Environment and Climate Change Canada | Environnement et Changement climatique Canada

Country Profile:

Cuba

World Meteorological Organization
Weather • Climate • Water

CIMH
Caribbean Institute for Meteorology and Hydrology

1. PHYSICAL GEOGRAPHY

Cuba is an island nation in the Caribbean Sea. Cuba has an official area (land area) of 109,884 km2. The main island (Cuba) has 5,746 km of coastline. The main island (Cuba) makes up most of the land area 104,556 km^2 and is 1,250 km long and 191 km across its widest points. Cuba lies west of the North Atlantic Ocean, east of the Gulf of Mexico, south of the Straits of Florida, northwest of the Windward Passage, and northeast of the Yucatan Channel. As such, Cuba is the northern- and western-most island nation in the Antilles chain, namely between 19°45'N and 23°25'N, and 74°W and 85°W, respectively.

Terrain is mostly flat to rolling plains, with rugged hills and mountains in the southeast. The highest point is Pico Turquino at 1,974 m, part of the Sierra Maestra mountain range in the southeast of the island. White sand beaches, as well as mangroves and marshes can be found in the coastal area. Cuba has negligible inland water area. The largest natural water mirror is Laguna de Leche at 67.2 km^2, while the man-made Zaza Reservoir, at 113.5 km^2, is the largest inland water surface by area in the country.

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Figure 1 Map of Cuba. (Credit: Wiki Commons)

Cuba experiences year-round warm, humid conditions associated with marine tropical climates. The annual rainfall totals between 600 mm in the extreme southeast to 1000-2000 mm in much of the country and locally more than 3000 mm at higher elevations (INSMET, http://www.met.inf.cu/). Though similar to most of the Caribbean islands, there is a wet and a dry season, the wet season is very distinctly bi-modal with rains in May and June, and again in September and October (and up to November in the southeast), but drier episodes during July and August. In fact, in the extreme southeast, July is the driest month in terms of rainfall totals. Cuba does receive some significant rainfall (and cooling) during the Northern Hemisphere winter when cold fronts pass through. The annual cycle of the mean temperature overall peaks in July and August at around 28°C and is at its coldest in January at around 22-24°C (http://www.met.inf.cu/ ; http://carogen.cimh.edu.bb). The rainfall naturally allows for forest of cypress and mahogany over much of the main island.

2. CLIMATOLOGY

There is a network of around 50 stations in Cuba used in climate monitoring and operated by the Instituto de Meteorologia de la República de Cuba (http://www.met.inf.cu/).

The monthly rainfall totals reference climatologies of Western and Eastern Cuba (1981-2010), as well as non-reference climatologies (1971-2015) of monthly mean temperatures for 3 stations – that lie in proximity of the 3 rainfall stations –, are summarized in Table 1, while the climatologies for two stations in Western Cuba (i.e. Casa Blance, Havana for rainfall; and Station nº325 for near-surface air temperature; these stations stand in close-by locations) are also presented in Figure 2. As the farthest north-west of all Caribbean islands save for The Bahamas, Cuba features a marine tropical climate that is quite regularly subject to incursion of extra-tropical weather systems. That is especially so during the northern hemisphere winter when cold fronts and troughs in the Sub-Tropical Jet (sometimes fused with the Polar Front Jet) can penetrate through the northern Caribbean, producing wet spells immediately followed by cool spells. The annual temperature cycle is amplified, especially in the western and central part of the country. This relates primarily to the latitude at the border of the tropics, and amplified by the incursion of extra-tropical systems.

In terms of rainfall seasonality, there are the typical dry and wet season which in Cuba correspond with the cool and warm season, respectively. However, the state of the atmosphere often preconditions dryness over Cuba (especially in the east) during July. This could be related to the proximity of the Atlantic Subtropical High Pressure cell (aka Azores-Bermuda High) and the seasonal migration of the Tropical Upper Tropospheric Trough, which in July promotes convergence in the upper troposphere and therefore impedes deep convection. Because of this, the wet season is strongly bi-modal, with a first peak around May-June (around 60 mm in Punta de Maisi *versus* around 150 mm in the other two stations in the wettest of the two months) and a second, stronger peak around September-October (140 mm to 200 mm).

