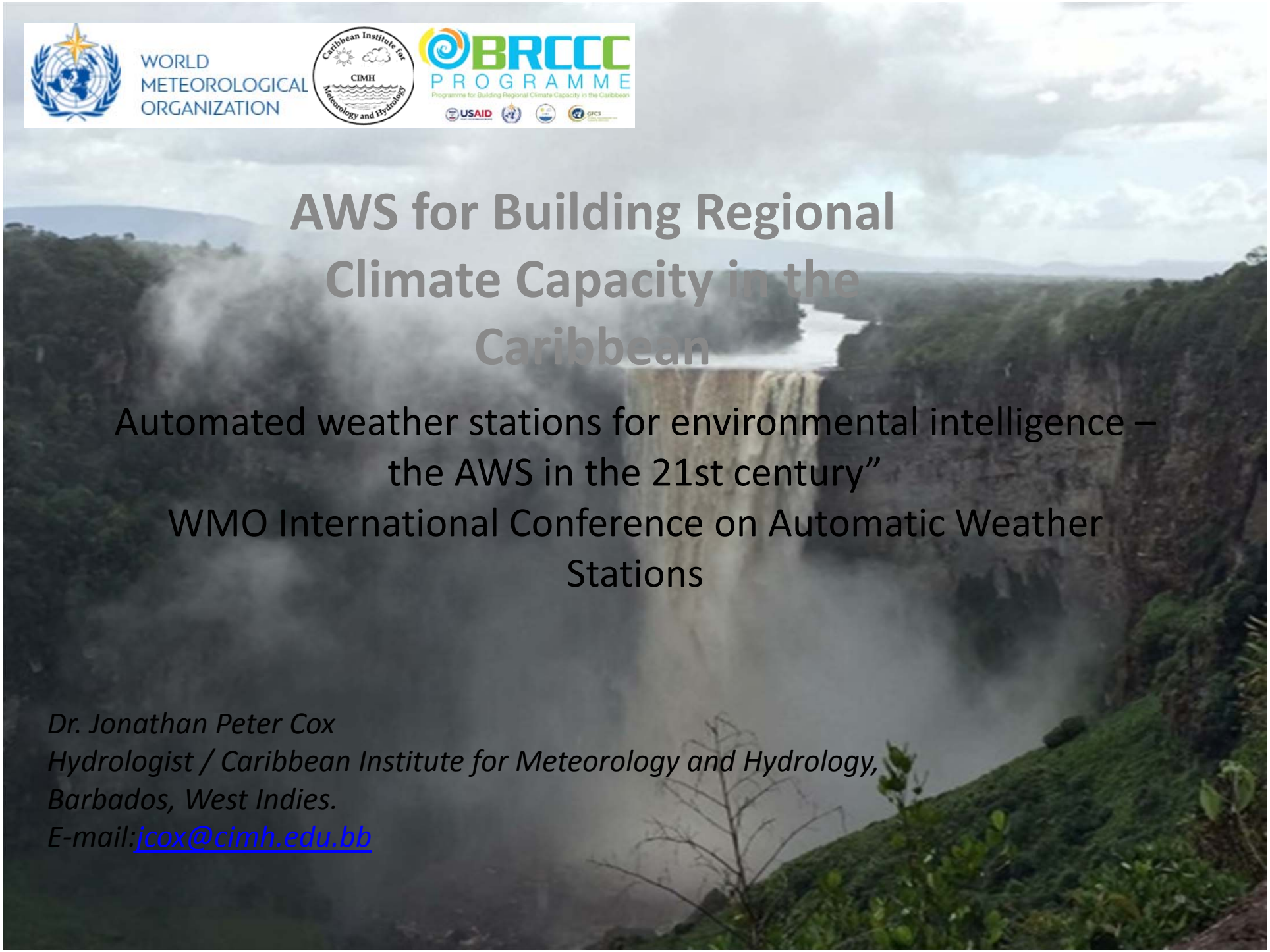


AWS for Building Regional Climate Capacity in the Caribbean

Automated weather stations for environmental intelligence – the AWS in the 21st century"
WMO International Conference on Automatic Weather Stations

Dr. Jonathan Peter Cox
Hydrologist / Caribbean Institute for Meteorology and Hydrology, Barbados, West Indies.
E-mail:jcox@cimh.edu.bb

Background

- **Water Resources Engineer**
  - Drought Management
  - Real Time Flood Mitigation
  - Hydrometry

Geographical experience:

  - Caribbean,
  - South America,
  - Europe,
  - Middle East.

