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Rainfall Gauge for the Dominican Republic 2023

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Abstract

Detailed maps of mean annual and monthly rainfall distribution over the island of Hispaniola are presented, based upon the records of 162 stations and upon recent information. According to these maps, the mean annual and monthly rainfall distribution, as well as the variations in the sequence of mean monthly rainfall in different parts of the island, has the most complex pattern of any unit of the Greater Antilles. This is due largely to the mountainous relief which exerts a marked influence upon the areal distribution of rainfall. Mean annual rainfall varies from less than 20 inches on Leeward Lowlands and enclosed interior valleys, to more than 100 inches (millimeters) on elevated mountain slopes and favorably located areas at low elevation. The most significant features of mean monthly rainfall distribution are best illustrated by the February, May, July, September, and November rainfall maps. The February map shows a generally light rainfall over the entire island. This is characteristic of the winter period of minimum orographic trade wind rainfall. The heaviest rainfall, from four to six inches, is recorded on the windward coast and mountain slopes bordering the Atlantic Ocean. With but one exception, not even the higher elevation of the central, interior, and southern mountains can compensate for the decreased humidity of the trade winds after they have crossed the coastal mountains, and from less than one to four inches of rainfall are recorded. The May map, representative of the spring and early summer period of maximum convectional rainfall, shows a heavy rainfall for the island as a whole, especially over the interior and southern mountain regions where more than ten inches are recorded. Even the dry leeward lowlands and enclosed valleys of the interior record more than two inches of rainfall everywhere, and from 6 to 8 inches are recorded in the most elevated and favorably exposed places. The July map for the midsummer "less rainy" period indicates a general decrease of the convectional rainfall over the entire island. This is a result of lower humidity, increased wind velocity, higher pressure, and more stable upper air conditions due to the extension of the southwestern portion of the Azores-Bermuda high over the region. From less than one to more than ten inches of rainfall are recorded. July is the month of minimum rainfall on the northern coast and mountain slopes bordering the Atlantic Ocean, where summer (late June through August) is the less rainy season. At this time the winds blow from the east parallel to the coastal mountains and only one to four inches(mms)of rain falls. The September map illustrates the rainfall distribution for the late summer and autumn period of maximum convectional and tropical cyclonic rainfall. The heaviest rainfall, from six to more than ten inches, is recorded on the southern slopes of the island, where cyclones come ashore. The northern side of the island, exposed to the less rainy rear quadrants of the tropical cyclones, records only four to eight inches of rainfall. The November map shows the distribution for the late autumn and early winter period of maximum orographic trade wind and northern rainfall. In contrast to September, the heaviest rainfall, from eight to more than ten inches, is recorded on the northern slopes of the island where the trade winds and northerners from the Atlantic are forced to rise. A remarkably sharp rain shadow appears on the leeward slopes of the central mountains where from two to six inches of rainfall are recorded. The mountains of the south are high enough to cause further rainfall of from six to more than ten inches on their upper slopes.

Keywords: Rainfall Gauge • Climate Parameters • Climatic Change • Meteorological Society

Introduction

Climate definition

The Climate represents the average values in a certain place of the terrestrial atmosphere, either on the surface or in height, of the climatic elements considered. Time, on the other hand, represents current values.

Climate parameters and factors

Climatic parameters can be defined as any property or condition of the atmosphere whose set characterizes the Climate of a place over a sufficiently representative period of time. They also define the time at a given moment: Sunshine, sun temperature, air, atmospheric pressure, wind, rain, humidity.

Climate factors are those that acting jointly define the general conditions of a land area of relatively wide extension, such as: The situation of the region within the general atmospheric circulation, continentality factor, orographic factor, effect of the temperature of marine waters.

Some valuable concepts

The energy received from the sun, when passing through the Earth's atmosphere, heats the water vapor, altering the density of the gases, which generate inequalities and motorize the general circulation of the atmosphere.

Most of the energy used by living beings comes from the Sun, plants absorb it directly and carry out photosynthesis. Fossil fuels, for example, conserve Solar Energy captured millions of years ago.

We are going to unify the concepts to better understand the processes that generate rainfall Figure 1 and Figure 2.

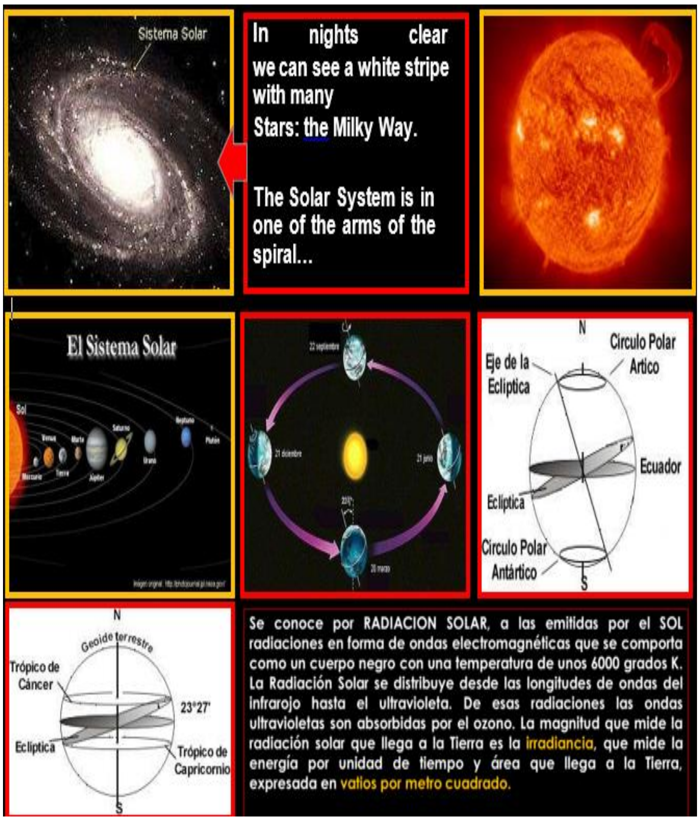


Figure 1. Concept of climate

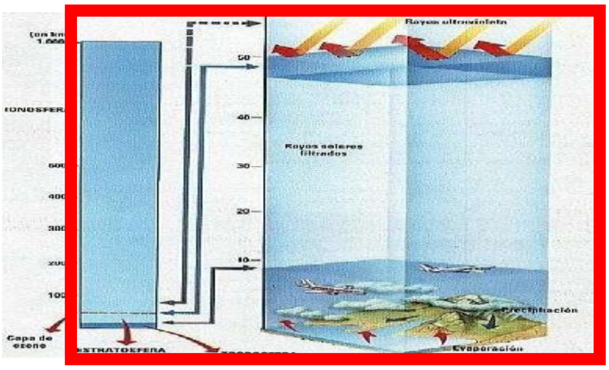


Figure 2. The atmosphere from the earth

The first climate concepts

Since our Island began to be populated by our Taino Indians, the interest in things of nature have always been present, particularly due to the manifestations of the Climate. At that time there were eleven Gods, including one in particular: Guabancex with two other companions, one as an announcer and the other a collector and governor of the waters. When Guabancex gets angry, they say that he makes the wind and water run, he all things to the ground and uproot the trees. And when they reached their maximum expression of thunder, lightning and hail, they were attributed to the God of Storms:Hurricane Figure 3.

Figure 3. The God storm: Hurricane

History of the espanola or santo domingo island

Expressions from about 300 years ago that continue to affect us with Floods and Droughts.

"These abundant rains, when refreshing the air, cause humidity that produces annoying effects" Figure 4.

Figure 4. Fr. Pierre-Francois-Xavier de Charlevoix. PARIS. M. DCC. XXX.

"it would be difficult to avoid many of the disastrous effects that the present lack of rain causes in fields and towns; but it is undeniable that we could remedy a lot, if we counted less on the kindness, highly debatable, of the climate and the earth, and something more on the capacity that man has to correct the defects or extremes of nature.

Fast forward in time, at the end of the 19th century the first rainfall information appeared in the stations installed by the Scottish railway company that went from Samaná to Santiago. The sequence of observations made in Samaná responded to the passage of the Lilis Cyclone of 1894, that is, we have a data bank of more than a century for the study of Climate. Climatological Statistics: the power of hurricanes was felt for the first time in 1502, changes were introduced in the construction processes of buildings, that is, construction regulations, to increase resistance to intense winds generated by these tropical phenomena, never seen in Europe, the Colonial City of Santo Domingo is built. A few years later, the Ozama river in Santo Domingo, established the maximum limit of its floods and was marked next to the so-called Ceiba de Colón on the western bank of the Ozama, this was apparently taken into consideration, and in the development of the City Colonial the signaling of nature was respected on this point, we will first point out the external influences where we consider solar radiation, the movement of translation of the Earth, the movement of rotation of the Earth and the astronomical tides, on each of them, researchers can abound to the extent in which we are obtaining results. In the local influences we contemplate the orography, the convection, the temperature and humidity of the waters of the sea and lakes, the sea and land breezes, the breezes of valleys and mountains and the anthropic influences. So it is the same to talk about the climate of a community on the coast or a community in the mountains. The first precipitation maps by Oliver Fassig, Leo Alpert, and International Organizations show the influence of mountains and mountain ranges in the distribution of rainfall over the Country, however, this complex orographic system of the Country is in charge of activating precipitation nuclei that they depend on the direction of the trade wind, regulated by the North Atlantic Ocean Oscillation and the movement over the Island of Frontal Systems, Eastern Waves, and Tropical Cyclones.

The first treaty on climatology

In 1730 the priest of the Society of Jesus Fr. Pierre-François-Xavier de Charlevoix wrote and published in Paris, the Historia de la Isla Española or Santo Domingo and in his First Volume we can find the main features of the Climate that we are observing today, it can be the first treatyon climatology

In it, the east wind is called Brisa and it is also called trade wind from the French Alis which means "united". In addition, the east wind does not make itself felt on the coasts until nine or ten in the morning, when the heat of the Sun expands the air. The wind increases with the Sun and then decreases, during the night it returns to the sea, being called Earth Wind. It is maintained in the city of Sango Domingo, and is known as the secondary circulation of the sea and land breezes. Despite the diversity in temperature fluctuations, our ancestors did not agree on what was Summer or Winter. Those who live in the west and south call the time of tropical cyclones winter, from April to November, those of the north coast's consider that it is from November to February, the months of the cold fronts, and between them, a period of flowering until May and a dry period until the end of August.

