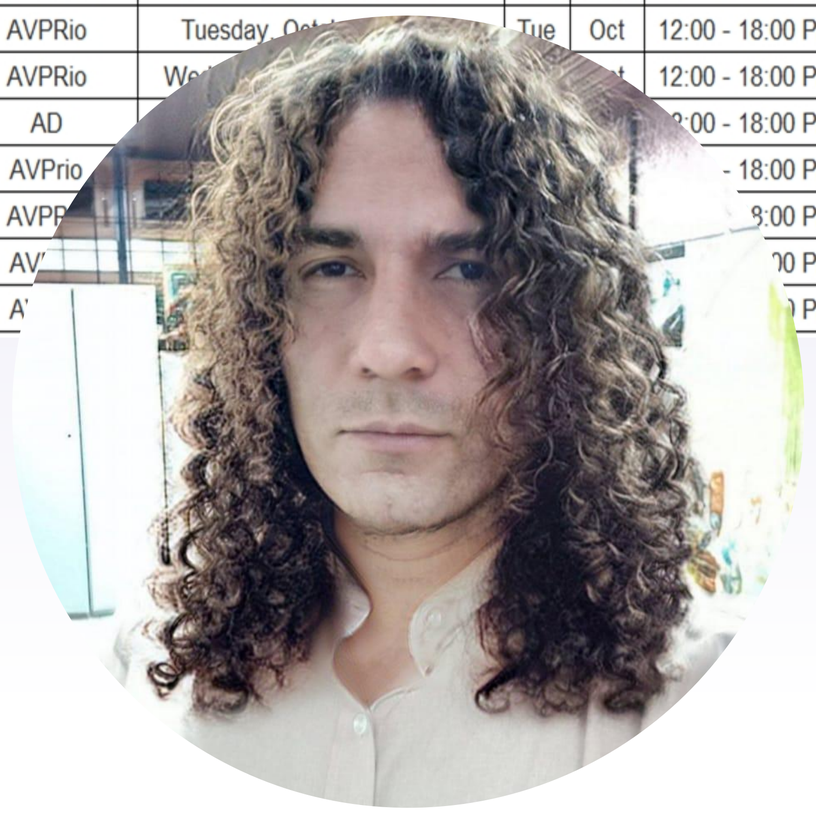
LAT	LON	DMAO(K	CITY	REF POINT	MARKER PO	DATE	DA	MO	TIME PER GMT	SAT	INS	CON	BT	BT	XB	FRF	FI (C2-adapted La
-3.745	-59.56	104.74	Autazes	Lago Piratinga	AVPRio	Saturday, October 07, 2023	Sat	Oct	12:00 - 18:00 PM	G16FRP	GOES	92	405.3	308.3	356.8	1331.9	VH (FRP>600
-3.745	-59.56	104.74	Autazes	Lago Piratinga	AVPRio	Saturday, October 07, 2023	Sat	Oct	12:00 - 18:00 PM	G16FRP	GOES	92	403	308.5	355.8	1255.8	VH (FRP>600
-3.8	-59.616	105	Autazes	Paraná Madeirinha	AVPrio	Monday, September 4, 2023	Mon	Sep	12:00 - 18:00 PM	G16FRP	GOES	92	397.9	310.9	354.4	1067.6	VH (FRP>600
-3.545	-59.334	93	Autazes	AM254	AVPAD	Monday, September 18, 2023	Mon	Sep	12:00 - 18:00 PM	G16FRP	GOES	100	395	302.9	349	1043.6	VH (FRP>600
-3.8	-59.616	105	Autazes	Paraná Madeirinha	AVPrio	Monday, September 4, 2023	Mon	Sep	12:00 - 18:00 PM	G16FRP	GOES	92	392.6	309.1	350.9	930.5	VH (FRP>600
-3.509	-59.067	104.74	Autazes	Rio Preto do Pantaleão	ADPrio	Tuesday, October 10, 2023	Tue	Oct	12:00 - 18:00 PM	G16FRP	GOES	96	389.3	305.8	347.6	900.7	VH (FRP>600
-3.745	-59.579	104.74	Autazes	Lago Piratinga	AVPRio	Saturday, October 07, 2023	Sat	Oct	12:00 - 18:00 PM	G16FRP	GOES	90	389.2	303.9	346.6	874.3	VH (FRP>600
-3.545	-59.334	93	Autazes	AM254	AVPAD	Monday, September 18, 2023	Mon	Sep	12:00 - 18:00 PM	G16FRP	GOES	100	387.3	300.7	344	853.9	VH (FRP>600
-3.765	-59.195	105	Autazes	Nazaré	AVPrio	Monday, September 4, 2023	Mon	Sep	12:00 - 18:00 PM	G16FRP	GOES	96	388	309.1	348.6	835.2	VH (FRP>600
-3.7556	-59.5741	105	Autazes	Lago Imbaúba	Solo perto de rio	Saturday, October 7, 2023	Sat	Oct	12:00 - 18:00 PM	Aqua	MODIS	75	399.7	305.3	352.5	827.98	VH (FRP>600
-3.509	-59.067	104.74	Autazes	Rio Preto do Pantaleão	ADPrio	Tuesday, October 10, 2023	Tue	Oct	12:00 - 18:00 PM	G16FRP	GOES	96	384.9	305.3	345.1	802.2	VH (FRP>600
-3.765	-59.195	105	Autazes	Nazaré	AVPrio	Monday, September 4, 2023	Mon	Sep	12:00 - 18:00 PM	G16FRP	GOES	96	385.9	310.3	348.1	788.5	VH (FRP>600
-3.745	-59.579	104.74	Autazes	Lago Piratinga	AVPRio	Saturday, October 07, 2023	Sat	Oct	12:00 - 18:00 PM	G16FRP	GOES	90	385.2	303.1	344.2	777.5	VH (FRP>600
-3.653	-59.734	104.74	Autazes	Paraná do Mamori	AVPrio	Saturday, October 28, 2023	Sat	Oct	12:00 - 18:00 PM	G16FRP	GOES	96	383	300.7	341.9	762.2	VH (FRP>600