In terms of variability, there is a maximum around the two rainfall peaks with 200 mm to 300 mm difference between the 10^{th} and 90^{th} percentiles. While the interannual variability is lower in absolute terms in the other months, record lows frequently are 0 mm (with the exception of Camagüey during the wet season), while every month has seen at least 125 mm in all three stations. (http://rcc.cimh.edu.bb/)

Annual daytime near-surface air temperature at sea level averages out at 25°C to 26°C, running at around 32-33°C in August and about 5-6°C lower from December to February. The variability is enhanced in the cool season, with the difference between the coldest and warmest values per month in the historical record exceeding 5°C in the westen and central portions, but 3-4°C in the east (http://carogen.cimh.edu.bb/).

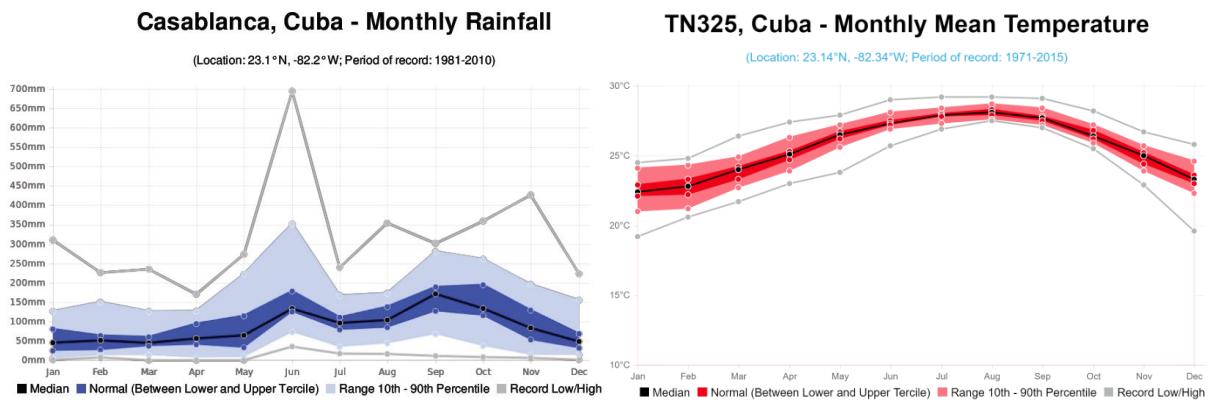

Figure 2 1981-2010 reference climatology of monthly rainfall totals (left) and 1971 to 2015 climatology of mean near-surface air temperature (right) for the Casablanca, Havana station in western Cuba. Source: rcc.cimh.edu.bb and carogen.cimh.edu.bb (Data from Insituto de Meteorologia de la República Cubana)

Table 1. Summary statistics of rainfall and temperature for West and East Cuba

Station Name	Casablanca, Havana (Period/Year/Month of Occurrence)	Punta de Maisi (Period/Year/Month of Occurrence)
Mean Annual Rainfall	1243.5 mm (1979 -2015)	796.1 mm (1979 -2015)
Wettest Year / Month / three-month period	1906 mm (2013) / 694 mm (Jun. 1982) / 909 mm (Apr to Jun. 1982)	1521 mm (2007) / 380 mm (Oct. 2007) / 795 mm (Sep to Nov. 2010)
Driest Year / Month / three-month period	803 mm (1981) / 0 mm (on multiple occasions) / 21 mm (Jan. to Mar. 2007)	320 mm (1991) / 0 mm (on multiple occasions) / 4 mm (Mar. to May 1984)
Mean Annual Temperature	25.5 °C (1971 – 2015)	27.1 °C (1971 – 2015)
Warmest Year / Month / three-month period	26.3 °C (2015) / 29.2 °C (Jul. 2009 & Aug. 2015) / 29.1 °C (Jul. to Sep. 2009)	27.7 °C (2015) / 30.0 °C (Aug. 1998) / 29.7 °C (Jun. to Aug. 1998)
Coldest Year / Month / three-month period	24.9 °C (2010) / 19.2 °C (Jan. 1981) / 21.2 °C (Dec. 1979 to Feb. 1980)	26.6 °C (1985) / 22.9 °C (Jan. 1981) / 24.2 °C (Jan. to Mar. 1981)