The evolution of climatology at the beginning of the 20th century

In the Magazine of Agriculture, within the Theme "Time and Harvests", of the month of April 1907, it is pointed out about a terrible Drought, in addition it triggered forest fires and death of cattle, the following was commented:"it would be difficult to avoid many of the disastrous effects that the present lack of rain causes in fields and towns; but it is undeniable that we could remedy a lot, if we counted less on the goodness, highly questionable, of the climate and the earth, and something more on the capacity that man has to correct the defects and extremes of nature.

Factors that intervene in climate of the dominican republic

In order to take advantage of the Climate of a country, we must not only know the average values of the different variables that allow us to plan various activities, we must also know what are the factors that intervene to obtain these results and understand the deviations which of these values are recorded. In the local influences We contemplate the orography, the convection, the temperature and humidity of the waters of the sea and lakes, the sea and land breezes, the breezes of valleys and mountains and the anthropic influences. So it is the same to talk about the climate of a community to refer to some of these factors, the general circulation, the trade wind, the Tropical Maritime air mass, subtropical jet currents, subtropical troughs, advection of cold air, low cold in height, low and high pressure in height, polar fronts, prefrontal troughs, wind shears, equatorial jet streams, tropical waves and tropical cyclones. The relationship between ENSO and the climate of the Dominican Republic is evident, especially in the coastal plains of the North Atlantic, where rainfall decreases. Naturally, when rainfall is scarce in any part of the country, there is less cloudiness and more direct radiation increases temperatures. As an example, and using the indices developed by the Japan Meteorological Agency for ENSO, we find that 16 weather stations of the Dominican Republic established minimum annual rainfall records during the cold event in 1967 and others did so with the Niños of 1976 and 1991. The climate of the Dominican Republic island, in the first place, is under the influence of the North Atlantic anticyclone and the tropical maritime air mass it generates. Due to these influences and our geographical position, our climate is said to be tropical and humid, and it is also said to be tropical maritime due to the type of air mass indicated that covers the Island practically throughout the year. Therefore, the temperature and its moisture content will have important repercussions on the observed time at a given moment. The anticyclone is also responsible for the dominant trade winds from the east, with directions to the north and south over the Dominican territory. It is necessary then, to know better what are the elements that model the climate of the Dominican Republic.

Influences on the Pluviometry of the Dominican Republic

North America: The polar continental air mass and the frontal systems

North Atlantic: The tropical maritime air mass and the trade wind.

Africa: Influences on the pluviometry of the Dominican Republic.

North America: The Polar Continental air mass and the frontal systems north Atlantic. The Tropical Maritime air mass and the Trade wind. In short, we can say that the rainfall regime of the Dominican Republic has the following influences:

Weather systems that model the climate of the Dominican Republic.

- General Circulation (Trade Wind – Tropical Maritime Air Mass) Subtropical Jet Currents Subtropical Troughs
- Prefrontal troughs wind
- Shear
- Sold air advection
- Cold lows in altitude
- Tropical waves
- Low and high pressures in height Equatorial jet streams Polar fronts
- Tropical cyclones

Local influences on the Dominican climate

- Orography
- Convection
- Temperature and Humidity Sea and Land Breezes Valley and Mountain Breezes

External Influences

- Solar radiation
- Translation of the Earth
- Rotation of the Earth
- Astronomical Tides

The Dominican Republic has the ideal climate for its development, provides us with the necessary components for life, makes its beneficial resources available to us: radiation, precipitation, temperature, humidity and wind, with the necessary energy for development: hydraulic, solar and wind. The atmosphere gives us abundant water, without which we could not think of sustainable development, the only thing that is required of us is to learn to use it to achieve it, it can run out, and our future generations will suffer critical periods of scarcity Figure 5.

Figure 5. Map of The Dominican Republic showing radiation, precipitation, temperature humidity and wind, with the necessary energy for development: hydraulic, solar and wind.

The System of Valleys and Mountains oriented east to west favors the development of rain clouds and formation of cloud forests with rainfall that feeds surface and groundwater.

The role of mountains in the production of water

The annual rainfall map immediately highlights the role of the mountains and mountain ranges in the distribution of rainfall, however, there is an additional rainfall contributed by the forest itself that should be highlighted at this time. In conditions of periods of drought imposed by the climate regulatory centers and where many localities in the Dominican Republic have been pressured by the scarcity of water due to prolonged periods of drought that exceed 120 days, the dynamics in the upper part of The mountains is different, every day due to the heating of the sun, the humid air of the valleys rises and becomes saturated, condensation occurs, millions and millions of water droplets appear, grouped in the mists and mountain mists that are captured by the plants. until producing large drops that fall to the ground. Cloud forests must be evaluated to determine the contribution to our Hydrological Cycle figure 6,7 and 8.

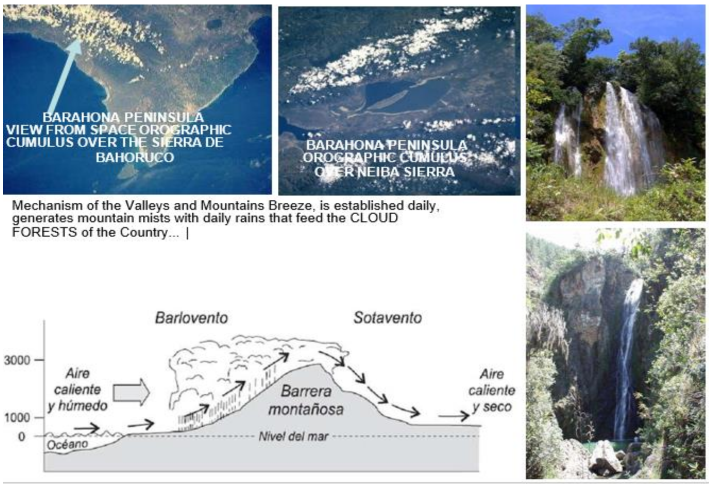


Figure 6. Hydrological Cycle

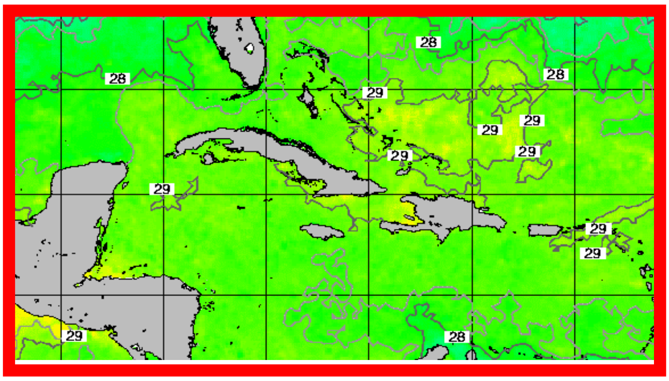


Figure 7. Temperatures of sea waters (29 C)

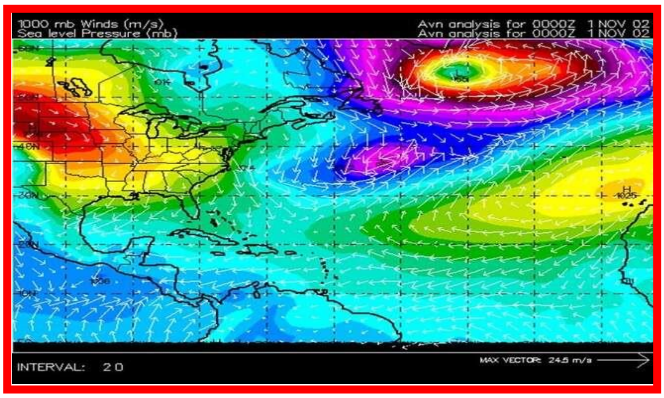
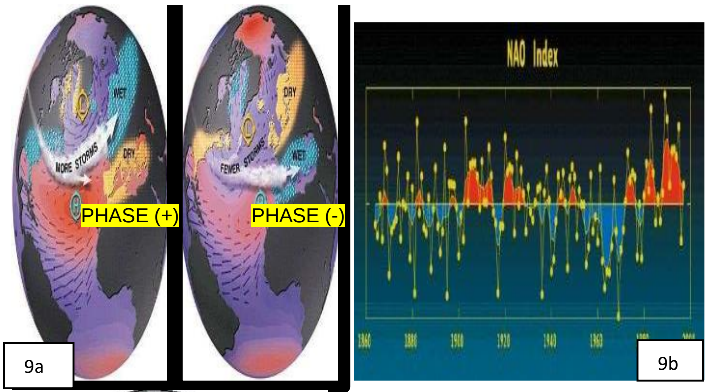


Figure 8. East winds of the north Atlantic anticyclone

On a global scale we also have ace the Climate Regulatory Centers, where we must mention the two most influential, the North Atlantic Oscillation, and the Southern Oscillation or ENSO, better known as the El Niño and La Niña of the equatorial Pacific Ocean; Finally, we must include the global warming due to anthropogenic influences. In other words, if we really wanted to understand and understand the variability of our climate for its use, we must analyze all those influences mentioned above. If these did not exist, the climatic variables, being a small country, would not have much difference; however, in the following table of selected stations from different regions of the country, we can note that the variable "monthly average precipitation" has great differences. in the same station, and also between the values of stations located in different regions [1], such as Santo Domingo and Villalpando, or Villalpando and Villa Nizao. The average maximum rainfall in Villarpando is 86 millimeters in October, while in Santo Domingo the maximum is 188 in May, and that of Villa Nizao is 314 in May.