-3.54638	-59.32322	105	Autazes	AM254	AD	Monday, September 18, 2023	Mon	Sep	12:00 - 18:00 PM	G16FRP	GOES	100	379.8	301.3	340.6	689.8	VH (FRP>600
-3.854	-59.749	104.74	Autazes	Paraná Madeirinha	AVPRio	Wednesday, October 04, 2023	Wed	Oct	12:00 - 18:00 PM	G16FRP	GOES	100	376.8	295.9	336.4	643.8	VH (FRP>600
-4.019	-59.745	105	Autazes	Geraldo Alves	AV	Wednesday, September 13, 2023	Wed	Sep	12:00 - 18:00 PM	G16FRP	GOES	100	375.8	301.3	338.6	622.1	VH (FRP>600
-3.763	-59.693	104.74	Autazes	Paraná do Mamori	AVPRio	Friday, October 13, 2023	Fri	Oct	12:00 - 18:00 PM	G16FRP	GOES	98	375.6	299.3	337.5	616.1	VH (FRP>600
-4.019	-59.745	105	Autazes	Geraldo Alves	AV	Wednesday, September 13, 2023	Wed	Sep	12:00 - 18:00 PM	G16FRP	GOES	97	372.7	298.5	335.6	566.3	HIGH (100<FRP<
-3.52153	-58.9777	105	Autazes	Urucurituba	AD	Tuesday, October 3, 2023	Tue	Oct	12:00 - 18:00 PM	Aqua	MODIS	100	434.5	313.4	373.9	565.88	HIGH (100<FRP<
-3.491	-59.048	104.74	Autazes	Rio Preto do Pantaleão	AVPRio	Tuesday, October 10, 2023	Tue	Oct	12:00 - 18:00 PM	G16FRP	GOES	94	373.2	304.8	339	561.1	HIGH (100<FRP<
-3.692	-58.947	192	Autazes	Urucurituba	AVPRio	Tuesday, August 29, 2023	Tue	Aug	12:00 - 18:00 PM	G16FRP	GOES	98	372.4	300	336.2	557.9	HIGH (100<FRP<
-3.964	-59.746	104.74	Autazes	Geraldo Alves - Rio Madeirinha	AVPRio	Tuesday, Oct	Tue	Oct	12:00 - 18:00 PM	G16FRP	GOES	100	371.8	299.9	335.9	547.8	HIGH (100<FRP<=
-3.854	-59.749	104.74	Autazes	Paraná Madeirinha	AVPRio	We	t		12:00 - 18:00 PM	G16FRP	GOES	100	370.8	296.2	333.5	537.4	HIGH (100<FRP<=
-3.509	-59.047	104.74	Autazes	Água Azul Soares	AD				:00 - 18:00 PM	G16FRP	GOES	96	371.4	305.2	338.3	535.2	HIGH (100<FRP<
-4.092	-59.877	105	Autazes	Geraldo Alves - Lagoa Canarana	AVPrio				- 18:00 PM	G16FRP	GOES	96	369.1	294.4	331.8	530.8	HIGH (100<FRP<
-3.854	-59.73	104.74	Autazes	Paraná Madeirinha	AVPR				3:00 PM	G16FRP	GOES	98	370.4	302	336.2	526.6	HIGH (100<FRP<=
-3.653	-59.734	104.74	Autazes	Paraná do Mamori	AV				00 PM	G16FRP	GOES	96	368.4	296.5	332.5	494	HIGH (100<FRP<
-4.092	-59.877	105	Autazes	Geraldo Alves - Lagoa Canarana	A				PM	G16FRP	GOES	79	366	284.1	325.1	479.6	HIGH (100<FRP<



