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DESCRIPTION OF THE GEOGRAPHIC FACTORS AND ATMOSPHERIC CIRCULATION SYSTEMS ACTIVATING IN THE STATE OF PARÁ, BRAZIL

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ABSTRACT
As an integral part of the doctoral research entitled: "Climate dynamics and rainfall in the state of Pará, Brazil: proposal for a climate classification", this work was developed, considering the theoretical-methodological framework shaped by Geographical Climatology, particularly from the guidelines offered by Monteiro (1973), which propose an understanding of atmospheric dynamics in conjunction with surface attributes, which are the relief and its topography. Thus, it was a matter of understanding such attributes competent to the state of Pará, with the premise that in the future, in the final outcome of the research, employing the other steps concerning Monteiro's proposal (1973). As results obtained, an interpretation of the elaborated thematic cartographic production is highlighted, aimed at representing the geomorphological and topographic components, in association, still, with the atmospheric circulation systems operating in the state of Pará.
Keywords: Geographical Climatology, Relief, Atmospheric Systems.

DESCRIÇÃO DOS FATORES GEOGRÁFICOS E DOS SISTEMAS DE CIRCULAÇÃO ATMOSFÉRICA ATUANTES NO ESTADO DO PARÁ, BRASIL

RESUMO
Como parte integrante da pesquisa de doutorado, intitulada: "Dinâmica climática e as chuvas no estado do Pará, Brasil: proposta de classificação climática", foi desenvolvido este trabalho, considerando o arcabouço teórico-metodológico moldado pela Climatologia Geográfica, particularmente, a partir das orientações ofertadas por Monteiro (1973), que propõem um entendimento sobre a dinâmica atmosférica em conjunto aos atributos de superfície, sendo estes o relevo e sua topografia. Assim, tratou-se de compreender tais atributos competentes ao estado do Pará, com a premissa de no futuro, no desfecho final da pesquisa, empregar as demais etapas concernentes a proposta de Monteiro (1973). Como resultados obtidos, ressalta-se uma interpretação da produção cartográfica temática elaborada, voltada a representar as componentes geomorfológica e topográfica, em associação, ainda, aos sistemas de circulação atmosférica atuantes no estado do Pará.
Palavras-chave: Climatologia Geográfica, Relevo, Sistemas Atmosféricos.

INTRODUCTION

This work is an integral part of the doctoral research, in the development phase, entitled: "Climate dynamics and rains in the state of Pará, Brazil: proposal of climate classification", being established under the framework theoretical-methodological molded by Geographic Climatology, particularly from the orientations offered by Monteiro (1973).

Geographic Climatology, through the understanding of the rhythm of succession of the types of time, is based on the integration between the different attributes responsible for the climate of a given region. Fact that, in the analysis of these, atmospheric agents are sequenced in order to specify the climatic dynamics under a genetic premise.

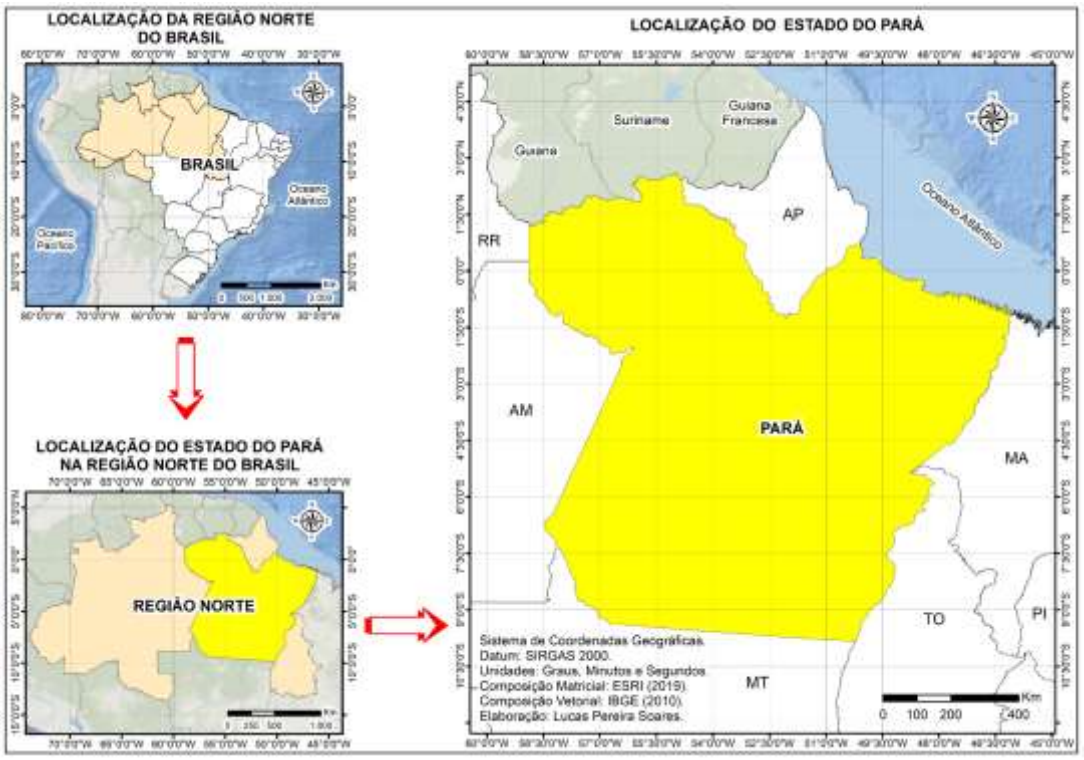
The understanding of this dynamic, however, must be preceded, as Monteiro (1973) guides, by an initial recognition of the fixed surface attributes, which are mainly shaped under the topographic and geomorphological components, allow to characterize these geographical factors as agents responsible for influencing the weather conditions. Thus, it was a treatment to understand the fixed surface attributes relevant to the state of Pará, with the premise that in the future, in the final outcome of the research, the other steps concerning Monteiro's proposal (1973) were used.