The influences of the s Patterns ORocean-At mospheric

Scientists have identified several anomalies in the behavior of the Oceans that are transmitted to the atmosphere and cause changes in the world's climates. The most common are El Niño and the Southern Oscillation (ENSO)related to oscillations in the temperatures of the surface waters of the Equatorial Pacific, the second North Atlantic Oscillation the NAO, associated with air masses moving north to south in the North Atlantic Figure 9a and b. When you talk about the boy, refers to when the sea waters are warmer than normal in the eastern equatorial Pacific and when they are colder the girl, in both conditions there are important changes in the weather in many parts of the world, there are intense rains in South America, droughts in Africa and Australia with Forest Fires. In both scenarios, THE BOY or THE GIRL changes are generated in the local climates of various areas of the Dominican Republic Figure 10a and b.



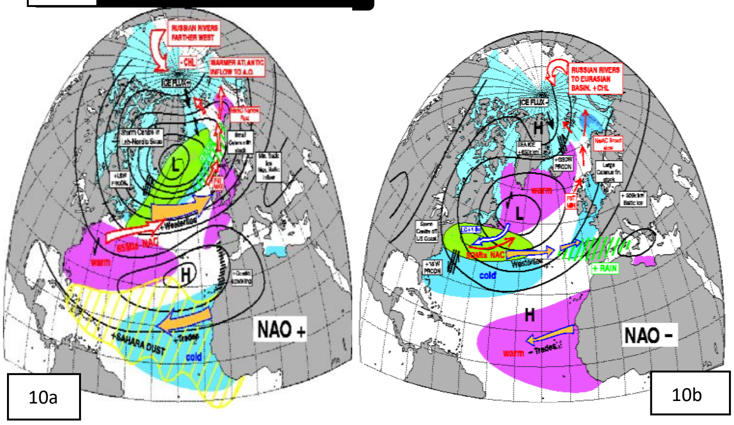


Figure. 9a and b, 10a and b. The local climates of various areas of the Dominican Republic

NORTH ATLANTIC OSCILLATION (NAO): The teleconnections of our Climate with the North Atlantic Oscillation, the NAO It consists of an index resulting from the pressure difference between the low located over Greenland and the high associated with the anticyclone of the Azores islands. They establish the positive phase which is characterized by pressures below the normal in high latitudes of the North Atlantic and high pressures in the central Atlantic, to the east of the USA and to the west of Europe. In the negative phase moves to the south of the pressure centers, both phases are related to the position of the North Atlantic jet stream and these in turn to the trajectories of extra-tropical storms. If these did not exist, the climatic variables, being a small country, would not have much difference; however, in the following table of seasons in different regions of the country, we can note that the variable "monthly average precipitation" has great differences in the same station, and also between the values of stations located in other regions such as Santo Domingo, Villalpando and Villa Nizao. The average maximum rainfall in Villarpando is 86 millimeters in October, while in Santo Domingo the maximum is 188 in May, and that of Villa Nizao is 314 in May [2] Figure 11.

Meterology, Climate and Disasters

Minimum Monthly — Maximum Monthly

Precipitación Media Anual de Estaciones Seleccionadas
(Milímetros enteros)

Estación	Ene	Feb	Mar	Abr	May	Jun	Jul	Ago	Sep	Oct	Nov	Dic
Tamayo	7	9	16	31	64	62	24	60	61	62	31	19
Villarpando	8	9	35	60	74	57	39	60	82	86	37	10
Jinamagao	26	32	29	63	95	64	17	23	58	69	75	38
El Novillo	204	171	244	259	335	170	207	188	241	328	368	238
Los Jengibres	190	133	141	203	286	123	171	170	152	247	364	229
Villa Nizao	99	107	160	175	314	278	141	211	258	299	208	120
Puerto Plata	203	156	135	160	152	73	78	88	88	147	297	309
Las Américas	49	41	42	65	134	107	100	143	149	143	100	62
Bonao	107	108	118	204	333	139	176	204	180	252	248	146
Bayaguana	45	61	79	127	232	230	227	281	218	201	117	58
Santo Domingo	63	57	54	72	188	140	145	177	181	187	100	84

Figure 11. Average monthly precipitation selected stations

Despite the fact that interannual variations occur, prolonged periods of negative or positive phases are observed Figure 12a, b, c and d.

We believe that this is an important aspect when relating it to the increase in the number of tropical cyclones in the Atlantic basin, secondly, due to the displacement of the anticyclone, we should expect a change in the direction of the trade wind on our island, and thirdly, the possibility of receiving during the positive phase African Dust that influences the sensation of heat and well-being of people as has happened in these years coinciding with a dry period Figure 13.

Antonio Cocco Quezada

MARCAS CLIMATOLOGICAS
Días consecutivos sin lluvias

LOCALIDAD	DIAS	AÑO
Pepillo Salcedo	145	1976
Villa Vásquez	139	1948
AZUA	147	1944
Oviedo	146	1975
Tamayo	147	1991
El Cercado	145	1947
Elías Piña	147	1053
Monte Plata	121	1992
Pedernales	162	1967

Figure 12a. Weather Marks Consecutive Days Without Rain

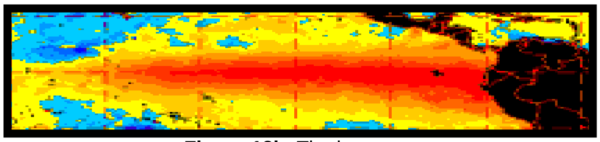


Figure 12b. The boy

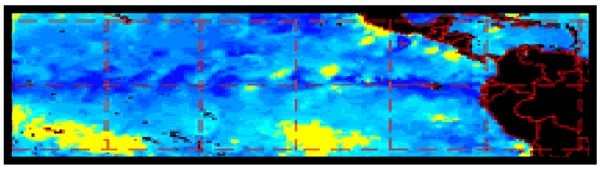


Figure 12c. The girl

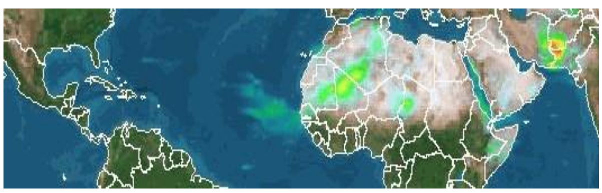


Figure 12d. African powder

Débiles - 11	Moderados - 7	Fuertes - 5	Muy Fuertes - 3
1952-53	1951-52	1957-58	1982-83
1953-54	1963-64	1965-66	1997-98
1958-59	1968-69	1972-73	2015-16
1969-70	1986-87	1987-88	
1976-77	1994-95	1991-92	
1977-78	2002-03		
1979-80	2009-10		
2004-05			
2006-07			
2014-15			
2018–19			

Débil - 10	Moderado - 4	Fuerte - 7
1954-55	1955-56	1973-74
1964-65	1970-71	1975-76
1971-72	1995-96	1988-89
1974-75	2011-12	1998-99
1983-84		1999-00
1984-85		2007-08
2000-01		2010-11
2005-06		
2008-09		
2016-17		
2017-18		

Figure. 13. Ocean events of "El Nino" and "La Nina"

On this, we carried out some investigations on the influence of the two phases of the southern oscillation on our climate and without delving into them we found that the Dominican Republic did not escape the effects of the El Niño indicated and on February 2, 1983 a forest fire broke out, in conditions of extreme drought, which affected 51,200 forest tasks in the area of Valle Nuevo, Constanza. In 2005 a prolonged drought that spread eastward from Cuba produced the largest known forest fire, the Gajo del Toro fire in the Cordillera Central. The availability of water and the inflows to the reservoirs also respond, the Tavera Dam registered the lowest average flow of a year in 1982 with 17.7 cubic meters per second and the second of 19.1 cubic meters per second with the warm event of 1997 [3]. At the other extreme, the highest inflows have occurred in 1988 with 51.7 cubic meters per second and in 1999 with 51.8 cubic meters per second, both extremes in La Niña years; These are signals that we must take advantage of in our investigations Table 1 and 2.

Climatic Behavior in "La Niña" Events Regions Dominican Republic

TEMPORADA FRONTAL (Nov – Abr/Decilos)

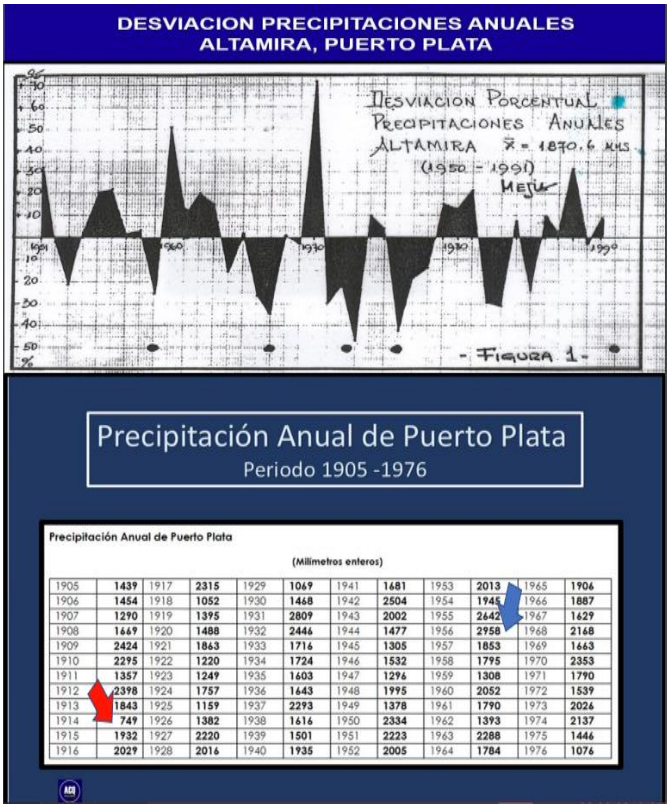
La Niña	La Vega	Cabral	Luperón	Bayaguana	El Cercado
1950	HUMEDO	SECO	-----------	SECO	SECO
1955	NORMAL	NORMAL	NORMAL	SECO	SECO
1957	SECO	SECO	NORMAL	SECO	SECO
1965	NORMAL	SECO	HUMEDO	SECO	SECO
1971	HUMEDO	SECO	HUMEDO	SECO	SECO
1974	NORMAL	SECO	HUMEDO	SECO	SECO
1976	HUMEDO	SECO	HUMEDO	NORMAL	SECO
1985	NORMAL	SECO	HUMEDO	NORMAL	SECO
1986	HUMEDO	NORMAL	HUMEDO	SECO	NORMAL

ACTIVIDAD CONVECTIVA (Mayo – Julio)

La Niña	La Vega	Cabral	Luperón	Bayaguana	El Cercado
1950	NORMAL	SECO	NORMAL	HUMEDO	SECO
1955	HUMEDO	HUMEDO	NORMAL	HUMEDO	HUMEDO
1957	SECO	NORMAL	SECO	HUMEDO	NORMAL
1965	HUMEDO	HUMEDO	SECO	HUMEDO	NORMAL
1971	NORMAL	SECO	SECO	HUMEDO	NORMAL
1974	NORMAL	NORMAL	SECO	HUMEDO	NORMAL
1976	SECO	NORMAL	SECO	NORMAL	NORMAL
1985	SECO	HUMEDO	SECO	NORMAL	NORMAL
1986	HUMEDO	NORMAL	SECO	HUMEDO	SECO

As you can see in the table, we chose the La Niña years that had been proposed to us, we selected five stations in different Regions and we chose the Period from November to April that we have called frontal activity due to the influence of cold fronts. The results could not be more evident, in La Niña years we must expect rainfall above normal in the Luperón area, but in the stations of Cabral de la Hoya on Lake Enriquillo, Bayaguana in the Eastern Plain and El Cercado in the Valle from San Juan de la Maguana, we should not expect rain. This is extremely interesting.