- Design and exploitation of Supervisory Control And Data Acquisition systems for flood mitigation and drought management.

Current Deployment:

- Caribbean Institute for Meteorology and Hydrology (CIMH), Barbados, West Indies.
  - (WMO) Regional Climate Centre (RCC) for the Caribbean
  - CIMH provides:
    - Climate products and services to the Caribbean region.
    - Training to regional stakeholders on how to effectively interpret climate information integrate in planning and decision-making activities.

Climate Change

- *Increasing variability and impacts boosted society's demand for tailored climate products and services.*
- *The delivery of critical climate services requires:*
  - *Network of dependable and precise instruments positioned in strategic locations over the region of interest.*
  - *Computational power and IT expertise.*
  - *Model research and know-how.*
  - *International collaborations.*

BRCCC

- *Building Regional Climate Capacity in the Caribbean programme (2014-2017):*
- *33 automatic stations:*
  - 6 full AWS,
  - 16 radar water level stations and
  - 11 SM and STemp stations
- *Objectives:*
  - *Monitor the effects of climate change.*
  - *Provide input for hydrological models in the Caribbean.*
  - *Near real-time Flood mitigation.*

Region of focus: Guyana

- Why?
  - 214.970 km²
  - Challenging terrain
  - Telecommunications
  - Isolated locations
  - Large distances

Data loggers deployed:

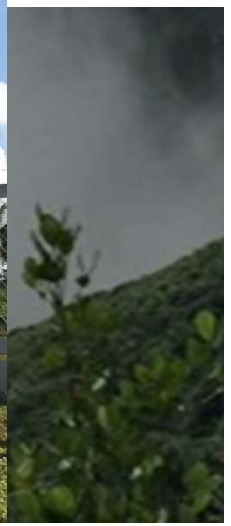
Three distinct models in Guyana:

1. SatLink3 Logger/Transmitter SL3-1,
2. GPRSLink 2-Way Logging Transmitter,
3. XLite 9210B with Satlink2.

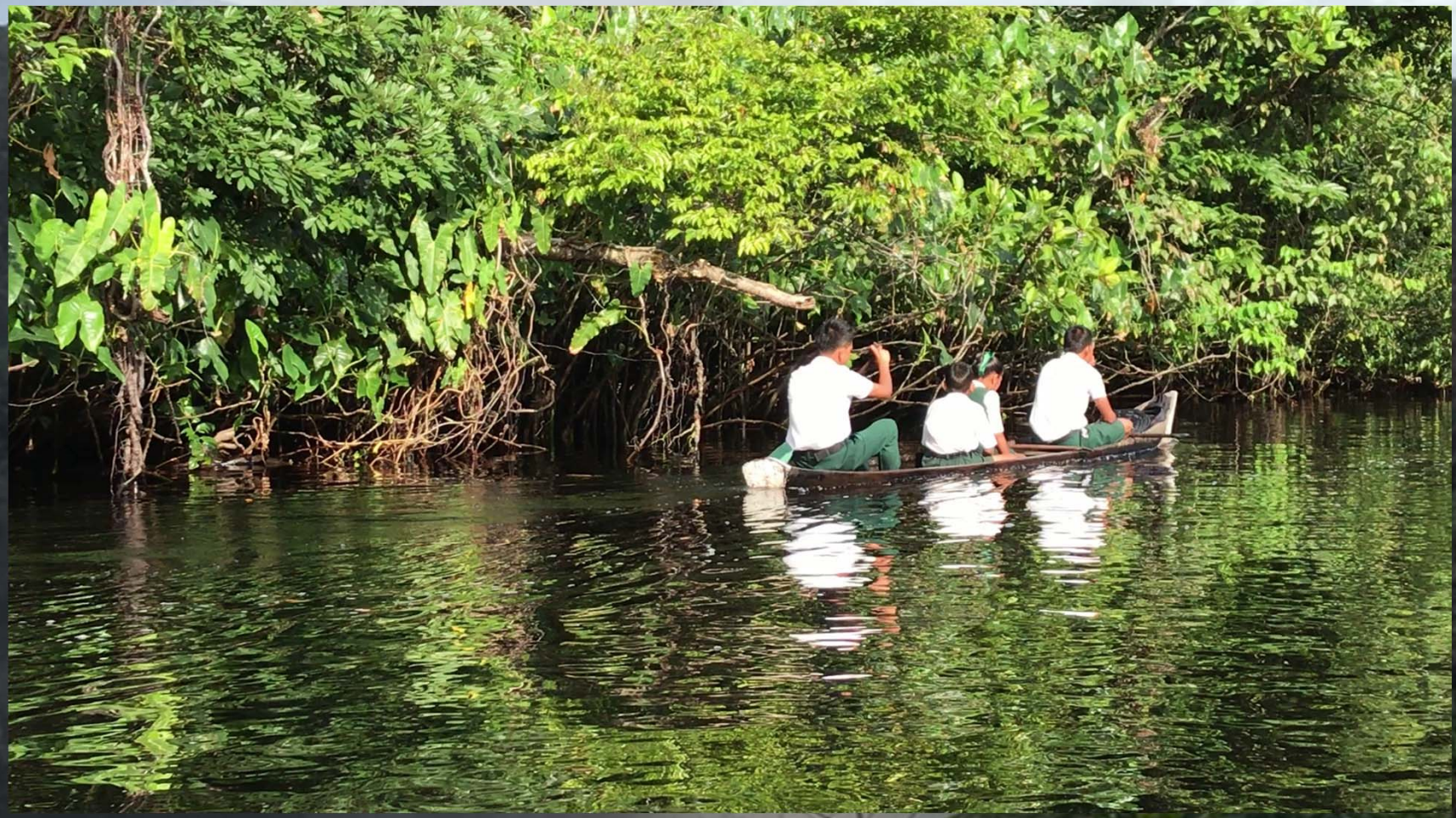
Guyana Equipment:

Sutron equipment BRCCC Guyana:

- 1 Radio/ Goes Satellite Full AWS
- 2 GPRS Soil Moisture Stations
- 4 SatLink-3 Radar Water Level Stations, (no boom, no tripod,)
- Guyana Hydromet:
  - 6 Sutron 0.2 mm tipping bucket rain gages.



Amazon AWS at Santa Rosa



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Full AWS

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Site Preparation

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Soil Moisture GPRS Link stations

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426 Km of Jungle “Autobahn” to Brazil

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Radar water level station with satellite communication.

Current transmission (TXFORM):

Tx data would look like this

:WL 2 #5 2.50 2.50 2.50 2.50 2.39 2.28 2.28 2.25 2.25 2.25 2.25 -99999.00 :RainRt 2 #5 0.20 0.00 0.40 0.00 1.40 0.00 0.60 0.00 0.00 0.00 0.00 0.00 :RainAcc 27 #60 0.6 :BL -1.00 N5o37'47.61"W58o22'49.10"

Current message is 202 bytes (00:00:07 seconds) out of 343 bytes (00:00:10 seconds)
Available space is 141 bytes
In that message, sensor data is

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Data Transmitted

140593AE - 10/10/2017 15:06:31 UTC
No Matching TransportMedium for Channel 69

Message Parameters:

DCP Address: 140593AE	Message Quality: Good
Signal Strength: 37 dBM	Frequency Offset: 0 (0 Hz)
GOES Channel: 69E	Message Length: 321
DRGS code: UB	DRGS Description:
Carrier Start (UTC): 15:06:30.276	Carrier Stop (UTC): 15:06:39.644
Additional Flags: (none)	

Raw Data:


```
        140593AE17283150631G37-0NN069EUB00321bB1F@D|@EF@EJ@EJ@EK@EB@D}@EE@EE@EC@D~@D{@E
G@EK@EL@EL@EJ@EB@AA@@~@@}@@~@AB@AB@Cr//////@Cv//////////////////////////////
////////////////////////////////////////////////////////////////////////////
////////B^OB^PB^PB^OB^PB^Q@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@//////////////
//////////////////////@@B@@B@@B@@B@@B@@B:BL 12.25
```

