



**ADVANCES IN
FOREST FIRE
RESEARCH**

DOMINGOS XAVIER VIEGAS

EDITOR

2014

Integrated and integral forest fire management – Operation Roraima 2013, Brazil

Morais, J. C. M.^a, Barreto, R. V., Alves, R.^c, Lima, J. P. P.^d, Silva, M. M.^e, Felix, H. C.^f, Barcelos, M. A.^g, Cunha, A. M. C.^h, Balderramas, A. J. P.ⁱ, Pinho. M. C.^j, Olivato, C. M. O.^l, Rocha, M. C.^m, Macedo, C. F.ⁿ,

^a *Brazilian Institute of Environment and Natural Renewable Resources, jose.morais@ibama.gov.br*

^b *Fire Brigade of the Federal District, vianna1975@gmail.com*

^c *State Committee for the Prevention and Fight against forest fires. Government of the State of Roraima, ramonwalves@yahoo.com.br*

^d *Brazilian Institute of Environment and Natural Renewable Resources, terroada@yahoo.com.br*

^e *1st Jungle Infantry Brigade Brazilian Army, marcelomarcant@hotmail.com*

^f *Chico Mendes Institute for Biodiversity, HUDSON.FELIX@ICMBIO.GOV.BR*

^g *Fire Brigade of the Federal District, barcelos.cbmdf@gmail.com*

^h *Brazilian Institute of Environment and Natural Renewable Resources, anacanut@yahoo.com.br*

ⁱ *Brazilian Institute of Environment and Natural Renewable Resources, ncbalderramas@oi.com.br*

^j *Brazilian Institute of Environment and Natural Renewable Resources, marlenecpinho@hotmail.com*

^l *Brazilian Institute of Environment and Natural Renewable Resources, creusaolivato@gmail.com*

^m *Brazilian Institute of Environment and Natural Renewable Resources, mrocha41@gmail.com*

ⁿ *Brazilian Institute of Environment and Natural Renewable Resources, clemilton.macedo@ibama.gov.br*

Abstract

In 1998, the indiscriminate use of fire to manage agricultural and forest areas in favourable weather conditions in the state of Roraima resulted in one of the largest forest fires in the modern era, which was immensely aggravated by the lack of preparation of public institutions that are responsible for fire prevention and protection.

This event, however, left important lessons and prompted the establishment of new forest fire fighting and prevention policies across Brazil. Fifteen years later, Operation Roraima Green 2013 adopted a new fire prevention and fighting model based on concepts, methods and routines of "Integrated and integral forest fire management". Joint coordination was established to constitute the Integrated Multi-Agency Operational Coordination Centre (*Centro Integrado Multi Agências de Coordenação Operacional*) - CIMAN Federal - with a situation room to monitor high fire-risk forest areas, namely protected federal, state and municipal zones, public forests and forest areas of national interest. Greater emphasis was placed on the detection of hotspots by means of remote sensing, warning and quick initial attack on behalf of response bodies, in accordance with priorities established by all the involved entities and institutions.

A Unified Command Unit was constituted to establish priorities for forest fire fighting and prevention activities based on the doctrine of the Incidents Command System - SCI.

Key challenges of integral management were:

- 1 – Forecasting risk situations;
- 2 – Fire prevention actions and control of intentional forest burning;
- 3 – Fire fighting preparation;
- 4 – Forest fire fighting;
- 5 – Civil and criminal accountability of offenders;
- 6- Recovery and reconstitution of affected areas.

The Centre also promoted intense flow of information on implemented actions, which allowed perfect integration between the involved institutions.

Keywords: *Integrated management, Comprehensive management, Prevention, Combat, Accountability*

1. Introduction

The Climate Report Data, prepared by the Amazon Protection System - Sipam for the period of September, October and November/2012, indicated that during the quarter the coastline of eastern Amazonia was under the influence of a subsidence branch, with short rains in region increasing temperatures. The fallout would be below the climatological patterns, particularly the south-central Amapá, Pará northeast, northwest of Maranhão, Tocantins and Amazonas northern, and **Roraima** south.

These data also indicated a probable **occurrence of *El Niño***, where its effects enhance normal climate, i.e., change the dry period of the state of Roraima which tends to have a more severe and prolonged summer (drought), with rising temperatures, gusty winds and consequently low relative humidity, favoring the spread of flame in case of wildfires.