The relationship between ENSO and the climate of the Dominican Republic is evident, especially in the coastal plains of the North Atlantic, where rainfall decreases. Naturally, when rainfall is scarce in any part of the country, there is less cloudiness and more direct radiation increases temperatures. As an example, and using the indices developed by the Japan Meteorological Agency for ENSO, we find that 16 weather stations of the Dominican Republic established minimum annual rainfall records during the cold event in 1967 and others did so with the Niños of 1976 and 1991 Figure 14 and 15.



Precipitación Anual de Puerto Plata

(Milimetros enteros)

1905	1439	1917	2315	1929	1069	1941	1681	1953	2013	1965	1906
1906	1454	1918	1052	1930	1468	1942	2504	1954	1945	1966	1887
1907	1290	1919	1395	1931	2809	1943	2002	1955	2642	1967	1629
1908	1669	1920	1488	1932	2446	1944	1477	1956	2958	1968	2168
1909	2424	1921	1863	1933	1716	1945	1305	1957	1853	1969	1663
1910	2295	1922	1220	1934	1724	1946	1532	1958	1795	1970	2353
1911	1357	1923	1249	1935	1603	1947	1296	1959	1308	1971	1790
1912	2398	1924	1757	1936	1643	1948	1995	1960	2052	1972	1539
1913	1843	1925	1159	1937	2293	1949	1378	1961	1790	1973	2026
1914	749	1926	1382	1938	1616	1950	2334	1962	1393	1974	2137
1915	1932	1927	2220	1939	1501	1951	2223	1963	2288	1975	1446
1916	2029	1928	2016	1940	1935	1952	2005	1964	1784	1976	1076

Figure 14. Annual precipitation of Puerto Plata

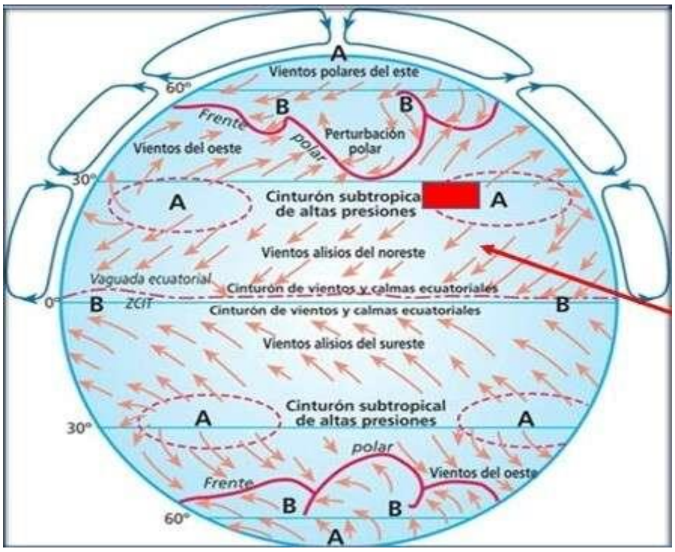


Figure 15. Climate of the Dominican Republic

Understanding the dynamics of our country's climate has been our goal in recent years, which is based on the processes that produced in the general circulation of the atmosphere, and that together with the Geographical characteristics are the two fundamental elements for the configuration of our climate.

Taking as a starting point the average rainfall from the country's meteorological stations, we have managed to define zones related to atmospheric systems that develop from Africa to the Canadian plains despite being under the influence of the North Atlantic trade winds.

On the other hand, we have the meteorological systems that we regularly hear in the meteorological reports that inform us about the weather forecast or analyze climatological data, and they are going to refer to some of these factors, the general circulation, the trade wind, the mass of Tropical Maritime air, subtropical and equatorial jet currents, subtropical troughs, advection of cold air, cold lows in altitude, polar fronts, prefrontal troughs, wind shears, Tropical Waves and Tropical Cyclones. On a global scale we have the Climate Regulatory Centers, where we must mention the two most influential, the North Atlantic Oscillation, and the Southern Oscillation or ENSO, better known as the El Niño and La Niña of the equatorial Pacific Ocean. If we want to understand and comprehend the variability of our climate for its use, we must analyze the influences mentioned above [4].

In subsequent editions and referring to the same climatic event, the fact is highlighted that, while there is a severe drought in the south and east, in the northern regions the rains have been extreme, falling copious and continuous downpours, generating abundant crops of cocoa and tobacco. This was pointed out also by Charlevoix in 1730, so that the main characteristics of the Climate were maintained despite having passed 175 years. If we really manage to establish a better-founded relationship between the ENSO and the Climate of the Dominican Republic,we would be at the door of a climate forecast more than six months in advance that would allow us to plan all the activities of the nation's productive sectors.We are going to show the example that we presented at the III IRI Meeting on Climate Research held in Santo Domingo, to defend our thesis that the regional forecasts did not represent what should happen in our country due to the difference in existing regional climates. Figure 16, 17, 18 and 19.

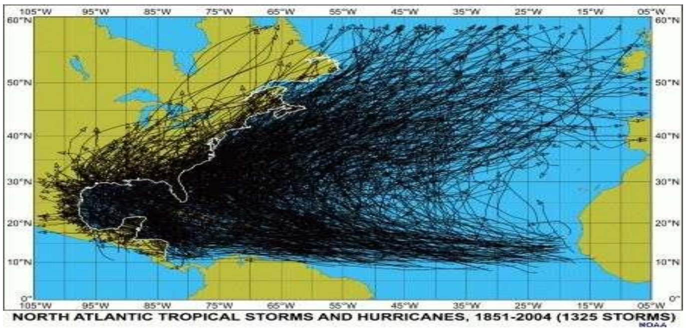


Figure 16. North Atlantic tropical storm and hurricanes, 1851-2004

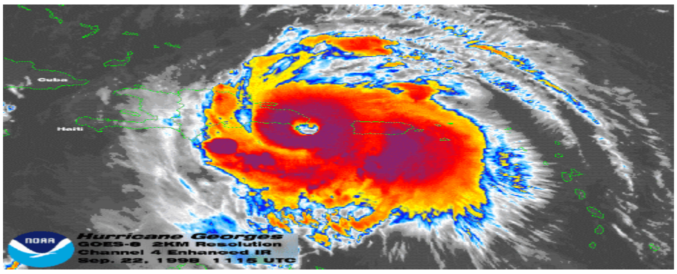


Figure 17. Hurricanes Georges

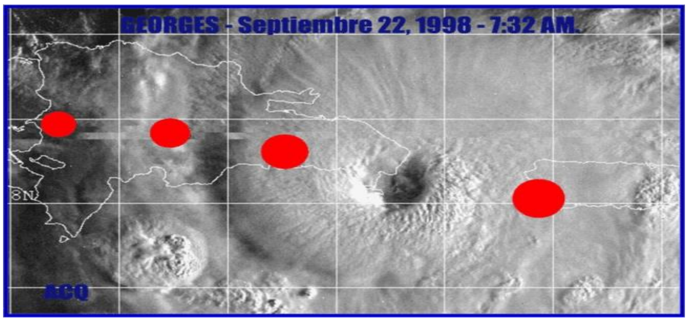


Figure 18. Georges- September 22, 1998

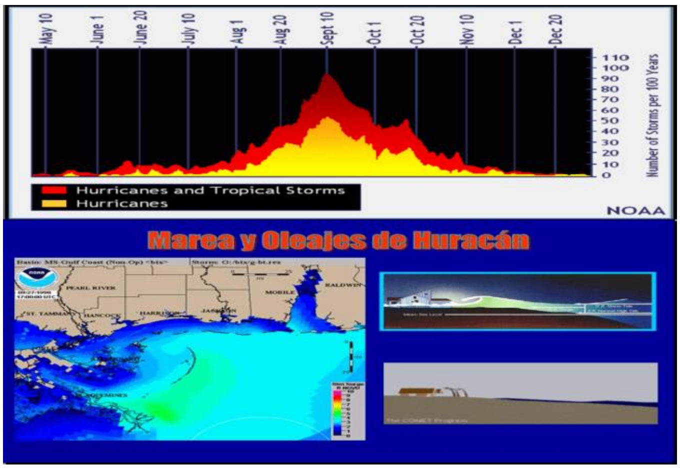


Figure 19. Storm surge in Georges

The power of hurricanes

The destructive power of hurricanes is based on the excess of water and the high speed of the winds they generate, being the deadliest of its effects: The Storm Tide, which is an accumulation of sea waters on the coasts capable of producing severe flooding and a large number of deaths. The historical value in the region is 6,000 deaths in Galveston in 1970 and the highest recorded in the Dominican Republic was produced by Hurricane DAVID in 1979 Figure 20. When a hurricane approaches the Dominican Republic we must take into account:

- Storm surge.
- High speed of the winds according to the Hurricane Scale.
- Intense rains with large river floods, floods and others.
- Tornadoes.