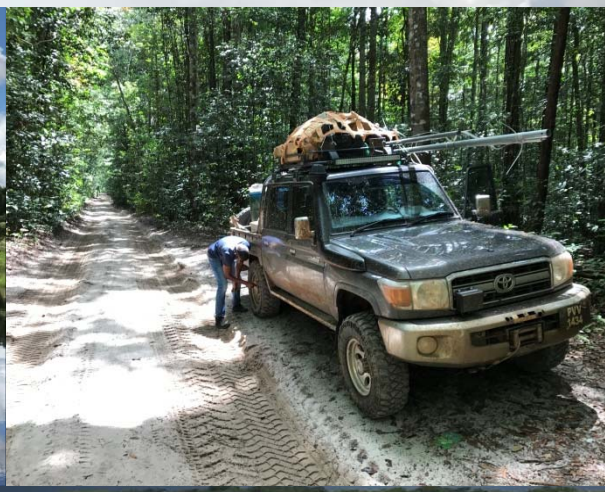
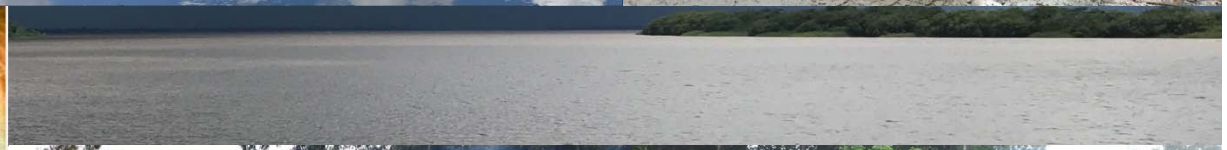
No bed of roses !









Maintenance is paramount!

- Many projects ignore this point
- Essential at least every two months:
  - Preventive maintenance
  - Corrective maintenance
- Caribbean:
  - $$$$$$$

Corrective versus Preventive Maintenance
What is the difference and where is the value?

- Corrective maintenance (CM):
  - Identify,
  - Isolate,
  - Rectify faults.

- Preventive maintenance (PM) :
  - Maintain operating condition via
    - Systematic inspection,
    - Detection,
    - Correction of incipient failures either before they occur or develop into major defects.

Corrective Maintenance in Barbados

Preventive Maintenance in Surinam

DEWETRA

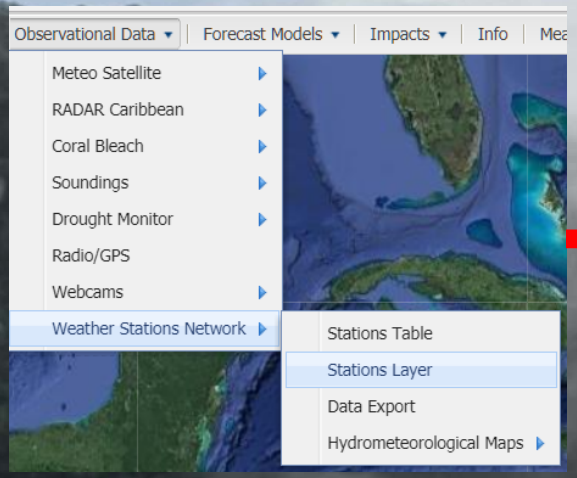
- Fully operational web-GIS platform aimed at multi-risk mapping, forecasting and monitoring.
- Access link and credentials:

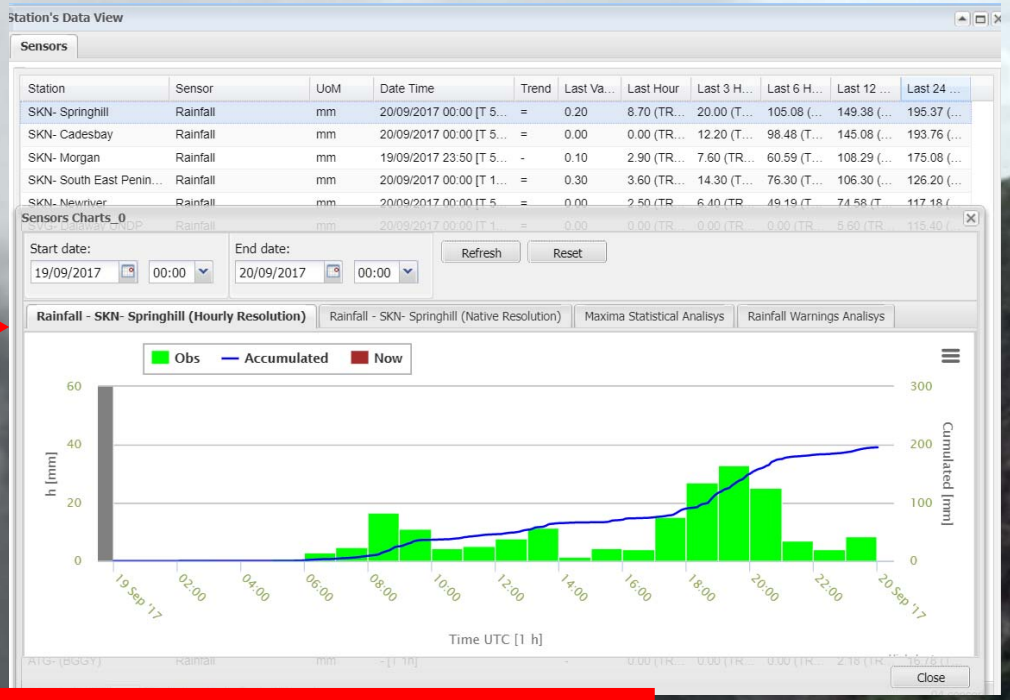
http://bb02.cimafoundation.org:8080/dewetra/