The development of the characterization of the relief was carried out by the interpretation of the geomorphology classification of the Brazilian Institute of Geography and Statistics (IBGE, 2006), in spatial clipping to the state of Pará, with the topography analyzed from data from the Shuttle Radar Topography Mission (SRTM) project.

As general results of these interactions, we highlight the cartographic elaboration of geomorphology and altimetry maps, supporting the development of a division of the state of Pará into 4 large areas, which even endorsed by heterogeneous conditions, in view of geomorphological and topographic attributes, allow a better organization and visualization of these superficial features in the vast expanse of the territory of Pará. Together with this, an association with geomorphology and topography maps was also promoted, a broad presentation of atmospheric systems operating in the region, trying to synthesize them through the indication of territorial genesis of these.

Figure 1 highlights the state of Pará, which, as an area of study, is located in the Northern region of Brazil, bordering the states of Maranhão and Tocantins to the west, Amazonas and Roraima to the east, Mato Grosso to the south, being to the north delineated by the Atlantic Ocean, also bordering Amapá and bordering Guyana and Suriname, located in the low equatorial latitudes, between 10º South and 3º Norte.

Figure 1 - Location of the state of Pará.



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METHODOLOGY

The research follows the approach established by Monteiro (1973), based at this moment, and from this work, by an initial description of surface agents, individualized by the arrangement and altimeter composition of the relief. The other procedures listed by Monteiro (1973) will later be developed in the framework of doctoral research, being dependent on this initial stage, which thus demarcated a recognition and description of the studied area.

In view of this context, in view of this priority need to describe the territory of Pará, according to its geomorphological and altimeter aspects, the following list lists the materials used for the elaboration of cartographic products used in the interpretation of such factors:

- IBGE geomorphological classification (2006) in shapefile layer, available on the online site: https://bdiaweb.ibge.gov.br/#/consulta/geomorfologia;

- Topographic data from the Shuttle Radar Topography Mission (SRTM) project, in raster layer, collected next to the address: https://earthexplorer.usgs.gov/.

The cartographic treatment of these materials was performed from the ArcGIS Pro manager, considering:

- The organization of a mosaic of radar images, under spatial resolution of 30 meters, from the composition of the raster SRTM 1 Arc Seconds layers, comprising the entire South American territory, however emphasizing the state of Pará, through the production

of a topographic map, as a contribution to the understanding of the altimeter levels of Pará;

- Organization of the corresponding information the relief units classified by IBGE (2006), through the spatial cutout to the territorial limits of the state of Pará, subsequently proceeding to the elaboration of the map of geomorphological units.

Together with this geomorphological and topographic information, we highlight an update of Nimer's proposal (1989), referring to the distribution of "atmospheric circulation systems in South America and Brazil", however, for this work, the spatial scale is restricted to the state of Pará, proposing this update on the dynamic systems that act in the region, cardinally emphasizing the direction of their entry in geomorphology and topography maps.

With the cartographic products elaborated, an organization is developed that better adjusts the presentation and description of the geomorphological classification and altimetric levels, which integrated the overview on dynamic systems, refers to an initiation to the integration between fixed surface agents with those dynamic altitude.

THEORETICAL REFERENCE

Based on precepts more organized in favor of a science marked by the method of analysis, the proposals for spatialization of the physical-environmental variables that, in primacy, highlight the exquisite contribution of Halley (1683), from which the foundation, served as the basis for the geographical reading developed by Humboldt (1817), focused on the method of spatialization by isolines, stands out, responsible for influencing a range of other authors.

This method developed by the author, as highlighted in Humboldt (1817 apud GAY-LUSSAC and ARAGO), with the elaboration of the "Carte des Lignes Isothermes", becomes widely accepted and employed by climatologists, either in the development of encyclopedic and atlas publications, such as Woodbridge (1823) and Berghaus (1838 apud BERGHAUS, 1845), or even in more specific studies, such as that of Mühry (1856), already framed in the work of the Humboldtian medicine line (RUPKE, 1996).

This developed spatial logic also allows the interest of Humboldt himself, from the publication of the Cosmos (HUMBOLDT, 1875), in the understanding of the variation of climates, or even their elements, in favor of an association with geographical factors, especially the emphasis that, as the author's object of study, associates it with vegetation development and temperature variation in the midst of the altimeter contrast.

However, this premise of spatialization of climatological variables, considering a relationship with geographic factors, becomes less usual in the works of greater repercussion that follow, a fact that marks, for example, the initial proposal of the Köppen climate classification (SANT'ANNA NETO, 2001) based on the mapping of vegetation developed by Augustin de Candolle, in a relationship between climate and vegetation (AYOADE, 1996), which, however, in the final version, in Köppen (1918), demonstrates more attention only to the spatialization of temperature, rainfall and its seasonal aptitude, leaving in the background the phytogeographic criterion.

Another association is developed by Strahler (1951 apud STRAHLER and STRAHLER, 1994) when considering in his proposal the framework printed in the schools of Dynamic Climatology, incorporating a genetic relationship between the dynamism of air masses and precipitation. Nimer (1989) also propose a genetic classification, bringing

prominence to the Brazilian level and aggregating quantitative and qualitative information, involving the use of average data and information on atmospheric dynamics, in a principle similar to that outlined by Strahler (1951 apud STRAHLER and STRAHLER, 1994).