Storms Rain Extreme Cyclones Tropical

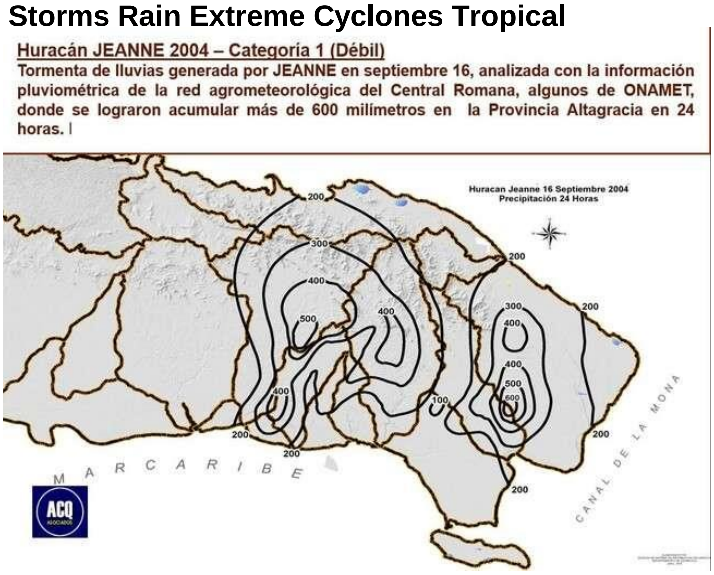


Figure 20. Huracan Jeanne 2004

It should be taken into account that in the area where the maximum precipitation was generated, the storm stagnated and a change in translation movement occurred.

ISOYETS of the Rain Storm of Hurricane DAVID of 1979 where more than 600 mm were measured in 24 hours and more in the area of Valle Nuevo and adjacent areas, we understand that some adjustments must be made due to wind speed. Hurricane DAVID at those times It was moving to the west northwest Figure 21 and 22.

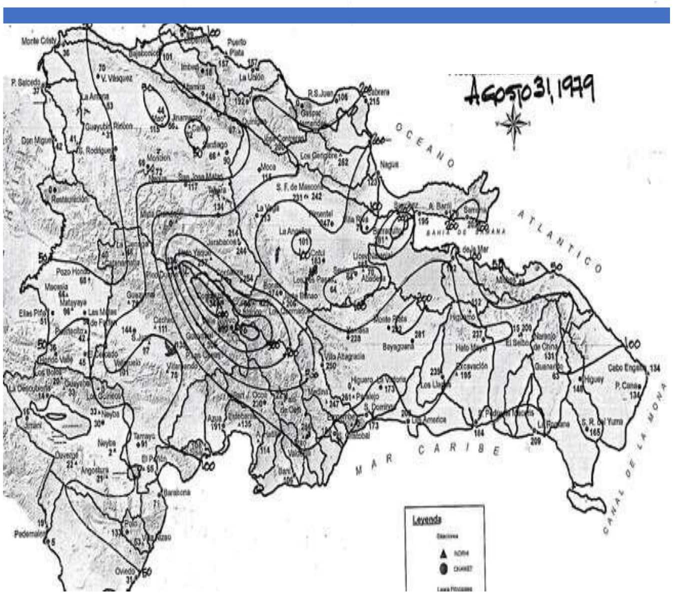


Figure 21. Rain storm and hurricane

Pluviometry Dominican Republic

Figure 22. Orography of the Dominican Republic

Factors involved in the climate of the Dominican Republic

In order to take advantage of the Climate, we must not only know the mean values and their variables that allow us to plan various activities, but also to understand the deviations that these values are recorded. The Climate of the Spanish Island or Santo Domingo, as we have seen. It is under the influence of the North Atlantic anticyclone and the air mass it generates, of the TROPICAL MARITIME type. Due to these influences and our geographical position, it is said that our CLIMATE is tropical and humid, due to the type of air mass that covers the island practically throughout the year. The temperature of the sea waters and the moisture content of the air will have important repercussions on the observed time. Precipitation is the main variable for development, we believe that enough water reaches us from the atmosphere and that we can regulate a more efficient use, so that Drought Periods do not cause so much havoc in the National Economy [5].

Oliver Fassig, first meteorologist to obtain a doctorate in Meteorology in the Americas and working in San Juan, Puerto Rico published in 1929, the first isohyet map in his work A tentative chart of Annual Rainfall over the island Haiti – Santo Domingo, where some of the main features of the distribution of rainfall are observed Figure 23.

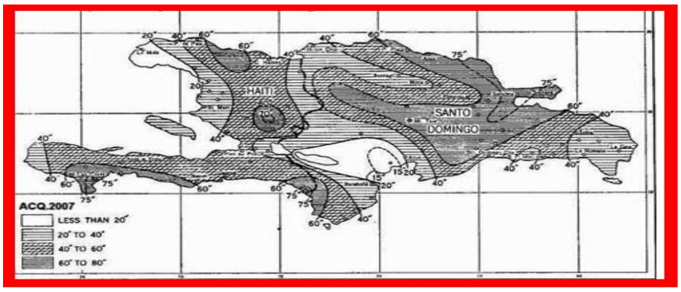


Figure 23. Isoy map andtas of the Republic Dominican

Map Dominican Republic recipes

Leo Alpert in the year 1940 with more information than Fassig and considering the importance that the exposure of mountains to wind circulation plays in the increase in rainfall, develops his map where the maximum and minimum pluviometric centers appear more defined Figure 24.

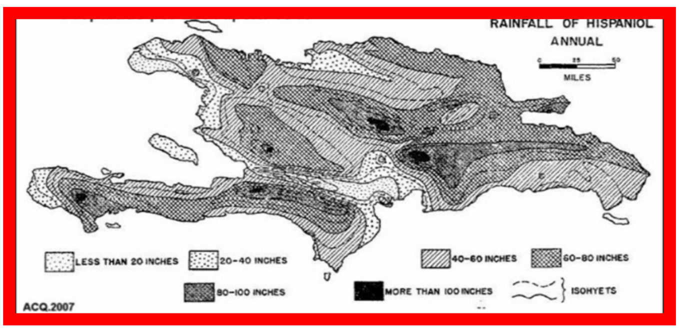


Figure 24. Isoyets Island Annuals Spanish 1940 ALPERT

Annual precipitation MAPS – Dominican Republic

International organizations: Something that we must highlight in these maps are the areas prone to desertification, a topic of interest in the scientific community and in the process of global warming, are the four centers of rainfall deficit in the country, to which attention must be paid, to try to stop these processes as much as possible, which are linked to the excessive use of the soil and inadequate management of the forest. The province of Pedernales in the southern part of the Barahona peninsula, the Hoya del Lago Enriquillo, the lower Yaque del Norte basin in the northwestern region, and the upper part of the Central Cordillera stand out Figure 25 and 26.

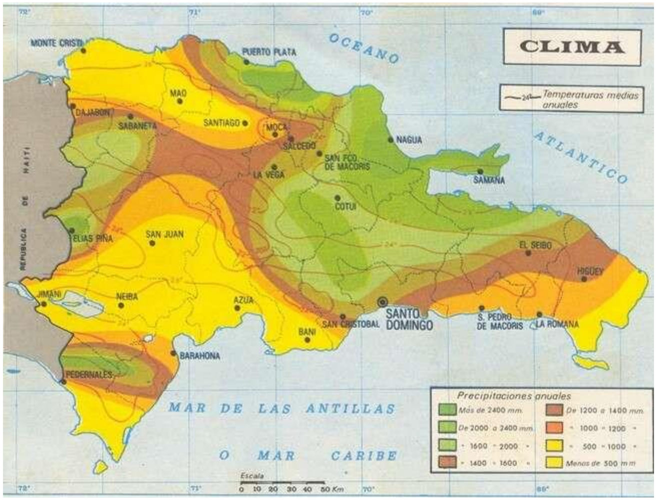


Figure 25. Areas prone to desertication.

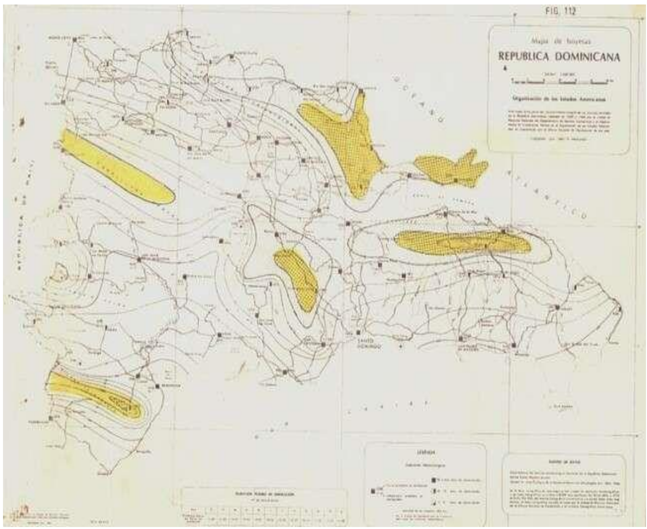


Figure 26. The province of Pedernales in the southern part of the Barahona peninsula

Monthly behavior: In the month of JANUARY, we are influenced by the Winter Systems and, as noted in the Map corresponding to January, they occur in the North Atlantic Coastal Plains, the Northern Cordillera. Oriented west northwest to east southeast. The month of FEBRUARY, the maximums of January are weakened and the areas are reduced in their pluviometric values, we can say that the rains are reduced throughout the Country. The month of MARCH, the maximums of January are weakened and the areas are reduced in their fluviometric values, we can say that the rains are reduced throughout the Country. The month of APRIL, the maximums of January are weakened and the areas are reduced in their pluviometric values, we can say that the rains are reduced throughout the Country. The month of May, it is characterized by frequent convective processes, the period of Electric Storms begins. The month of June, the maximums of the convective processes are weakened, they are more associated with the western part of the Central Cordillera. The month of JULY, the pluviometric maximums are weakening, the maximums associated with the Central Cordillera. The month of AUGUST, the areas of effective precipitation are reduced in the northwest and southwest Figure 27. The month of September, the rains decrease north of the Central and Eastern Cordillera.The month of October, rainfall is dominant throughout the Central Cordillera and in the Northeast and Eastern Region. The month of November, the rains are concentrated in the northeast and Atlantic coasts, including the Samana Peninsula. The month of December, they remain in the

Northern Cordillera and the Atlantic Plains.