Article on the Brazilian Amazon Region

Geolocating the intense active fires and thermal anomalies in the city of Autazes

Dr. Jonas Gomes da Silva - www.jgsilva.org

Professor at the Federal University of Amazonas
Faculty of Technology
Industry Engineering Department - Eureka Laboratory

jgsilva@ufam.edu.br

Translation with updates from the article published in JCAM
13th December 2023 - during the celebration of National Prosecutor's Office Day

Figure 9: Burned green area near Piratinga Lake (Autazes city)-07/Oct/2023
Source: NASA FIRMS, da Silva (2023) and Google Maps

To celebrate the National Prosecutor's Office Day, this article gifts the Amazonas prosecutors responsible for the Environment with the geolocation and profile of the intense fires in Autazes city, between August and October 2023, which affected the climate and air in the region.

On 14 December 2023, it will be 42 years since the sanction of the first Organic Law of the National Prosecutor's Office. Article 82 of the brazilian National Organic Law No. 8625-93 establishes December 14th as the National Prosecutor's Office Day. According to item (b) of Subsection XIX of Article 6 of Complementary Law No. 75/93, it is the responsibility of the Federal Prosecutor's Office to promote the accountability of individuals or legal entities for activities that are harmful to the environment, applying criminal sanctions and seeking reparation for damages <**http://tinyurl.com/3dnufxm2>**. Thus, it is crucial that the conscious citizen helps with information to support professionals from the Amazonas State Prosecutor's Office, IBAMA-AM and other local environmental control agencies.

As part of the ongoing series profiling cities within a 300-kilometer radius of Manaus that registered the most acute active wildfires and thermal anomalies, this article examines events transpiring in Autazes, the highest-ranked municipality regarding the quantity of intense or extremely intense blazes detected during the studied timeframe when employing the Fire Radiative Power (FRP) metric.

From 69,805 records obtained from NASA/FIRMS and with the application of criteria and variables already explained in previous articles, it was possible to identify 2,272 records considered the most critical in the region, of which 485 (21.74%) occurred in Autazes (see Figures 9, 10 and 11), 338 (14.88%) in Itacoatiara, 222 (9.7%) in Careiro, 209 (9%) in Nova Olinda do Norte and 192 (8.4%) in Manaquiri, these being the five most critical cities in total number of fires or thermal anomalies considered intense (100MW <FRP<=600MW) or very intense (FRP> 600MW) and which require greater attention from the brazilian authorities.

Figure 10: Intense active fire in green area located 612m far from AM254 Road - Autazes - 18 September 2023
Source: NASA FIRMS, da Silva (2023) and Google Maps

The city of Autazes is known for its milk and cheese production. In a straight line, it is about 112 km from Manaus, and by river, the distance is approximately 218 km. Autazes is located in the 7th sub-region, covering the Negro and Solimões Rivers, bordering the cities of Itacoatiara, Nova Olinda do Norte, Borba, Careiro and Careiro da Várzea. According to IBGE <**http://tinyurl.com/2n3hc6zm**>, in 2022, Autazes had an area of 7,652.852 km2 and a population of 41,562 inhabitants.
The analysis of the 485 NASA satellite records resulted in the following result and recommendations:
1. In terms of Fire Radiative Power (FRP)
The majority of events (467; 96%) were classified as High, that is, above 100MW and equal to or below 600MW. While 18 records (3%) were considered very high, representing major blazes.