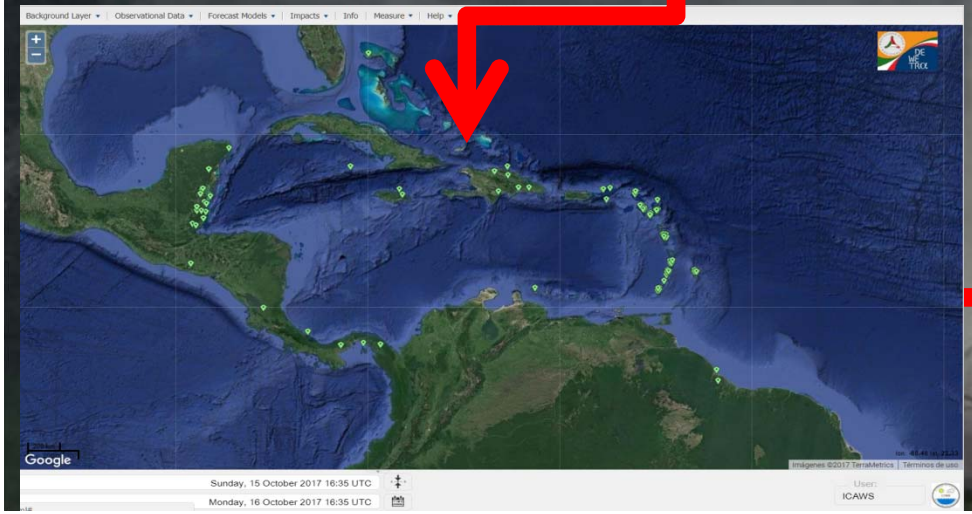
User: ICAWS

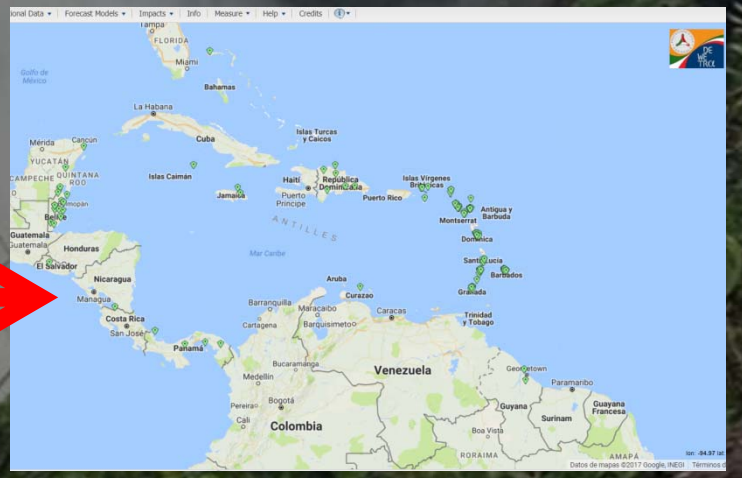
Password: ICAWS