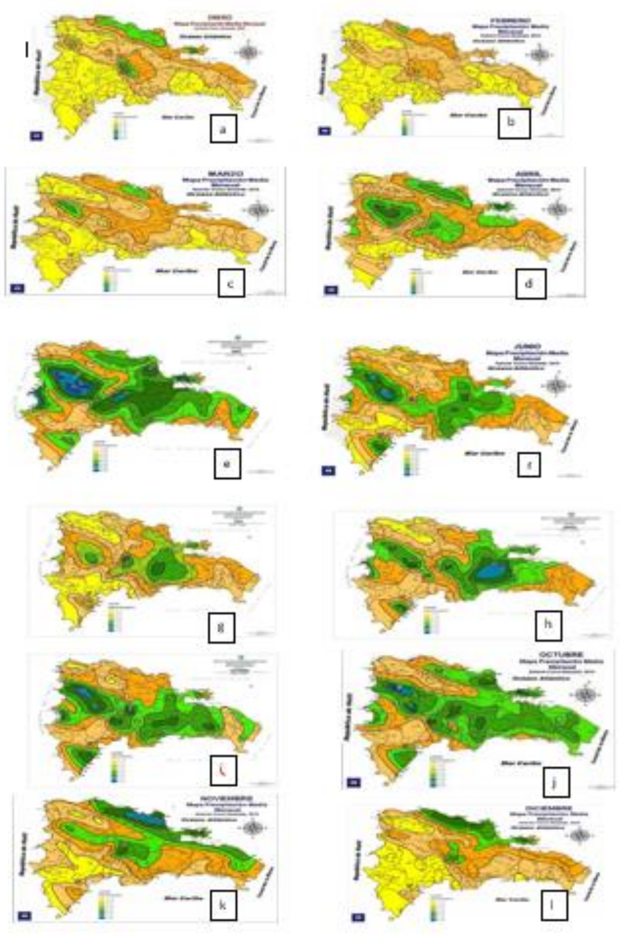


Figure 27. Monthly behavior in the months January - December

Behavior regions (Geomorphic)

Average precipitation in natural regions: The natural or geomorphic regions are defined according to the forms of the terrestrial relief, and have a great relationship with the behavior of the Climate, as we have seen in the analysis of the distribution of previous rainfall, we are going to associate them with the AVERAGE ANNUAL PRECIPITATION, so that the different sectors of national development, mainly the educational and environmental sectors of the Dominican Republic can handle and use them in Geography classes and others Figure 27 and Table 3. The Dominican Republic has a complex relief that interacts with rainfall generating systems in 22 natural regions:

1. Central Cordillera
2. Northern Cordillera
3. Eastern Cordillera
4. Sierra de Samaná
5. Sierra de Neyba
6. Sierra de Bahoruco
7. Sierra of Yamasá
8. Sierra de Martín García
9. Los Haitises
10. Cabrera Promontory
11. Procurrent of Barahona
12. The Atlantic Coastal Plains
13. Sabana de La Mar and Miches Coastal Plains
14. Caribbean Coastal Plains
15. Coastal Plain from Azua.
16. Cibao Valley
17. San Juan Valley
18. Bonao Valley
19. Villa Altagracia Valley
20. Hoya de Enriquillo
21. In tramontane valleys of the Central Cordillera.
22 In tramontane Valleys of the Sierra de Neyba.

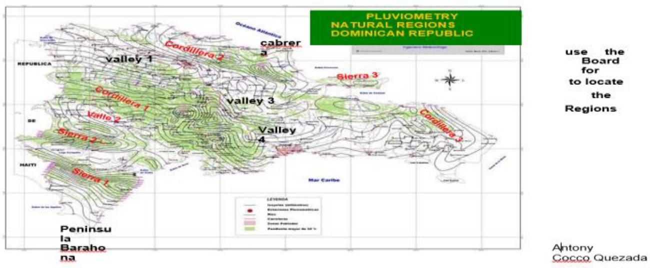


Figure 28. Fluvometry natural regions Dominican regions.

mountain ranges	saws	valleys	coastal plains	valleys	promontories	Peninsula
				intramontaneous		
Central	bahoruco	Cibao	Atlantic	Central Cordillera	cabrera	Barahona
Northern	neyba	San Juan	Sabana de la Mar and Miches	Sierra de Bahoruco		
Oriental	Samana	Bonao		Sierra de Neyba		
			Caribbean			
		Villa Altagracia	Azua	Hoya Enriquillo		

Table. 3. Mountain ranges

Central Cordillera and Its Intermountain Valleys Jarabacoa, San Jose De Ocoa, Constanza, Rancho Arrira and Restauracion

This region has 9 meteorological stations of the SMN, Surge men of rain has its maximum precipitations in the autumn and in less quantity in the summer and the spring; thus Rancho Arriba and Constanza almost equal their rains in Atafio, spring and summer, San 'Jos de la Matas, Monci6n and Jarabacoa have their maximum average in spring, it is- Guidüs closely for those of autumn. On the other hand, the least rainy season of the year is winter, except for Jarabacoa, which has its dry season in summer. 2 The rainiest localities are the valleys of Rancho Arriba, Restauraci6n and Jarabacoa with 1,500 mm to 1,435 mm", average rainfall per year and an average frequency of 140 to 110 rainy days. The driest localities are Padre las Casas, Sa Jd se de Ocoay Constanza with 730 mm to 930 mm: average annual rainfall and an average frequency from 93 in Padre las Casas to 122 rainy days in Constanza,

Central mountains: According to final analyzes in the Central Cordillera, the most important annual rainfall occurs with values greater than millimeters. The maximum precipitations in the Autumn and in less quantity in the Summer and the Spring; thus Rancho Arriba and Constanza almost equal their rainfall in spring and summer, San José de las Matas, Monción and Jarabacoa have their maximum average in spring, followed by autumn. On the other hand, the least rainy season of the year is winter, except for Jarabacoa, which has a dry season in summer. 2 The rainiest localities are the valleys of Rancho Arriba, Restauración and Jarabacoa 1,500 mm to 1,435 mm, average rainfall per year and an average frequency of 110 to 140 days of rain. The driest localities are Padre las Casas, San José de Ocoa and Constanza with 730 mm to 930 mm of rain per year and an average frequency from 93 in Padre las Casas to 122 days of rain in Constanza.

Northern Cordillera: It is in the north of the country in the Province of Puerto Plata, in this region we have measurements in Altamira and Yasica, it is the rainiest mountain system in the country, with annual averages of 1980 in Yasica and 1820 in Altamira, with average frequency of 134 to 100 days. It presents its rainy season in autumn, winter and spring with averages of 600 mm, approximately in the AtoRo and 550 mm to 450 mm in winter and spring. Its dry season is in the summer with average rainfall of 300 mm to 270 mm, which is half of what falls in each of the other seasons of the year.

Cabrera Promontory: Located in the NE end of the north coast, it has an average annual pluviometry of 1,680 mm and a frequency of 6 rainy days per year. Its maximum rainfall occurs in the fall with 570 mm, equaling its rainfall in the three constant seasons (winter, spring and summer) with averages of 350 mm to 380 mm.

Samana sierra: It is one of the rainiest areas of the country every al. extreme NE of the country; we have its meteorological observatories located towards the interior of the bay, in narrow coastal plains, these are: S5nchez, Samaná and Arroyo Barril. It has annual rainfall averages above 2,000 mm; Samani has the fifth highest average in the country, with 2,212 mm and the highest frequency with 212 rainy days on average, its rainy season in the fall with 700 mm in Samaná, 650 in Arroyo Barril and 600 in Sánchez. Abundant rains in the summer with averages between 560 to 530 mm; spring accumulates average rainfall from 580 mm to 450 mm. Winter presents the season with the least rain, however these amount to 450 mm and 400 mm.

Eastern cordillera: With our meteorological stations in El Seybo and H to Mayor located at the foot of the mountain. It receives rains with pr 8 r I, annual averages of 1~340 mm in El Seybo and 1,580 in Hato Mayo r and a frequency of 137 to 122 days of 11 grapes on average per year.

Its rainy season occurs in the fall with 530 mm in Hato Mayor and 390 in El Seybo; The summer and spring rains are also important with an average of 490 mm to 320 mm. The dry season is in the winter with 190 mm in El Seybo and i55 in Hato Mayor. CARIBBEAN COASTAL PLAIN: In this region we have sixteen seasons

Atlantic coastal plains

The Atlantic coastal plains: They are divided into 4 sub-regions: Llano de Bajabonico, Llano de Puerto Plata, Llano de Yasica and Llano Costero de Nagua and Boba. In this region the rains increase from the west to the east, the rainiest areas are Gaspar Hernandez with more than 2000 mm, Nagua, Rio San Juan and Imbert with an annual average of 1,730 in Imbert; the zone of Luper6n in the extreme west has an average annual rainfall of 1,250 mm and Puerto Plata-Sosua 500 mm, the rainy days are between 160 in Nagua and 94 in Luperon. The rainy season is in winter with 667 mm in Sosua, in Imbert 580 mm, and Gaspar Hernández 560 mm. equalizes its rains in the atoRo. Rio San Juan and Nagua have their highest averages in the fall with 562 and 616 mm' respectively. Its €dry season occurs in the summer in all 10- Its €dry season occurs in the summer in all 10- ealities analysed. the lowest average in Luperón with 104 mm, and the highest in Nagua, Gaspar Hernández, Rio San Juan with 385 mm in the rest of the region, the rainfall values fluctuate between the cited averages. "I The rainiest localities are the valleys of Rancho Arriba, Restauraci6n and Jarabacoa 1,500 mm to 1,435 mm", average rainfall per year and average frequency of 140 to 110 rainy days. The driest localities are Padre las Casas, San Jdse de Ocoa and Constanza with 730 mm to 930 mm: mean annual rainfall and an average frequency from 93 in Padre las Casas to 122 rainy days in Constanza.