At the request of the Environmental Protection Director -Dipro/IBAMA a **Special Report** was drafted by the Operating Technical Center of Manaus / Meteorology Division DivMet-CTO/MN/Sipam for **Roraima** where the study indicated the following prognosis: "*Precipitation below the climatological patterns, especially at the beginning of the quarter, however the maximum and minimum temperatures may be slightly (about 1-2 ° C) above their climatological values.*"

Later the Prevention and Environmental Monitoring Division of Femarh located in Roraima, based on the Climate Report of the Amazon under No. 97, Year 9, prepared by the Amazon-Sipam Protection System with forecasts for December 2012, January and February 2013, noted that the state of Roraima would present precipitation from normal to below the climatological pattern, the temperatures being normal and above the climatological pattern.

Based on climatological information, the Director of Environmental Protection - Dipro / IBAMA decided to conduct an operation targeting preventive actions to protect federal and / or public interest areas in the state of Roraima.

With the assigned mission, the operation was based on the applicable legislation: Article 18 of Decree No. 2.661, of July 8th, 1998, Complementary Law No. of December 8th, 2011, Law No. 12.651, of May 25th, 2012, Law No. 12.727, of October 17th, 2012, MMA Ordinance No. 94 of March 19th, 2012, and we found that with the current legal basis we had to establish a relationship among the federal institutions.

On November 26th the shared planning proposal was submitted following the model of multi-agency Integrated Centers of Operational Coordination - CIMAN's deployed statewide in 2009, 2010 and nationally in 2010.

The proposal was to establish a Joint Coordination, the multi-agency Federal Integrated Operational Coordination Center - **CIMAN RR / Federal**, where a situation room was established. Such structure was conditional on the formation of a unified command that uses the doctrine of the Incident Command System - ICS.

The operating period from December 1st, 2012 to March 31st, 2013 was set, therefore the data used for comparisons of hotspots, combat, visits, burning and supervision observe this period of work.

2. Integrated Multi-Agency Center - CIMAN RR / Federal

The purpose of CIMAN RR / Federal within the 2013 Green Roraima Operation was to enhance the actions of the federal institutions involved, optimize the human and material resources looking for integrated and comprehensive management in preventing and fighting wildfires where the challenge was to predict risk situations, propose and implement preventive actions, prepare institutions for firefighting, hold offenders accountable and finally reconstruct areas affected by the fires.

CIMAN also installed a unique situation room and therein shared information about ongoing operations as well as search for joint solutions among participating entities. The results of actions undertaken were evaluated, seeking to optimize the strategies adopted. In every meeting an Integrated

Action Plan – PAI was prepared, which contains, among other directives, the specific objectives for the operational period, pointing to each institution involved the requested activities, as well as actions already implemented.

Throughout the period 17 meetings of CIMAN RR / Federal were held, 02 Non-Face-To-Face and 15 Face-To-Face meetings; with the presence of 14 federal agencies, plus the participation of a member of the State Committee for Prevention and Control of Wildfires, and the support of the Fire Brigade of the Federal District (CBMDF), constituting the integrated management of wildfires in Roraima (table 1).

Table 1. Agencies composing CIMAN RR / Federal. 2013 Green Roraima Operation. Source: CIMAN RR / Federal.

N	Logo:	Institution	Agency	No.	Logo:	Institution	Agency
1		1 st Jungle Infantry Brigade of the Brazilian Army - 1st BIS	Ministry of Defense	09		Regional Management / RR, Brazilian energy company Eletrobras / Eletronorte	Ministry of Mines and Energy
02		Boa Vista Air Base of the Brazilian Air Force - BABV	Ministry of Defense	10		Supervisory Office / RR Brazilian Airport Infrastructure Company - INFRAERO	Ministry of Defense
03		State Supervisory Office of the Brazilian Institute of Environment and Renewable Natural Resources - IBAMA	Ministry of Environment	11		Supervisory Office / RR National Institute of Colonization and Agrarian Reform - INCRA	Ministry of Agrarian Development
04		Regional Coordination - CR-2 Chico Mendes Institute for Biodiversity - ICMBio	Ministry of Environment	12		Supervisory Office / RR Brazilian Agency of Intelligence - ABIN	Institutional Security Office
05		Regional Coordination / RR National Indian Foundation - FUNAI	Ministry of Justice	13		Vice Consul of Brazil in Santa Elena of Uairén - Venezuela - ITAMARATY	Ministry of Foreign Affairs
06		5th Regional District / RR Federal Highway Police - DPRF	Prosecutors Office	14		Agro Forestry Research Center / Brazilian Agricultural Research Corporation - EMBRAPA	Ministry of Agriculture
07		State Committee for the Prevention and Combat of Wildfires. Government of the State of Roraima	Government of the State of Roraima	15		National Institute for Space Research - INPE	Ministry of Science and Technology
08		Manaus Regional Center Amazon Protection System - SIPAM	Ministry of Defense	16		Fire Brigade Federal District - CBMDF	Government of the Federal District