Operational Example DEWETRA

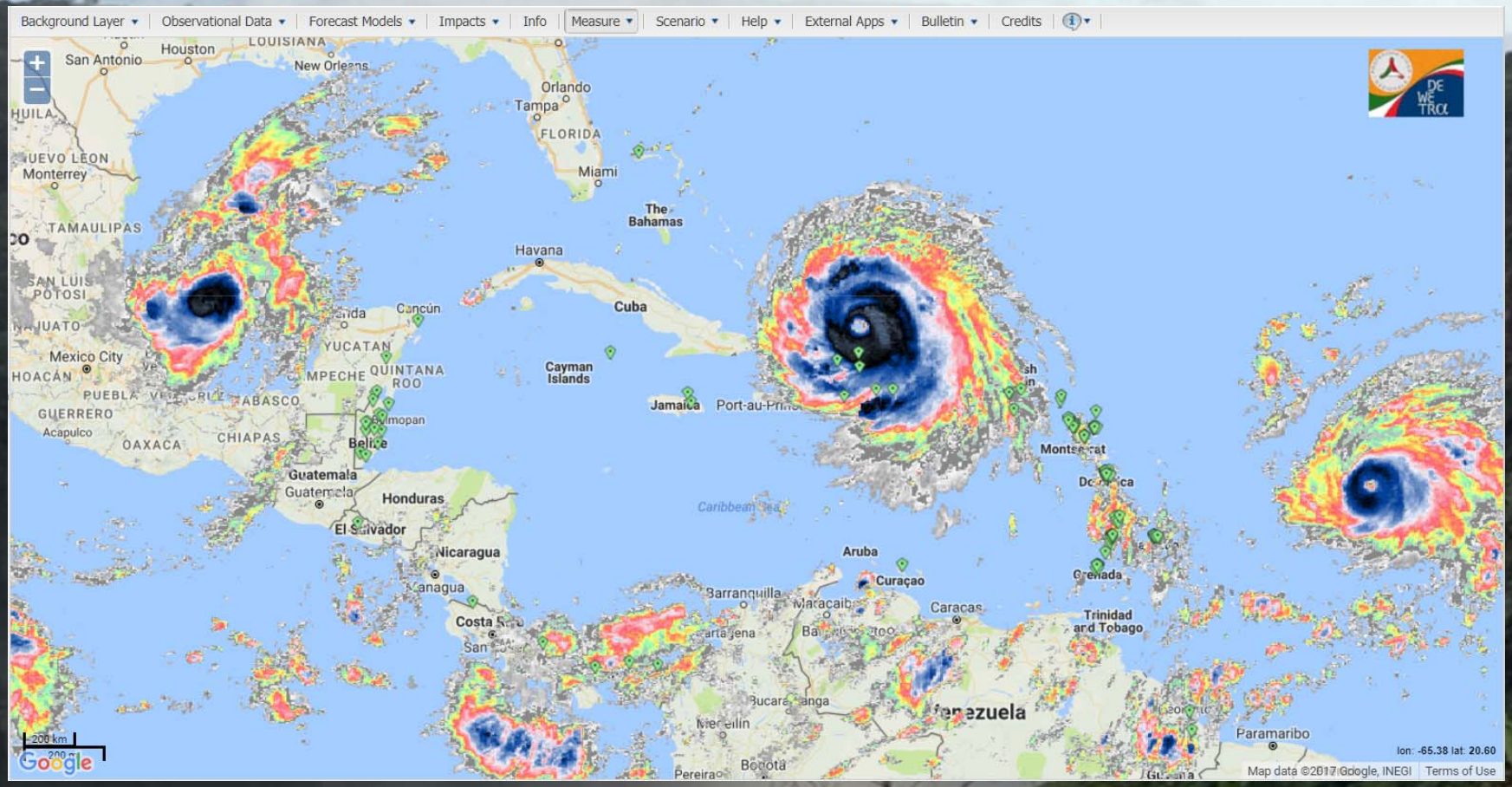








Irma Katia Maria