Source: http://rcc.cimh.edu.bb/

3. SOCIO-ECONOMIC LANDSCAPE

The Republic has a (combined) population (2014) population of around 11.38 million (http://data.worldbank.org/country/cuba). The Republic's 2014 HDI of 0.769—puts Cuba in the high human development category—positioning the country at 66 out of 187 countries and territories (UNDP 2015, http://hdr.undp.org/en/composite/trends). The (2013) GDP was estimated by the World Bank at USD 77.15 billion (and a GNI of USD 5,880 per capita). Mean life expectancy is 79.4 years. Cuba is the leading Caribbean producer of sugar, though the main activity of the country's planned economy in terms of foreign currency exchange has been tourism (which overtook sugar in the mid-1990s).

4. KEY NATIONAL STAKEHOLDERS AND THEIR NEEDS

A 2015-2016 survey of user climate information needs in the Caribbean captured responses from 1 sectoral representative from the health sector. One Cuban health user also participated in focus group discussions (FGDs) in May 2016. This very small sample size signals that a targeted future research intervention may be needed to address this critical data gap in the Cuban context.

Climate information is of value to the decision-making of health stakeholders. For example, the Cuban survey respondent indicated that climate information is used for "making forecasts of some infectious, diseases and entomologic indices"; while the FGD participant described the relationship between the hospitals and the Met office as "extremely important because that's how they [health care practitioners] get the alert ahead of time", particularly with regard to respiratory illnesses.

5. RANGE OF CLIMATE SERVICES

As of November 2015, the Cuba Institute of Meteorology (INSMET) classified itself as a Category 2 climate services provider offering a basic range of climate data services and information products, as well as, essential climate data services and information products. The organisation tailors 2 of the 7 regional climate products for the national context[1]. The products are used to prepare the climate-monitoring bulletin and the climate forecast. INSMET has been delivering climate information to users for over 10 years.

The socio-economic sectors that benefit from climate services in Cuba are the agriculture, water, disaster risk management, health and energy sectors. INSMET specifically interacts with the Ministry of Public Health. The INSMET believes that the fisheries, construction, land planning, human settlements and infrastructure sectors can also benefit from the provision of climate services in the future.

The level of interaction between the organisation and the users of climate information has been reported to be moderate where users are engaged at later stages in the climate service project. Feedback is not routinely collected from users. The INSMET has not yet convened a National Climate Outlook Forum.

INSMET recommendations for improving its climate services capability include:

1. Guidance regarding best practices and lessons learned in the regional context for achieving a successful transition from conventional observation networks to automatic, with preserving the quality and integrity of the longest climate series;
2. The Cuban government funded the rescue of the available climate information from early 80s to the present, with national funding. Although this effort allowed digitizing more than 90% of the national climate data, it has not been completed yet. Additional funding is needed to complete this task and to implement actions to completion and validation of the information entered;
3. Access to more complete and reliable data from the sectors;
4. Develop predictive climate tools with greater skill;
5. Strengthening technology (increase computing capacity.ie. access to modelling supercomputers and internet connectivity); and
6. The establishment of feedback mechanisms with users.

[1] These are the CariCOF precipitation and Temperature Outlooks.

6. REFERENCES

C. McSweeney, M. New, G. Lizcano . 2010b. The UNDP Climate Change Country Profiles: Cuba

UNDP (2015). 2015 Human Development Report. http://hdr.undp.org/en/composite/trends

Web Sites

INSMET (Instituto de Meteorologia de la República de Cuba) - http://www.met.inf.cu/
http://carogen.cimh.edu.bb/
http://rcc.cimh.edu.bb/
http://data.worldbank.org/country/Cuba