The Integrated Center meetings were held every Wednesdays, always at 10am maintaining a routine with the opening followed by a brief introduction of the participants, the agenda exposed forecasts prepared by SIPAM, after which an analysis was made of hotspots of the operational period and the previous day. When we did not have a GIS specialist present at the meeting we made the analysis directly on the official monitoring of federal areas, an INPE website especially developed for the Green Roraima Operation, and at the end we updated and signed the PAI.

In the second half of January we had additional support with the arrival of technicians from the Brazilian Environmental Protection Agency (IBAMA) and the Fire Brigade of the Federal District - CBMDF in the operation to assist in the logistics and implementation of the Incident Command System- ICS. Thus the logistics establishing physical structure plus the ICS, which assigns concepts of command and control, with the GIS support, established a Situation Room idealized since December 2012 as follows in the chart below (Figure 1).

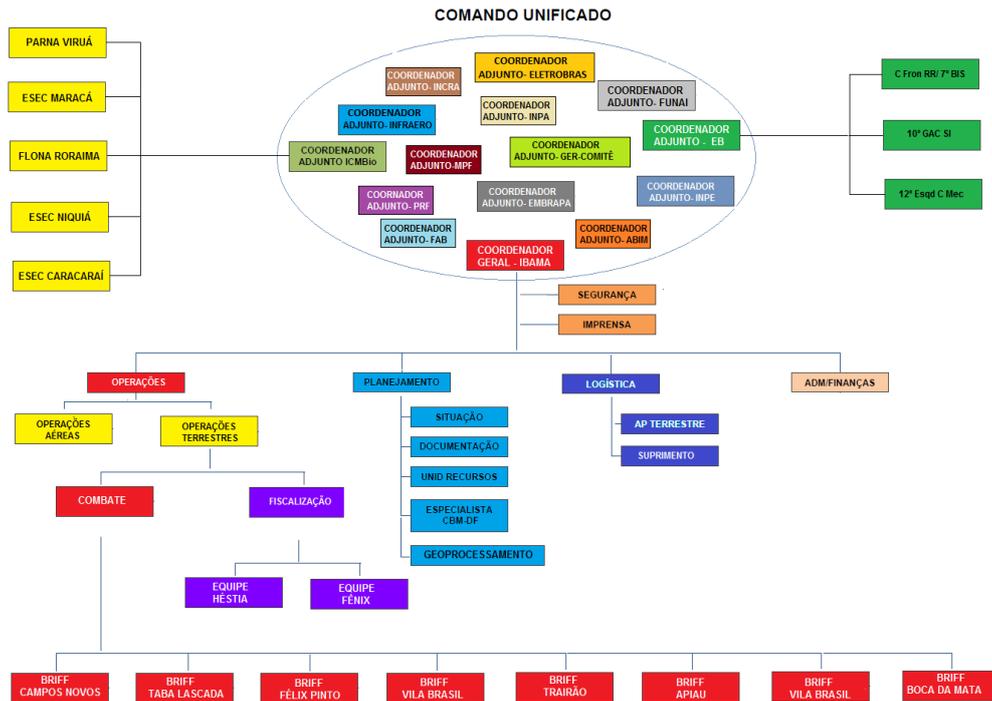


Figure 1. Chart of CIMAN RR / 2013 Federal. Green Roraima Operation. Source: CIMAN RR / Federal.