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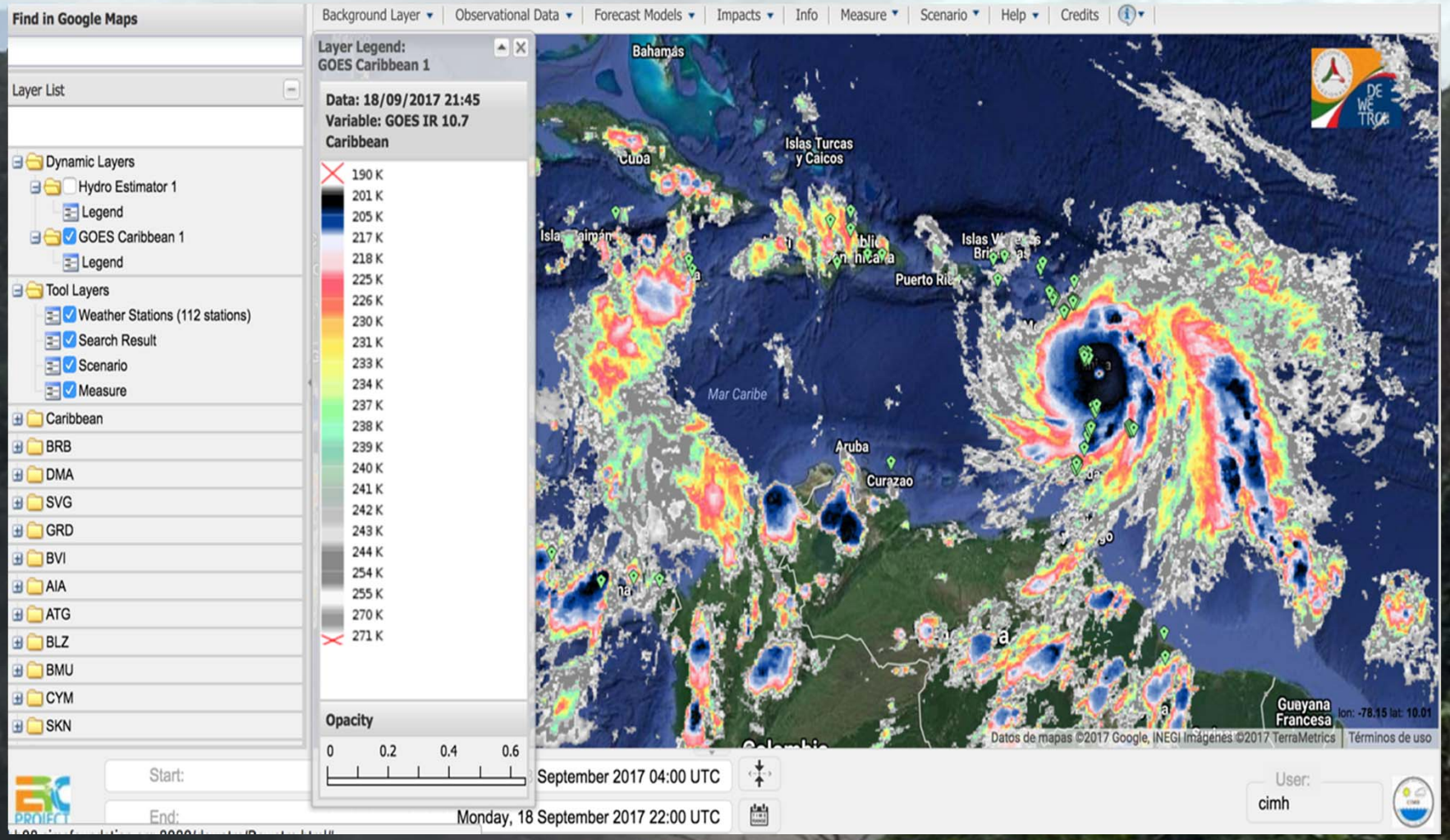
Maria Dominica