However, these classifications, either under static criteria such as Köppen (1918), or by the genetic basis of Strahler (1951 apud STRAHLER and STRAHLER, 1994) and Nimer (1989), are based on approaches that do not consider the pace of succession and exceptionality of the types of time, therefore, announced only by the criterion of average time, and even, do not consolidate under superficial geographical attributes.

This integration between Geography and Meteorology is carried out by Monteiro (1973), encompassing both a qualitative study, in favor of the rhythm of succession of the types of time, and a quantitative analysis, from the average standard. The author outlines in his classification, focused on the delimitation of local climates, the interest in meteorological attributes, under the theoretical framework of meteorological systems, thus reaching a genetic foundation. At the same time, it turns to geographical criteria, when considering in its proposal the influence of surface fixed agents, being the relief in association with other geographical factors, such as geographical position and the effects of maritimity and continentality, along with the dynamism of the time types.

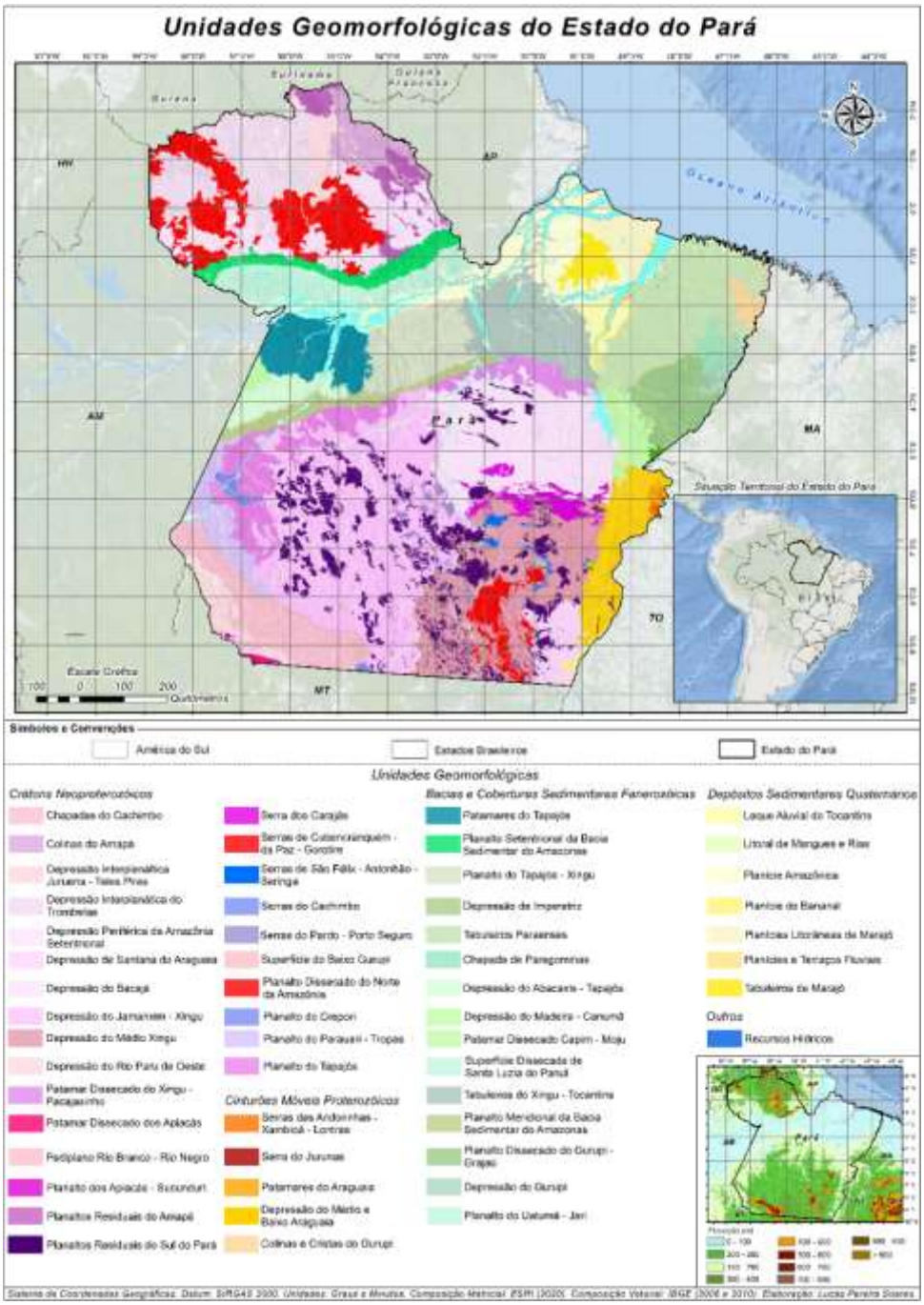
In summary, initially, based on the cartographic and spatial approach, the static climatic classifications are developed, later, the proposals of genetic classifications are proposed, and finally, the development of genetic and geographical classifications, such as that developed by Monteiro (1973), in which the rhythmic foundation is emphasized together with the geomorphological criterion, thus bringing an intrinsic geographical knowledge to the classification proposal, for an approach that unites static with dynamic.

Thus, Monteiro (1973) establishes the criteria for the delimitation of local climates, which, as he guides, is only possible by integrating atmospheric dynamism with relief. From this point of view, the author's classification proposal stands out based on geographical and meteorological criteria. In this context, it is intended to develop the proposal to delimit the climatic typologies for the state of Pará, however, as an initial approach, for the work on screen, only a description of the topographic and geomorphological aspects, associated with atmospheric circulation systems, which in a general composition, allow a initialization to the climate dynamics of Pará.