Remember that the participation of the institutions in this plan was voluntary and did not involve any transfer of funds, where each institution had contributions of capital already budgeted for the implementation of its final activities.

A logo was also created referring to the operation, inspired in similar events, keeping the brand already registered in other Brazilian states (Figure 2).



Figure 2. Logo of CIMAN RR / Federal. Source: CIMAN RR / Federal.

In the situation room the risk areas susceptible to deforestation when associated with burning and wildfires, the federal protected areas, forests and other public areas of security, economic and social interest were monitored, such as federal highways, GURI transmission lines and airfields. Emphasis was given on detection of hotspots, warning to quick initial attack by the response agencies, according to the priorities established by the agencies, institutions and organizations involved. For illustrative

purposes, find below pictures of the situation room assembled in the Supervisory Board of IBAMA in Roraima. The pictures were captured from the four corners of the room, with an emphasis on the meeting table (Figure 3).



Figure 3. Situation Room CIMAN RR / Federal - SUPES / IBAMA / RR. 2013 Green Roraima Operation. Source: CIMAN RR / Federal.

CIMAN RR also had a mission to find mechanisms to predict risk situations and provide information to participating agencies and maintain the situation room provided with information.

CIMAN RR initiated the monitoring of hotspots in the conventional manner, i.e., used a GIS Specialist who intersected the hotspots overlapped in the features of protected areas, indigenous lands, right of way, easement strips, military areas, rural settlements, border areas and aerodromes (Table 2).

Table 2. Areas monitored by CIMAN RR / Federal on the INPE website. 2013 Green Roraima Operation. Source: CIMAN RR / Federal.

Monitored Features	Responsible Agency	Monitored Areas
Overview	IBAMA	Throughout the State of Roraima
Federal protected areas	ICMBio	1,615,971 ha
State protected areas	Femarh	Not available
Indigenous lands	FUNAI	10,331,521.34149 ha
Federal highways	DPRF	1404 km
Aerodromes (Boa Vista, Caracaraí and Pacaraima)	Brazilian Airport Authority (INFRAERO)	Radius of 6 km from the center point of the aerodrome
GURI Transmission line	Eletronorte	190 km
Federal Settlements	INCRA	1,371,856 ha
Military areas	Army	279 421 hectares
Border area	Vice Consul of Brazil in Venezuela	954 km border

The daily monitoring has been replaced by the Special Report for Roraima developed by INPE. The report for the monitoring of outbreaks of fires in Green Roraima Operation presents all outbreaks detected by all satellites (blank) used in the monitoring of fires by INPE, in a radius of up to 400 kilometers (per 100 km) around the airport Boa Vista - Roraima. The figure also showed the Points of Attention representing significant persistent fires over the last 24 hours (yellow dots); 48 hours (orange dots) and 72 hours (red dots). Moreover, the red areas are the indigenous territories, the green areas are the state protected areas and the dark green areas are the federal protected areas (figure 4).

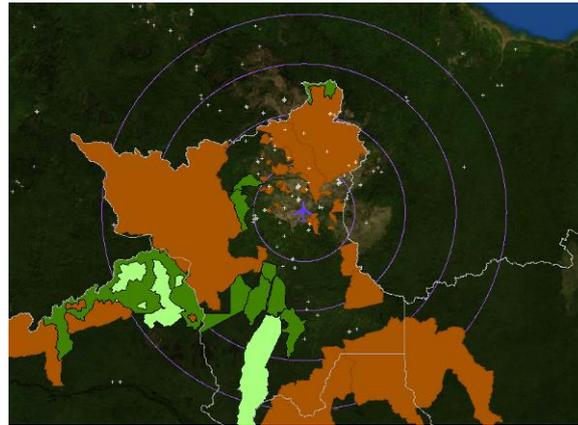


Figure 4. Active fire outbreaks detected by the monitoring satellites - Overview. Source: INPE. http://peassaba.cptec.inpe.br/queimadas/boletim_roraima/

The monitoring exposes a list of fires presented according to an index that combines the duration and extent of events detected by the nine satellites currently used by the INPE monitoring system. All the features of interest were also monitored individually and automatically, and when some hotspot is registered in these areas the information was passed along by email to the Situation Room and the agency responsible for the area.