2. Critical days, months and times
In relation to days, time of recording and months, the most critical days in terms of number of active fires and thermal anomalies were Tuesday (127; 26.2%), Monday (83; 17.1%), Saturday (66; 13.6%) and Sunday (64; 13.2%).
As for the Average (XFRP), the most critical days were Monday (XFRP=251.27MW),Saturday (XFRP=250.96MW), Wednesday (XFRP=216.2 MW) and Tuesday (XFRP=210.7MW), followed by Sunday (XFRP=183.6MW), Friday (XFRP=174.6MW) and Thursday (XFRP=159.7MW). In addition, the majority of events were recorded by NASA's satellites during the Day (482; 99.4%), while only three were recorded at night (0.62%).

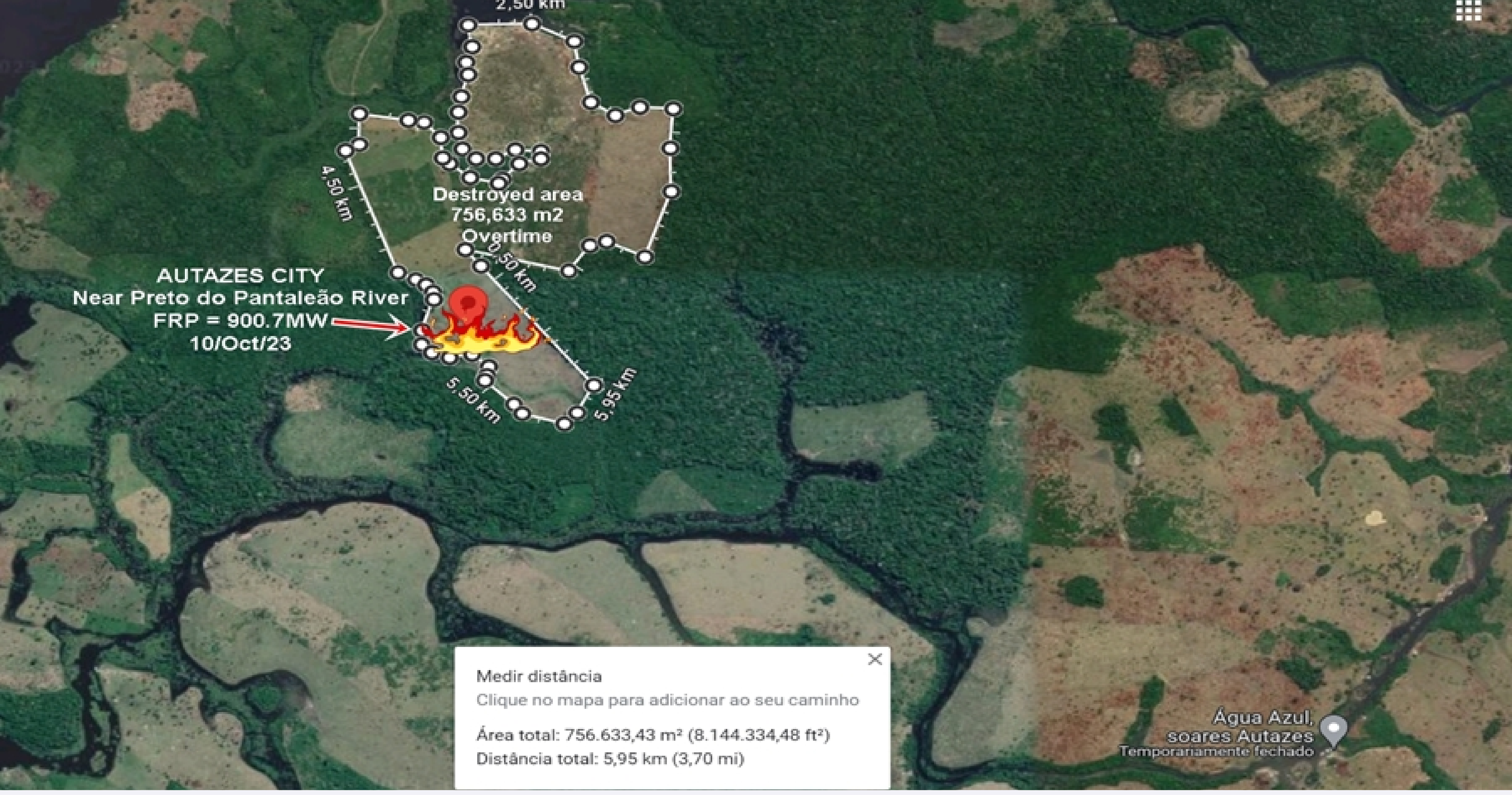


Figure 11: Intense active fire in destroyed area located 872m far from Preto Pantaleão River - Autazes - 10 October 2023
Source: NASA FIRMS, da Silva (2023) and Google Maps