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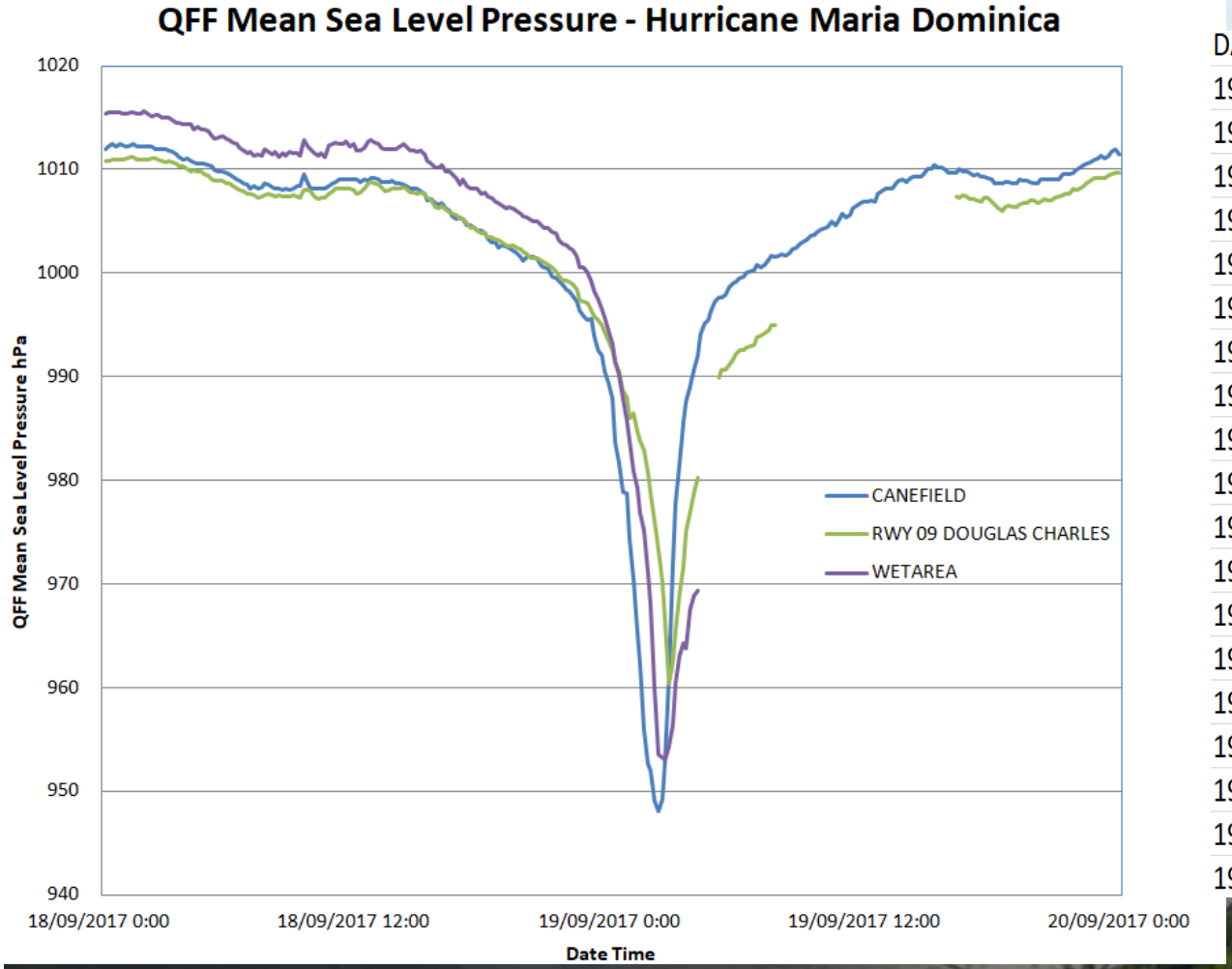
QFF through Maria



DATE TIME	CANEFIELD	D CHARLES	WETAREA
19/09/2017 1:00	970,5	986,5	980,9
19/09/2017 1:10	965,3	984,7	979,2
19/09/2017 1:20	962,3	983,8	976,8
19/09/2017 1:30	955,9	982,9	975,2
19/09/2017 1:40	952,6	980,8	971,1
19/09/2017 1:50	952,0	978,8	967,9
19/09/2017 2:00	949,1	976,1	960,0
19/09/2017 2:10	948,0	973,3	953,5
19/09/2017 2:20	949,2	970,2	953,2
19/09/2017 2:30	952,9	966,5	953,0
19/09/2017 2:40	961,0	960,4	954,3
19/09/2017 2:50	971,8	962,5	956,4
19/09/2017 3:00	977,7	965,4	960,4
19/09/2017 3:10	981,5	969,0	963,0
19/09/2017 3:20	985,6	971,6	964,3
19/09/2017 3:30	987,6	975,0	963,8
19/09/2017 3:40	989,0	976,8	967,5
19/09/2017 3:50	990,7	978,8	968,9
19/09/2017 4:00	992,0	980,3	969,4

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Hurricane Maria devastates Dominica @ Cat 5

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Conclusions & Recommendations

- Tailored climate products dedicated to disaster mitigation are a valuable tool in modern hazard management.
- To obtain quality data, stations must be strategically sited and professionally installed so as to be representative of the region and to withstand natural phenomena such as floods and hurricanes.
- Preventive and Corrective maintenance must be routinely performed to guarantee the quality of the data recorded and transmitted.

Conclusions & Recommendations

- Local stakeholders should be trained in and tasked with routine maintenance, and when required, seek back up from regional specialised personnel.
- Projects designed to augment the number of reporting stations in a network must have a sufficient budget to permit maintenance of such installations for a period of at least five years following deployment.
- Good technical backup and customer service from equipment suppliers is fundamental to ensure optimum up time and swift equipment repair or substitution.

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