In the figure below, from the top left to the bottom right corner, pictures of the monitoring of federal protected areas administered by ICMBio, Indigenous Lands managed by FUNAI, the easement of Guri line maintained by ELETRONORTE settlements promoted by INCRA , federal highways policed by DPRF, border areas where the Brazilian Consulate in Helena and Venezuela was reported (Figure 5).

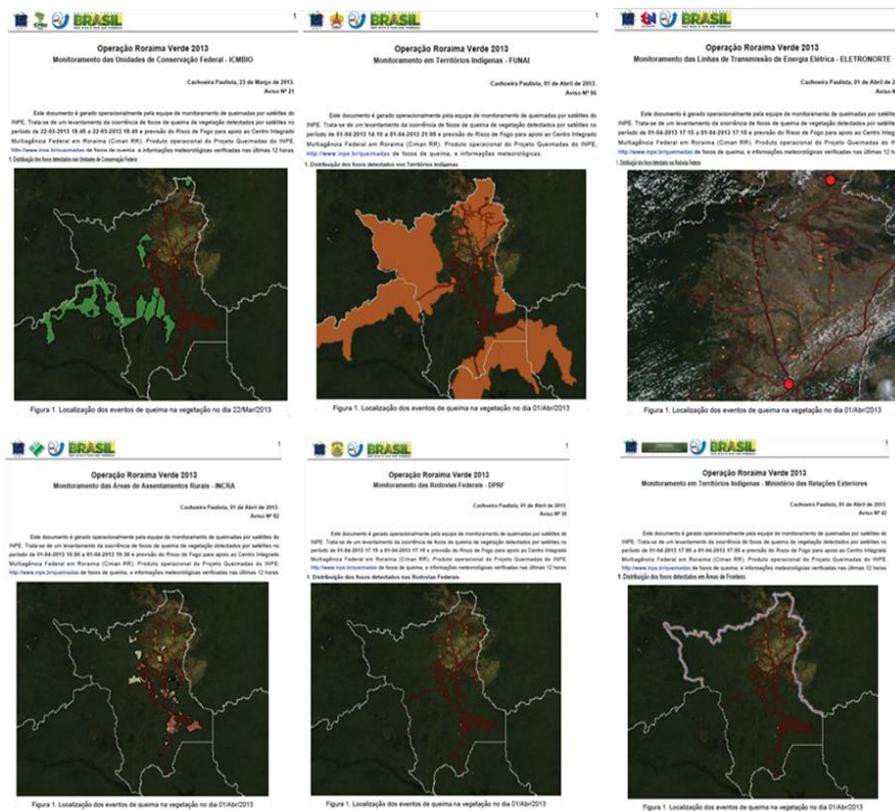


Figure 5. Features monitored by satellites. Source: INPE

The documents were generated operationally by the team of fire monitoring by satellites of INPE. The survey of outbreaks of wildfire outbreaks detected by satellites in the period and the prediction of fire risk for support to CIMAN RR.

3. Climatology, Forecasting risk situations

Climatological Report is a product based on data from INPE (National Institute for Space Research), INMET (National Institute of Meteorology) and SIPAM (Amazon Protection System), which presents the systematization of meteorological information related to spatial and temporal coverage of Roraima in the quarter January-February-March 2013 and it has strong application in the planning and operation of public services, among others. The information contained herein represents the assessment, treatment and secure dissemination of data, usefully contributing to the expansion of knowledge and the direction of public policy.

The average behavior of the oceans during the month of January is shown in Figure 6. The Pacific Basin was marked by the predominance of colder water (negative anomalies) of sea surface temperature (SST), especially in the equatorial zone comprising the *Niño* region. On the west coast of South America, there was expansion of surface waters with negative anomalies (colder than average) extending from the *Niño* 1 +2 region towards the region of *Niño* 3.

In the Tropical Atlantic Ocean there was a decrease in the area with warm anomalies in the northern tropical basin, while isolated areas of south tropical basin had a water colder than average. In the South Atlantic region there is a predominance of Negative SST anomalies, which created favorable conditions for the cold front in the southeastern of Brazil, resulting in precipitation.