RESULTS AND DISCUSSION

As a premise of this work, the description of geographic factors reiterates the distribution of relief under the limits of the state of Pará, based on the attempt to synthesize the geomorphological and topographic components. Under the constitution of the relief, 53 geomorphological units are delimited, from the IBGE proposal (2006), distributed in Figure 2, rescursing beyond these units, the morph structural classes to which they are inserted, being: the recent geology units, defined as Quaternary Sedimentary Deposits and Basins and Phrerozoic Sedimentary Cover;the units dated from the Precambrian, established as Neoproterozoic Crátons, when formed before the Brasiliano Orogenic Cycle, or as Neoproterozoic Mobile Belts, developed during the Brasiliano Orogenic Cycle.

Figure 2 - Geomorphological units of the state of Pará.

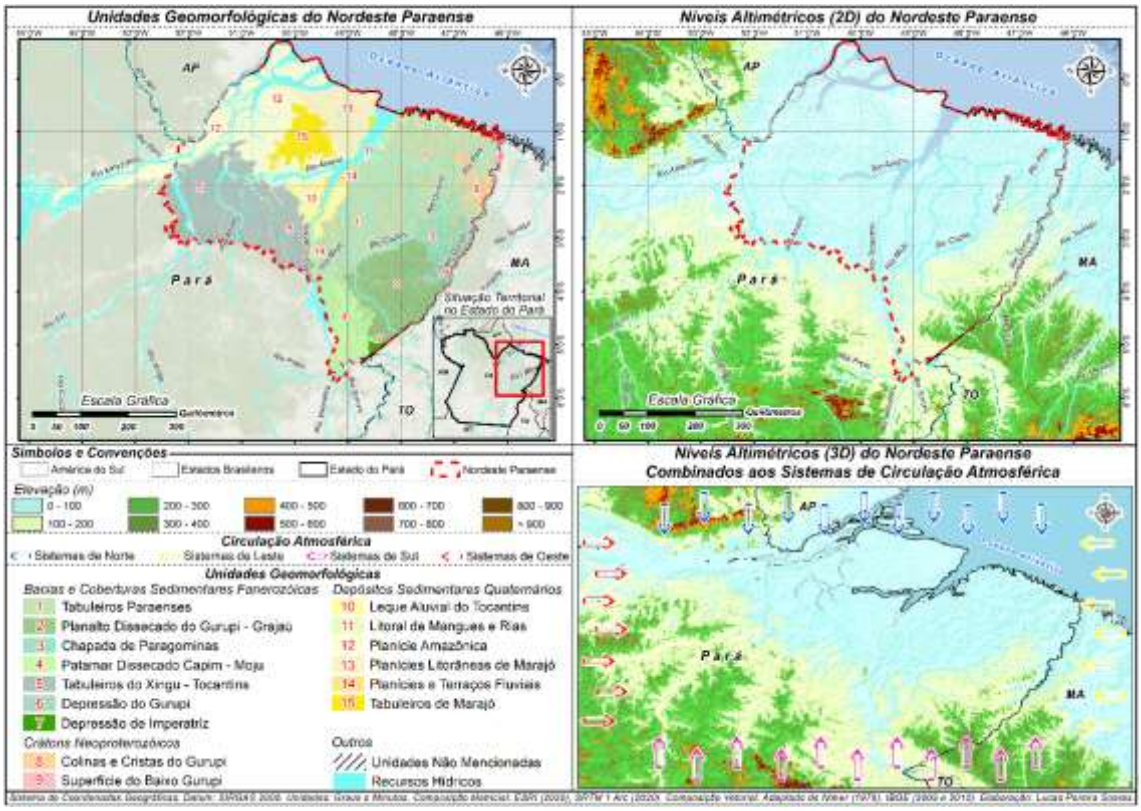


Source: elaborate by Lucas Pereira Soares.

In a joint composition, comprising both the geomorphological component and the topographic component, the territory of Pará is divided into 4 large parts, in order to establish some proximity traces that can be detailed from the presentation of the geomorphological units and that the following organization is responsible:

- Geomorphological units of northeastern Pará (Figure 3), noddedly formed by recessed lands with predominantly sedimentary morphostructure, but also marked by the presence of surface spots of morphologies structured in crátons. The altitudes in this composition vary from the base level to the elevation 200 m (Figure 3);

Figure 3 - Geomorphological units and altimeter levels of the Northeast of Pará.