Coastal Plains of the Caribbean

In this region we have ten, six meteorological stations, distributed in the wide plain. The rainiest areas are located towards the interior of the plain, adjacent to the Sierra de Tamasi and the western end of the Eastern Cordillera, where the towns of Yamasá, Monte Plata, Bayaguana and La Victoria are located; here the average annual rainfall values vary between 2,300 mm to 1,850 mm, with 166 to 132 rainy days. Yamasá with the highest annual rainfall in the country. The western end of the plain is very dry. The Baní zone has an annual average rainfall of 930 mm and an average frequency of 79 days; further east is San Cristobal, its average annual rainfall is 1,600 mm and 150 days of rain; continuing to the east on the border of the coast - 9 - ~, tero is located Santo Domingo and further inland, The Llanos in these two zones the average annual rainfall is 1,400 mm. y147 to light rains/decreases 118 days of rain. Following the cost edge. reaching 1,000 mm in San Pedro de Macoris and Cabo Engaño and a minimum of 870 mm annual average in La Romana. In San Rafael del Yuma and Higuey located inland. from the plain the rains increase to 1,400 mm annual average, the frequency of rain from San Pedro de Macorís for the rest of the plain varies between 170 to 118 days. The rainy season occurs in the summer and autumn with seasonal averages from 800 to 400 mm in the rainiest areas and from 400 to 200 in the driest. Winter is its dry season for the entire coastal plain with values means from 300 mm in Yamasa to 80 mm in Baní. y147 to light rains/decreases 118 days of rain. Following the cost edge... reaching 1,000 mm in San Pedro de Macoris and Cabo Engaño and a minimum of 870 mm annual average in La Romana. In San Rafael del Yuma and Higuey located inland. from the plain the rains increase to 1,400 mm annual average, the frequency of rain from San Pedro de Macorís for the rest of the plain varies between 170 to 118 days. The rainy season occurs in the summer and autumn with seasonal averages from 800 mm to 400 mm in the rainiest areas and from 400 to 200 in the driest. Winter is its dry season for the entire coastal plain with values means from 300 mm in Yamasa to 80 mm in Baní. y147 to light rains/decreases 118 days of rain. Following the cost edge. reaching 1,000 mm in San Pedro de Macoris and Cabo Engaño and a minimum of 870 mm annual average in La Romana. In San Rafael del Yuma and Higuey located inland. from the plain the rains increase to 1,400 mm annual average, the frequency of rain from San Pedro de Macorís for the rest of the plain varies between 170 to 118 days. The rainy season occurs in the summer and autumn with seasonal averages from 800 to 400 mm in the rainiest areas and from 400 to 200 in the driest. Winter is its dry season for the entire coastal plain with values means from 300 mm in Yamasa to 80 mm in Baní. 000 mm in San Pedro de Macoris and Cabo Engaño and a minimum of 870 mm annual average in La Romana. In San Rafael del Yuma and Higuey located inland. from the plain the rains increase to 1,400 mm annual average, the frequency of rain from San Pedro de Macorís for the rest of the plain varies between 170 to 118 days. The rainy season occurs in the summer and autumn with seasonal averages from 800 mm to 400 mm in the rainiest areas and from 400 to 200 in the driest. Winter is its dry season for the entire coastal plain with values means from 300 mm in Yamasa to 80 mm in Baní. 000 mm in San Pedro de Macoris and Cabo Engaño and a minimum of 870 mm annual average in La Romana. In San Rafael del Yuma and Higuey located inlan.

Cabrera promontory: Located in the extreme NE of the north coast, it has an average annual rainfall of 1,680 mm and a frequency of 6 rainy days 50. Its maximum rainfall occurs in the fall with 570 mm, equaling its rainfall in the three remaining seasons (winter, spring and summer) with averages of 350 mm to 380 mm.

Samana sierra: 6 SAMANA PENINSULA) It is one of the rainiest areas of the country, located at the extreme NE of the country; We have its meteorological observatories located towards the interior of the bay, in narrow coastal plains, these are: Sanchez, Samaná and Arroyo Barril. It has annual rainfall averages above 2,000 mm; Samana has the fourth highest average in the country, with 2,212 mm and the highest frequency with 212 rainy days. Its rainy season in the fall with 700 mm in Samaná, 650 in Arroyo Barril and 600 in Sánchez. Abundant rains in the summer with averages between 560 mm to 530 mm; spring accumulates average rainfall from 580 mm to 450 mms. Winter presents the season with the least rain, however these amount to 450 mm and 400 mm.

Cibao valley: This Valley is divided into two sub-regions, from Santiago to the west, the Yaque del Norte Valley and the Yuna Valley to the east. The Yuna Valley is the rainiest part with annual averages from 2,150 to 1,800 mm in Villa Riva, Cevicos, Cotuí and Pimentel to 1,450 mm to 1,230 mm in San Francisco, La Vega, Salcedo and Moca; its annual rainfall frequencies range from 180 in Cevicos to 132 rainy days in La Vega. Its rainy season in the fall and summer, the maximum averages in the fall in San Francisco, La Vega and Salceda with values between 400 mm at 380 mm; in Villa Riva, Cevicos, Cotuí and Pimentel their minimum values in the summer with 790 mms to 540 mms. La Vega has a maximum of rainfall in spring with 420 mm and Villa Riva almost equals its averages in autumn and summer. In the Yaque del Norte Valley, rainfall decreases with annual averages between 1,160 mm in Dajabon and 1,020 in Santiago, barely reaching 700 mm to 670 mm. In the rest of the subregion, the frequency of rainfall is from 130 to 107 days in Santiago and Dajabon up to 75 to 60 rainy days on annual average. In this part of the valley, the most abundant rains occur in the fall of 60 with average values from 350 mm in Dajab6n to 210 in Montecristi. Spring also presents important rains with 300 mm on average in Dajab6n and Santiago and 200 to 160 in the rest of the season. subregion. The dry season occurs in winter with 177 mm to 96 mm on average for this entire part of the Cibao Valley, except in Montecristi, which has its least rainfall in summer and a secondary maximum in winter. Dajabon is the rainiest area and has average, similar seasonal gods in the spring, summer and autumn with average values between 310 mm and 308 mm. The valleys of Bonao and Villa A1tagraci~ located between the Central Cordillera and the Sierra de Yamasá are among the rainiest regions of the country with annual averages from 2,230 mm to 2,270 mm and a frequency of 155 and 173 rainy days. The Bonao Valley has its rainy season in autumn and spring with 510 mm, the least rainy winter with 360 mm. The valley of Villa Altagracia presents its rainy season in the summer with 776 mm, it continues in autumn with 690 ~m, in the spring it drops to 516 mm on average~ Winter is the least rainy season with an average of 280 mm. The Bonao and Villa Altagraci~ valleys, located between the Central Cordillera and the Sierra de Yamasá, are among the rainiest regions of the country with annual averages of 2,230 to 2,270 mm and a frequency of 155 and 173 rainy days. The Bonao Valley has its rainy season in autumn and spring with 510 mm, the least rainy winter with 360 mm. The valley of Villa Altagracia presents its rainy season in the summer with 776 mm, it continues in autumn with 690 m, in the spring it drops to 516 mm on average~ Winter is the least rainy season with an average of 280 mm. The Bonao and Villa Altagraci~ valleys, located between the Central Cordillera and the Sierra de Yamasá, are among the rainiest regions of the country with annual averages of 2,230 mm to 2,270 mm and a frequency of 155 and 173 rainy days. The Bonao Valley has its rainy season in autumn and spring with 510 mm, the least rainy winter with 360 mm. The Villa Altagracia valley presents its rainy season in the summer with 776 mm, it continues in autumn with 690 ~m, in the spring it drops to an average of 516 mm, Winter is the least rainy season with an average of 280 mm. the less rainy winter with 360 mms. The Villa Altagracia valley presents its rainy season in the summer with 776 mm, it continues in autumn with 690 ~m, in the spring it drops to an average of 516 mm~ Winter is the least rainy season with an average of 280 mm. the less rainy winter with 360 mms. The Villa Altagracia valley presents its rainy season in the summer with 776 mm, it continues in autumn with 690 ~m, in the spring it drops to an average of 516 mm Winter is the least rainy season with an average of 280 mm.

Coastal plains of sabana de la mar and miches

Significant rains are generated under the influence of the entry of the northeast trade wind generated by the Atlantic Anticyclone, and the influence of the Sierra de Samana. Sabana de la Mar, has the third highest average annual rainfall value in the country with 2,263 mm, an average of 200 rainy days are recorded, Miches records 145 days and an annual average of 1,750 mm. In the Autumn season, the highest average of 680 mm is recorded in Sabana de la Mar and 550 in Miches; During the summer and spring they also receive abundant rainfall with 600 mm to 400 mm. Winter is the season with less rain, registering 370 to 400 on average.

Eastern corillera: The meteorological stations in El Seybo and Hato Mayor located at the foot of the mountain. Annual averages of 1,340 mm are recorded in El Seybo and 1,580 in Hato Mayor, with an average of 137 to 122 days per year, with autumn values of 530 mm in Hato Mayor and 390 in El Seybo; The summer and spring rains are also important with an average of 490 mm to 320 mm. The dry season is in winter with 190 mm in El Seybo and i55 in Hato Mayor.

Azua coastal plain: From the Azua area to the west, there is one of the driest regions of the country, the Azua station has an annual average of 665 mm with 62 rainy days. Its rainy season is autumn with 290 mm, in winter 48 mm of rain on average.

San juan valley: Represented by the towns of San Juan, Tas Matas de Farfán and Elías Piña; In this region, rainfall increases spatially towards the west, thus San Juan registers an average of 950 mm per year, Las Matas de Farfán 1,012 mm and Elías Piña 1,870 mm. The frequency of rains between 95 to 93 rainy days per year. During the course of the year the rains are distributed in a similar way in spring, summer and autumn with seasonal averages of 600 mm in Elías Piña and 350 to 250 in Las Matas and San Juan. Winter is the driest season with only 66 mm to 30 mm of average rainfall.