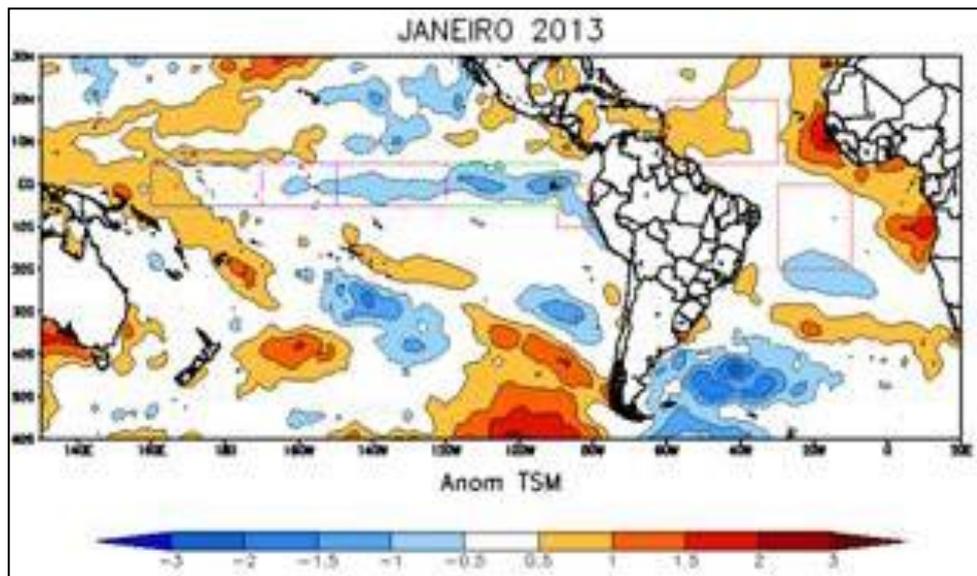


Figure 6. SST anomalies ($^{\circ}$ C) in January 2013. Rectangles in the Pacific represent areas of Niño 1 +2 (red), Niño 3 (green), 3.4 (dashed red) and Niño 4 (blue). Source: Data from CPC/NCEP processed by SIPAM.

During the month of January 2013, the Convergence Zone of the South Atlantic (SACZ) operated in the region resulting in very irregular spatial distribution of precipitation in the rest of the country, but in Roraima this system does not contribute to accumulated rain, particularly in the northeast sector of the State. ZCAS is a weather system characterized by a region of moisture convergence oriented from northwest to southeast, forming a deep band of cloudiness able to generate abundant precipitation. So in January, low precipitation was recorded across the state of Roraima as in figure 7.

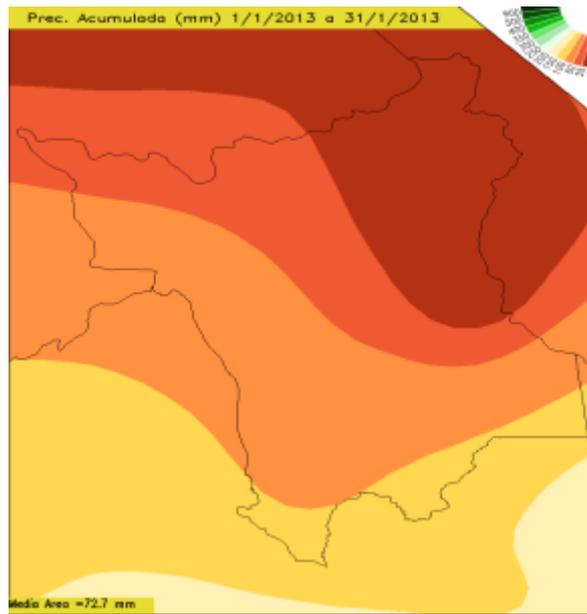


Figure 7. Precipitation recorded in January 2013 in the State of Roraima. Source: INPE.

Such low accumulated precipitation in January, or absence thereof, in some cases, contributed significantly to the increase in fire outbreaks in Roraima, as per the histogram below (Table 3).

Table 3. Histogram of fire outbreaks in the state of Roraima. Listing only of the states municipalities with occurrence of outbreaks in January 2013. Source: INPE.