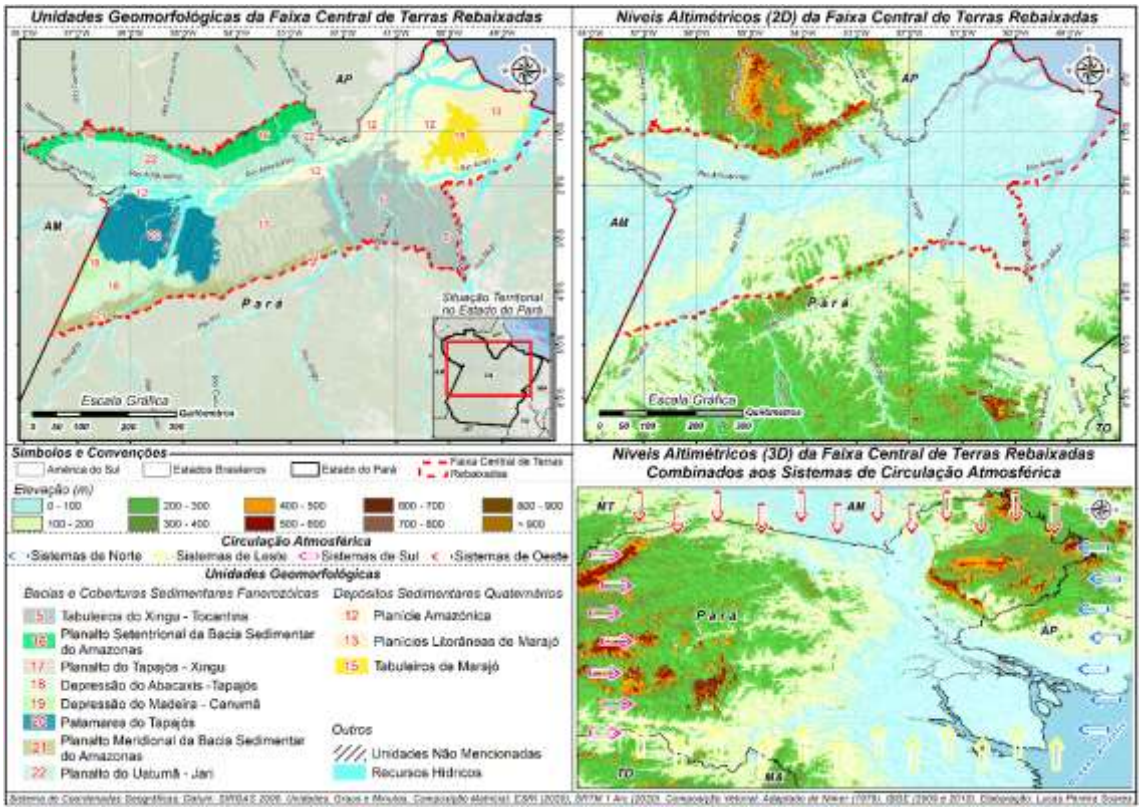
Source: prepared by Lucas Pereira Soares.

The Geomorphological Units of northeastern Pará, presented in Figure 3, are conducted under Basins, Roofs and Deposits, which on the surface are carved as: Coastal Plains of Marajó, Amazon Plain, Marajó Boards, Boards Paraenses, Xingu Boards – Tocantins, Alluvial Range of Tocantins, River Plains and Terraces, Mangrove and Rias Coast, Capim Dissected Landing – Moju, Imperatriz Depression, Paragominas High, Gurupi Depression. In a smaller spatial proportion, geomorphological formations are structured in the Neoproterozoic Crátons, such as the Surface of The Low Gurupi and the Gurupi Hills and Ridges, located already on the border with Maranhão.

In detail in Figure 3, the altimetry in these Geomorphological Units of the Northeast of Pará remains from the base level, varying only up to 100 m of elevation by large territorial part. Only in the composition that comprises the Gurupi Depression, the Plateau de Paragominas, the Dissected Plateau of Gurupi – Grajaú, the Dissected Capim Level – Moju and the Empress Depression, the levels rise and remain between 100 – 200 m. Even in the chronic reliefs, which are revealed by the Surface of the Lower Gurupi and the Hills and Ridges of Gurupi, the altitude remains lower, again not exceeding 100 m.

- Geomorphological units of the central strip of lowered lands (Figure 4), sedimentary land with predominance of modest altitudes, ranging from 0 - 300 m, in some cases, with peaks that are revealed by higher elevation, close to 850 m;

Figure 4 - Geomorphological units and altimeter levels of the central strip of lowered lands.



Source: elaborate by Lucas Pereira Soares.

They are filled in a completely sedimentary morphostructure, formed by the Amazon Plain, bordered by intermediate altimetry lands that are arranged on the right margin of this refer to the Coastal Plains of Marajó, the Marajó Boards, the Boards of the Xingu - Tocantins, the Plateau of Tapajós - Xingu and the Tapajós Levels, and on the left bank corresponds to the Uatumã Plateau – Jari.

In the rear of the Xingu - Tocantins And all the Tapajós - Xingu, under an East-West orientation stands out the Southern Plateau of the Amazon Sedimentary Basin. Encrusted between this and the Landings of Tapajós, it is, on the border with the state of Amazonas, the Depression of Madeira - Canumã and the Pineapple Depression - Tapajós. On the other bank, the Uatumã Plateau – Jari is parallel to the Northern Plateau of the Amazon Sedimentary Basin. It should be noted that these units of Southern and Northern Plateau limit the sedimentary terrains that make up the Geomorphological Units of the central strip of lowered lands, as observed in Figure 4.

Its modest altitudes, highlighted in Figure 4, are formatted by altimetric steps, initially between 0 – 100 m, stands out the entire Amazon Plain, with units immediately adjacent to it, such as Tapajós Plateau – Xingu and Tapajós Levels, on the right bank, and the Uatumã Plateau – Jari on the left bank, presenting as transition units with altitudes ranging from 0 – 100 m, in the places in contact with the Amazon Plain, and ranging between 100 - 200 in the inner areas.