Hoya de enriquillo: The rainiest locality is Barahona with just 1,020 mm of average rain per year, and 100 rainy days on average. In the rest of the region. the average annual rainfall values oscillate between 760 mm in Cabral and 480 in Tamayo. Its rainy season is autumn with 400 mm in Barahona and 154 in Tamayo; the summer and spring receive rains of some importance 11 that vary between 270 mm in Jimaní and Cabral and 110 mm average in Tamayo, for each seasonal season. Winter is "the end of the dry season, with 100 mms in Barahona and around 30 mm in Neyba and Duvergé

Intermountain valleys of the sierra de neyba

In the intramontane valleys of El Cercado and Hondo Valle, rainfall reaches average annual values of 1,100 mm in El Cercado and 1,500 in Hondo Valle on 85 and 112 days respectively. Its rainy season is Autumn with 530 mm to 400 mm of rain; summer and spring are from 480 mms to 300 mms. The dry period is winter.

Sierra de bahoruco: It is represented by the town of Polo and Elías Piña, the rainiest areas in the Southwest of the country. Polo receives annual rainfall of 1,870 mm and 154 days of rain, on average. Its rainy season is Summer with 700 mm on average, also Autumn with 630 mm. Winter is the dry period, although with significant rainfall of 200 mm on average.

Barahona peninsula: Represented by the towns of Enriquillo, Oviedo and Pedernales. Near Enriquillo is the rainiest area with 1,400 mm per year in 112 days, Pedernales on the other side of the peninsula is the driest area with 496 mm per year in 44 days. Oviedo, in the center of the peninsula, registers an average annual rainfall of 830 mm on average and 64 days of rain, in the spring between 100 mm to 400 mm on average; Winter is its dry season, the rains decrease to 150 mm in Enriquillo, 87 in Oviedo and 38 mm in Pedernales Figure 28.

Figure 28. Pluviometria cuena del rio yaque del norte Dominican region

Precipitation Climate Periods (Convective-Tropical – Frontal)

The climatic periods and climate dynamics: After all these experiences from the Tainos, Charlevoix, the World Centers, the frequency of hydro meteorological disasters, the results of Climate Change and the need for Sustainable Development, we needed a Model that would respond to all these experiences, and that would also respond to variations within a given period of time, in a region or regions. We achieve a classification based on CLIMATE PERIODS, as follows:1) A Period where the easterly winds grew enough to allow intense convection and the development of powerful downpour clouds, thunderstorms, and possible tornadoes.2) Another period where Tropical Waves and Cyclones predominated, and 3) At the time of the year when the rains depend on the Winter Meteorological Systems: Fronts and Troughs. Contrary to what happened to us with the seasonal analysis of rainfall from spring to winter, this allowed us to better understand the variability of our Climate and also explain the interconnection with events in the equatorial Pacific.

The classification we have arrived at considers a period of CONVECTIVE ACTIVITY three months from May to July, a period TROPICAL ACTIVITY from August to October and a period of FRONT ACTIVITY from November to April, with two short transition periods, one in the second half of April from frontal to convective activity where we went from an atmosphere with subtropical to tropical characteristics, and another in the first half of November from tropical to the front where we pass in reverse from a tropical atmosphere to a subtropical one.. Seeing the climate in this way, we can better understand why it rains in winter in the coastal plains of the North Atlantic, the causes of the rains in the South in summer, the cause of seasonal droughts, the difference in behavior of the Tavera and Valdesia dams, which It happens in Puerto Plata in the coastal plains of the North Atlantic, which receives the highest rainfall in the 3 months of November, December and January due to the passage of frontal systems that come from the United States. In the south, the Las Américas International Airport station registers the highest monthly values in the months of August, September and October, coinciding with the period of tropical activity, while in the interior of the country the month of maximum precipitation is May within the period of convective activity [6-10].

Dominican climatic periods (Cocco)

The different scenarios for the generation of rains lead us to the fact that they do NOT have influence throughout the Year, that they are periodic. In the analysis we found the following results, considering the pluviometric activity in each of the months analyzed Figure 29.

FRONT ACTIVITY CONVECTIVE ACTIVITY TROPICAL ACTIVITY	November – April May July August to October
Transition Periods	
Frontal to Convective Convective to Tropical Tropical to Frontal	15 – 30 April 15 – 30 July 15 - 30 October

NOTE

The advance or delay of the transaction periods are related to climatic variability, which depends on the behavior of oceanic thermal oscillations.

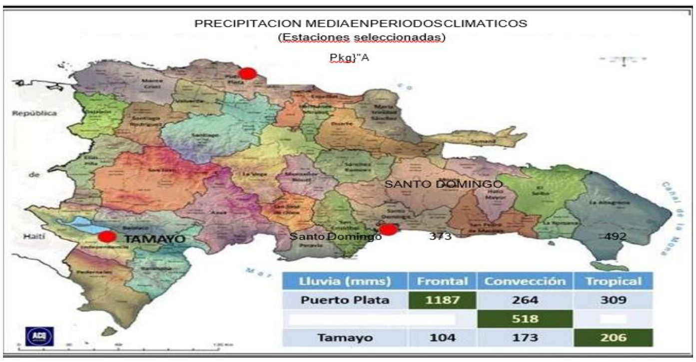


Figure 29. Precipitation media

As you can see in the table, we selected 5 stations in different regions and we chose the period from November to April that corresponds to the Frontal Activity due to the influence of cold fronts. The results could not be more evident, in La Niña years we must expect rainfall above normal in the Luperón area, but, in the stations of Cabral de la Hoya of Lake Enriquillo, Bayaguana in the Eastern Plain and El Cercado in the Valley of San Juan de la Maguana,NOwe must wait for rain, this is extremely interesting Table 4.

TEMPORADA FRONTAL (Nov – Abr/Decilos)

La Niña	La Vega	Cabral	Luperón	Bayaguana	El Cercado
1950	HUMEDO	SECO	-----------	SECO	SECO
1955	NORMAL	NORMAL	NORMAL	SECO	SECO
1957	SECO	SECO	NORMAL	SECO	SECO
1965	NORMAL	SECO	HUMEDO	SECO	SECO
1971	HUMEDO	SECO	HUMEDO	SECO	SECO
1974	NORMAL	SECO	HUMEDO	SECO	SECO
1976	HUMEDO	SECO	HUMEDO	NORMAL	SECO
1985	NORMAL	SECO	HUMEDO	NORMAL	SECO
1986	HUMEDO	NORMAL	HUMEDO	SECO	NORMAL

Table.4. Front season

The isolines of percentage values of the accumulated precipitations in the November-April Period. under the influence of the Frontal Systems, it tells us, that in the north of the Country 70% of the average annual rain is received and in the regions of the South and SW coasts barely 20% figure 30.

Figure 30. Precipitation media percentage

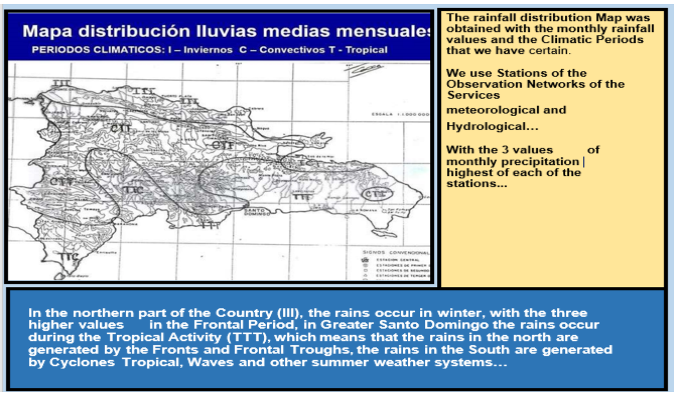


Figure 31. Rainfall distribution map

Conclusion and relevance for a sustainable future

Nature has blessed us with the main resource that it can give us, a favorable climate for our development, but it leaves us with the problem of knowing how to exploit it properly, to make it sustainable, we cannot allow the disappearance of the rivers, nor the aggression against the mountains. We have abundant water, however, poverty is linked to the availability of water, that is, there is something that we are not adequately understanding and perhaps it could be, the inadequate management of extreme climatic conditions where meteorological droughts intervene, so common and recurrent in our country and this can be verified by the rural migrations that have taken place in the last decades. It seems evident then, that the solution is to include the Climate, as a fundamental element, in the development of the Nation to obtain better results, and through a Climate economy or Econo-climatology, the economic and production aspects can be managed according to the Climate. However, we would have to do that considering the two "packages" that the climate provides us, the beneficial forces that generate wealth, and the evil forces that cause destruction and death. Regarding the first ones, we must fully exploit the optimal environmental conditions, radiation, wind force, temperatures and humidity, among others. Regarding the latter, we would not do anything if the evil forces destroy in a few hours everything that has not cost years; it is necessary, then, to really lead us along the path of development substantially improve the management of risk so that climatic disasters do not ruin those plans that we all have to leave future generations a country capable of providing them with the well-being that we can enjoy. Developed countries were able to achieve it and have done well economically, for example, Chinese companies tired of suffering avoidable losses have begun to pay attention to climatic factors, a change in attitude that is leading to the adoption of various types of meteorological services, for example, Chinese companies are adopting the international practice of taking weather forecasts into account when launching their products. This trend will contribute to expanding the national demand for this type of service. Some examples of the average monthly rainfall in different seasons in the Dominican Republic can give us an idea of the rainfall behavior in the three climatic periods. In addition, for your information, the annual precipitation series of the Puerto Plata station where the rains occur in the period of frontal activity from November to April. This organization will allow us to meet the main immediate challenges of the Dominican Republic, monitoring and preparation of the Country on Global Warming and the impact of global climate change, conserving and properly managing water resources, ensuring greater efficiency in the management of natural disasters, food production depending on the climate and taking advantage of climatological energy resources, and poverty reduction.

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