The time frame with the highest number of detected records is between 12 pm and 6 pm with 457 observed cases (94.23%), followed by the time frame from 6:01 am to 11:59 am (25; 5.15%) and from 6:01 pm to 11:59 pm representing only 3 cases (0.62%). There was no record between midnight and six in the morning.
In terms of number of fires and thermal anomalies per month, it was observed that September (233; 48.04%) was the most critical month, followed by October (202; 41.65%), while August recorded 50 cases (10.31%).
When analyzing the Average of FRP per month, October was the most critical month (XFRP=233.1MW), with 192 records of outbreaks considered high (100<FRP<=600) with XFRP equal to 199.94MW, followed by ten records of outbreaks considered very high (FRP>600MW) that had XFRP equal to 879.25 MW.
The second most critical month was September (XFRP=203.01MW) with 225 records of outbreaks considered high (100<FRP<=600) with XFRP equal to 179.87MW, while eight records of outbreaks considered very high (FRP>600MW) had XFRP equal to 853.90 MW.
3. Profile of the locations
Of the 485 records, the majority (280; 57.7%) occurred in green areas near rivers, followed by 99 records (20.4%) observed in green areas near already destroyed areas, as well as 32 events (6.6%) recorded in destroyed areas near rivers. Thus, it was noted that 64.32% of the records are near to rivers, lakes or streams, these being the main routes for the drainage of products derived from destruction.

The main rivers, lakes and streams preferred by arsonists and which require greater surveillance and preventive action by the government to promote sustainable development actions with riverine communities are: Paraná Madeirinha (71 records) or Rio Madeirinha (39 records), Paraná do Mamori (38 records), Rio Preto do Pantaleão (31 records), Rio Acará (30 records), Igarapé Taboca (11), Rio Mutuca (10), Lago Piratinga (10), Lago Imbaúba (8), Rio Madeira (8), Igarapé Tapaiúna (6), Lagoa Canarana (6), etc.

By land, when observing the number of records, it was noted that the places with the highest number of events are in the regions identified by Google Maps as "Geraldo Allves", leading with 75 records. Further investigation is needed to confirm whether this identification refers to a community, individual or legal entity. In addition, other critical areas include Murutinga (39 records), Santa Luzia Community (36 records), Urucurituba (36), areas around AM254 (17) and the Nazaré Community (15)

4. Geolocation of the largest fires

Due to space constraints, only the coordinates will be revealed, but the complete spreadsheet with the location of all the outbreaks in Autazes, along with Figures 9, 10 and 11 showing images of the sites, will be available in the Harvard University digital repository under DOI <**https://doi.org/10.7910/DVN/UOZQ5O**>.

The ten critical areas are:

Green areas near Lake Piratinga (Lat -3.745; Long -59.56 (Figure 9); Lat -3.745; -59.579; FRP=1331.9MW; FRP=1255.8MW, and FRP=874.3MW respectively);

Green areas near Paraná Madeirinha (Lat -3.8; Long -59.616;FRP=1067.6MW and 930.5MW respectively);

Green areas near already destroyed areas around AM254 Road (Lat -3.545; Long -59.334; FRP=1043.6MW (Figure 10); and FRP 853.9MW), in addition to a green area near the river in the Nazaré community (Lat -3.765; Long -59.195;FRP=835.2MW).

A destroyed area (Figure 11) near Preto do Pantaleão River (Lat -3.509; Long -59.067; FRP=900.7 MW).

Finally, congratulations to the Amazonas State Prosecutor's Office on its special day. As a token of appreciation, it is recommended that the prosecutors responsible for environmental affairs utilize this information to advance their analysis, corroborate locations, and pursue legal action against those who have contributed to the deforestation of Autazes's verdant areas and the deterioration of the surrounding region's environment, including Manaus. The next article will focus on events recorded in the city of Itacoatiara, so stay tuned!