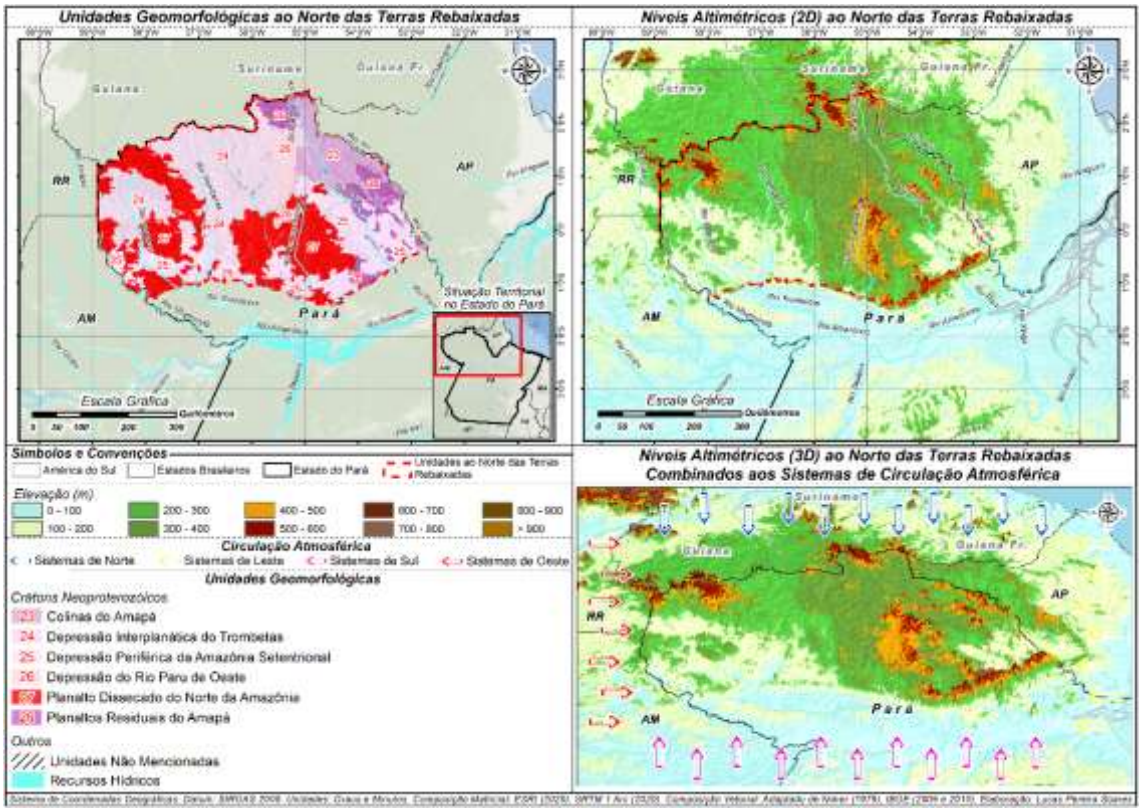
As far as the clearance of the plain region is removed, the elevation is higher. In the interiors of the Units of Plateau do Uatumã - Jari and Plateau do Tapajós - Xingu, some features with altimetric classes between 200 - 300 m are also evidenced. This altimetric

pattern, however, has a higher predominance in the Southern and Northern Plateaus of the Amazon Sedimentary Basin.

Both Plateaus are quite worn, but the Northern Plateau of the Amazon Sedimentary Basin is highly elevated, with its plateau to the West aligned between the levels of 500 – 600 m, marked by exceptions, of lower spatial representation, where the tops reach values between 800 – 850 m.

- Geomorphological units to the north of the lowered lands (Figure 5), formed primarily by chronic lands, whose elevation in general is characterized under levels starting from 100 to 800 m altitude.

Figure 5 - Geomorphological units and altimeter levels to the north of the lowlands.



Source: elaborate by Lucas Pereira Soares.

Moving inland, towards the cratonic compositions, as observed in Figure 5, these units are figured initially by the Peripheral Depression of Northern Amazonia, notably distributed from East to West in the midst of the highest altitudinal composition reliefs, such as the Residual Plateaus of Amapá, the Amapá Hills and the Northern Amazonian Dissected Plateau. Other Depression Units are also fitted between these higher complexes, such as the vast and spaced Interplanatic Depression of Trombetas, and in a smaller territorial extension, the Depression of the West Paru River.

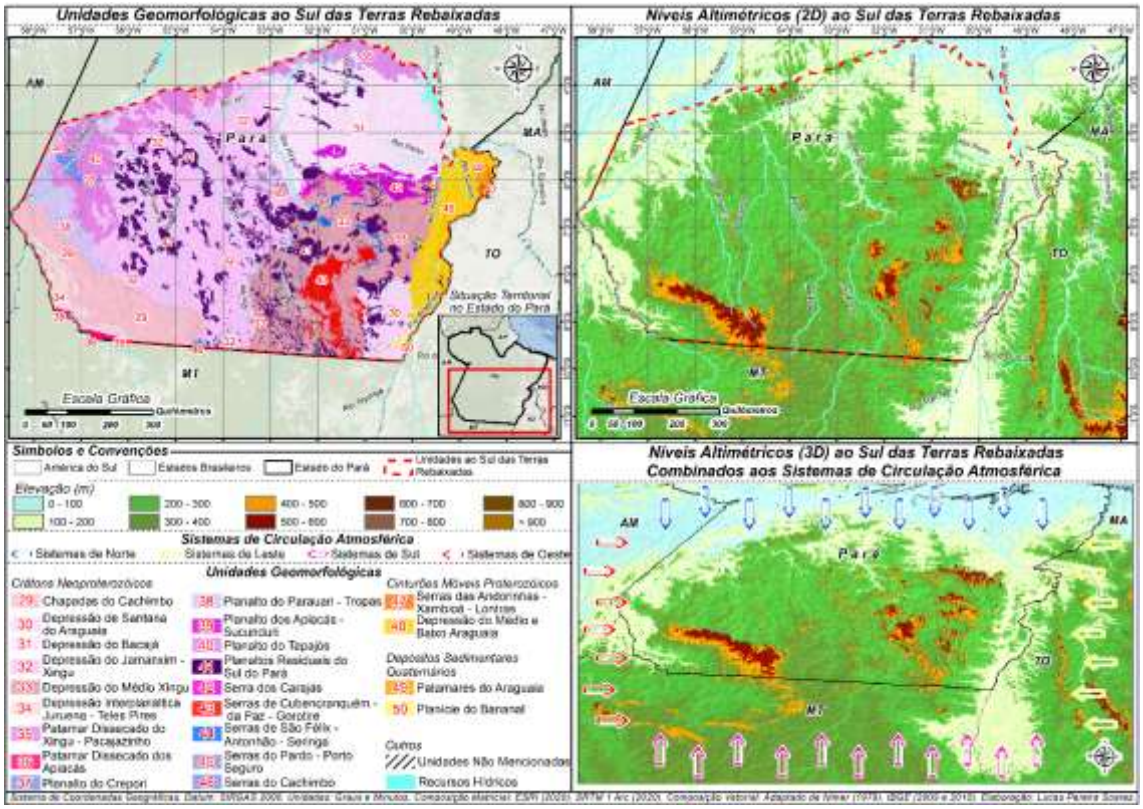
According to Figure 5, in the eastern portion of these Units, altimetric levels varying between 300 - 400 m predominate. In the western strip the levels decay, remaining between 200 - 300 m, however quite representative also at 100 - 200 m. The Colinas do Amapá, with sharp tops varying in altitude between 500 - 600 m, the Planate Dissuade do

Norte da Amazônia and the Plateau Residuals of Amapá are structured at 500 - 600 m, but with sharper tops at 700 - 800 m.

The Depressions arranged in altitudes that vary, in the eastern range from 300 - 400 m and in the western range, mainly, between 100 - 300 m, impede the formation of a cohesive block of the higher compartments, in this case we observe corridors of lower lands, guided by the altimetric gradient in the constitution of several valleys, characteristic of the linear wear of the relief caused by the hydrographic basins of the rivers of greater competence.

- Geomorphological Units to the South of the lowlands (Figure 6), formed primarily by cratonic terrains, whose elevation in general is characterized under the levels between 200 - 850 m. To a lesser extent, Neoproterozoic Orogenic terrains, with more modest elevations ranging from 100 - 300 m, stand out.

Figure 6 - Geomorphological units and altimeter levels in the South of the lowlands.



Source: elaborate by Lucas Pereira Soares.

These Units (Figure 6) begin from the cratonic reliefs that configure, from East to West, the Dissected Panama of the Xingu - Pacajazinho, the Tapajós Plateau and the Parauari Plateau - Tropas. Embedded among these is the Jamanxim - Xingu Depression, which together with the Bacajá Depression, the Médio Xingu Depression and the Santana do Araguaia Depression, form the most territorially representative complex of units of this portion of Geomorphological Units to the South of the lowlands.

In the midst of these Depressions, the Residual Plateaus of South Pará and the mountainous complex that comprises the Carajás Mountains, the Cubencranquém - da Paz - Gorotire ranges, the Pardo - Porto Seguro ranges, the São Félix - Antonhão - Seringa

ranges, and in the extreme south border with Mato Grosso, the Cachimbo Mountains, accompanied by the plateau do Cachimbo and the other units located in the southwestern portion of the state, such as the Juruena - Teles Pires Interplanar Depression, the Plateau dos Apiacás - Sucunduri and the Apiacás dissected plateau

. Close to the border with the State of Amazonas, the Crepori Plateau is encrusted between the already mentioned Parauari - Tropas Plateau and Tapajós Plateau. These are modulated units in highly eroded and lowered terrains, whose nomenclature as plateaus is given in function of their morph structural composition.

In the southeast, bordering the state of Tocantins, we highlight the relief formatted under the Neoproterozoic Mobile Belt, which in the state of Pará, include the Depression of the Middle and Low Araguaia, followed by less spatial expression by the thresholds of Araguaia and the Andorinhas - Xambioá - Lontras Mountains. In this portion of the territory, following the immensity of the Tocantins River, is the so-called Bananal Plain, located on the border of Pará with the states of Mato Grosso and Tocantins, as shown in Figure 6.

In these, the altimetric definition seen in Figure 6, is drawn, primarily, under surfaces of Depressions, which are distributed under average altitude between 200 - 300 m and considering the land compartments closest to the main channels of the large surface water bodies, being the rivers Amazonas, Tocantins, Xingu and Tapajós, the altimetry of these relief units remain under even lower levels, between 100 - 200 m, with such surfaces represented by various compositions ranging from lowered plateaus to Depressions.

The highest compartments of these Geomorphological Units to the South of the lowlands are located in the Southwestern part of the state. Exposed under these characteristics is the Chapadas do Cachimbo complex, with flat tops ranging from 500 - 700 m. And established in the midst of the Depressions, are the Residual Plateaus of South Pará and the Cubencranquém - da Paz - Gorotire ranges, with higher peaks between 700 - 800 m. Marked by an even higher elevation, between 800 - 850 m, is the Serra dos Carajás. It is important to remember, however, that despite the higher altitudes in these mountainous or plateau morphologies, in this southern portion, lowered terrain with elevations between 200 - 300 m predominate, mainly associated with depressions.

Again, as well as in the Geomorphologic Units to the North of the lowlands, the higher lands located to the South are not sustained by large homogeneous strips of land, only the Chapadas do Cachimbo complex is more representative, the others are isolated blocks, or residual reliefs, separated by linear erosion associated to the hydrographic basins of the rivers of greater competence.

Given this situation, and in a general overview of the Pará context, the places marked by lower altimetric levels are, notably 1 - the central strip of sedimentary lands that is cut by the Amazon River; 2 - the entire West of Pará portion, under direct interference of the basins of the Trombetas and Tapajós rivers; 3 - the entire Southeast strip that follows influenced by the basin of the Tocantins River; 4 - the Center-South portion shaped by the basins of the Xingu River and the Anapu River; and, finally, 5 - the Northeast of Pará, worked by the entire river system that surrounds the lower course of the Amazon river basin.

This organization of the fluvial complex, elevated by the huge hydrographic basins of Pará, are the starting point for the largest erosive process in the region, forming corridors

of valleys, depressions, testimonial or residual reliefs that, aggregated as geographical factors, by means of the orographic roughness, elaborated in high and low terrains, allow the fitting of the atmospheric circulation and its detailing in meteorological systems of local and meso-spatial order, important to the figuration of more specific climatic typologies.

Together with this geomorphologic and topographic information, it is emphasized, as observed in the maps presented, an indication about the input direction that refers to the atmospheric circulation systems acting for the state of Pará, in an update of the proposal elaborated by Nimer (1989), which allows us to understand, in a generic way, the following organization for the state of Pará:

- Northern Atmospheric Circulation Systems, individualized as the Intertropical Convergence Zone (ITCZ) under direct influence of the latitudinal position, with dynamics worked further by the arrangement and altimetric composition of the relief, with emphasis on the lowered coastal terrains, from Guiana to the Northeast of Pará, as well as, in the mouth region of the Amazon River, the border between the states of Pará and Amapá, whose reduced altitude favors the penetration of these systems continent inward. We should also emphasize the role played, under these systems, by the higher complexes composed of cratonic reliefs on the Brazilian frontier with Guyana, Suriname and French Guiana and on the western border of the state of Amapá and Pará.

- Atmospheric Circulation Systems of the West, refers to the dynamism of the Bolivian High (AB) and Cyclonic Vortices of High Level (VCAN), whose cloudiness advances in the middle of the Amazon lowlands, entering the territory of Pará across the border with the state of Amazonas. In these lowlands, the systems move without major obstacles of orographic barriers, mainly, in the Amazon riverbed, however, under this displacement of West, crossing the border with the state of Amazonas, reaching the cratonic lands in the state of Pará, the orographic is composed of a set of topographic relevance, which starts from medium altimetric steps, predominantly between 200 - 300 m, to those whose tops have more robust elevation, between 600 - 700 m. Thus, these Western Systems are modeled amidst the configuration of barriers and moisture corridors, constituted by the roughness that is peculiar to the Amazon cratonic terrains.

- Systems of Atmospheric Circulation of the South, by interference of the South Atlantic Convergence Zone (SACZ), the CVAN and the Frontal Systems (SF), which are displaced from the southernmost portions of the Brazilian territory, forming huge surface corridors and atmospheric moisture zones. These systems face the entire topographic component of the Brazilian Plateau until they reach the state of Pará and are still very dynamic. In the North region, they are strengthened by the Amazon climatic particularities and, at a local level, are shaped by the combination of geomorphological attributes. When entering the territory of Pará and under the direct influence of the latitudinal position, these systems lose strength as they advance towards more northerly marks.

- Systems of Atmospheric Circulation of East, consolidated by VCAN, from the advance of its convective edge over the eastern portion of the state of Pará, as well as comprises in a predominant circulation the Northeast Trade winds (ANE) and Southeast Trade winds (ASE), designed by cold ocean winds maintain a peculiar stability, which, however, can be broken depending on the intensity of the onshore flow of these under the set of

continental geographic factors. They advance under two components, a coastal and a continental one.

The flows of the littoral component come from the nearby Atlantic Ocean, entering through the lowlands of the coast, penetrating the continental interior through the northeastern portion of Pará. They are configured, also, under the state of Amapá, when they advance until the highest cratonic compositions located in the western face of the border of this state with the state of Pará. In the other component, these systems penetrate from the coast of the Brazilian Northeast, advancing under the whole continental land mass, thus shaped by the altimetric corridors and barred by the most accentuated orographies, until reaching the eastern portion of the Pará territory, by the borders of the states of Maranhão and Tocantins.

Under this second component, these flows are not configured as systems that enable vigorous convective activity in the state of Pará, unlike the coastal branch that provides the necessary moisture to produce or trigger the formation of convective systems at the local level, such as the Breeze Systems (SB) on the coast and the Convective Mesoscale Complex (CCM) in leeward of the reliefs of greater orographic, or even systems that can reach mesospatial size, as the Lines of Instability (LI) spreading to the interior of the territory.

When used together, the relationship between these systems and the relief leads to arrangements that propitiate the formation of humid corridors, or drier slopes, which integrated to the geographic position and in reference to the distance or proximity to the coast, are important factors to the climatic composition.

FINAL CONSIDERATIONS

As a premise to continue the development of the doctoral research "Climate dynamics and rainfall in the state of Pará, Brazil: proposal for a climatic classification", this general description was developed about the geomorphologic and topographic aspects allied to the atmospheric circulation systems that, in the general scope, reflect an important relation in the climatic understanding concerning the state of Pará.

It is a fact that, given the general character to which the work is submitted, its detailing, molded under the climatological field, still waives the other orientations established by Monteiro (1973), however, as a fundamental step, this presentation of the geomorphological and topographical components, described as geographical factors, are revealed by their disposition in the Para territory that, together with the atmospheric circulation, configure the local climatic typologies.

This overview, useful for the final outcome of the research, will serve as a help for further discussions about the role of surface agents in the process that leads to the genesis, intensification and dissipation of atmospheric systems, given that the relief, its layout, altimetry and geographical position, combined with the effects of maritime and continentality, promote, according to Monteiro (1973), the individualization of local climates in the regional.

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