- HISTOGRAM OF FIRE OUTBREAKS -
2013-01-01 00:00 p.m.: 00 to 01/31/2013 11:59 p.m.: 59
(AQUA Tarde)

Distribuição dos 191 focos de 2013-01-01 a 2013-01-31 em RR

Municipicípios	(1) Rorainópolis / RR		(31)
	(2) Bonfim / RR		(22)
	(3) Amajari / RR		(19)
	(4) Caracaraí / RR		(18)
	(5) Boa Vista / RR		(17)
	(6) Normandia / RR		(15)
	(7) Cantá / RR		(14)
	(8) Pacaraima / RR		(14)
	(9) São João da Baliza / RR		(10)
	(10) Iracema / RR		(8)
	(11) Alto Alegre / RR		(8)
	(12) Caro Ebe / RR		(6)
	(13) Uiramutã / RR		(5)
	(14) São Luiz / RR		(3)
	(15) Mucajaí / RR		(1)

In February 2013, the average behavior of the ocean is shown in Figure 08. The Pacific Basin was marked by the predominance of colder water (negative anomalies) of sea surface temperature (SST), especially in equatorial regions comprising *Niño*. On the west coast of South America, there was

expansion of surface waters with positive anomalies (warmer than average) in the entire length of the Chilean coast.

In the Tropical Atlantic Ocean there was a decrease in the area with warm anomalies in the northern tropical basin. While in the southern tropical basin there was predominantly standard of neutrality, except on the African coast where surface waters were warmer than average. In the South Atlantic region negative SST anomalies remained predominantly. The performance of the Alta da Bolívia together with the cooling in the Pacific Ocean intensified convection in western Amazonia and the ITCZ activity (Figure 8).

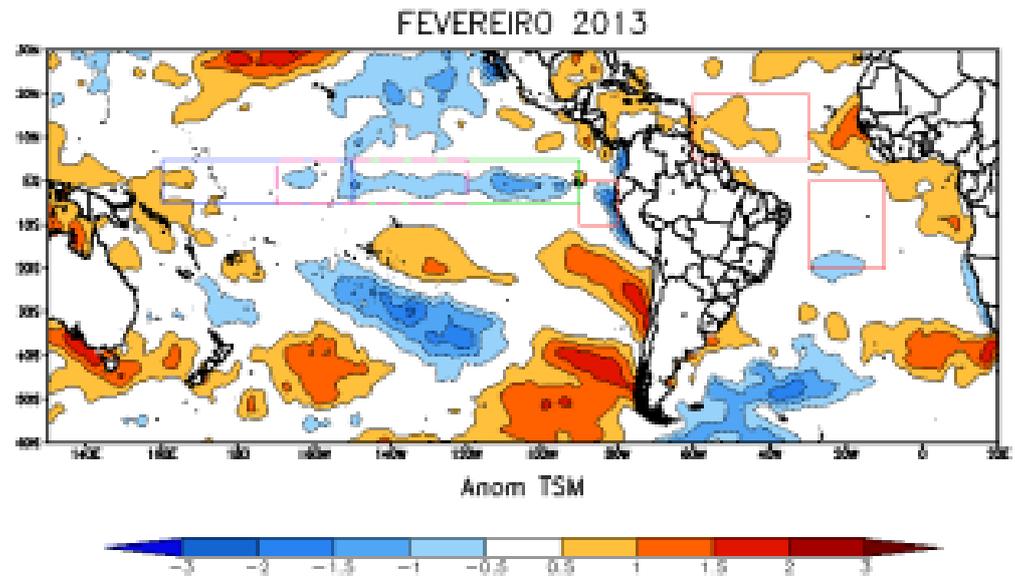


Figure 8. SST anomalies ($^{\circ}$ C) in February 2013. Rectangles in the Pacific Ocean represent areas of Niño 1 +2 (red), Niño 3 (green), 3.4 (dashed red) and Niño 4 (blue). Source: Data from CPC / NCEP processed by SIPAM.

Figure 09 shows the Accumulated Precipitation during the month of February 2013. The performance of the Intertropical Convergence Zone (ITCZ) in the region caused great irregularity in the spatial distribution of precipitation. The ITCZ is a weather system formed by clusters of clouds of great vertical development with the potential to cause large volumes of rain. The most northerly position of the ITCZ and warming in the tropical north Atlantic basin, which contributed to an increase in the transport of moisture from the ocean toward the continent, were primarily responsible for the emergence of positive anomalies over the state of Roraima.

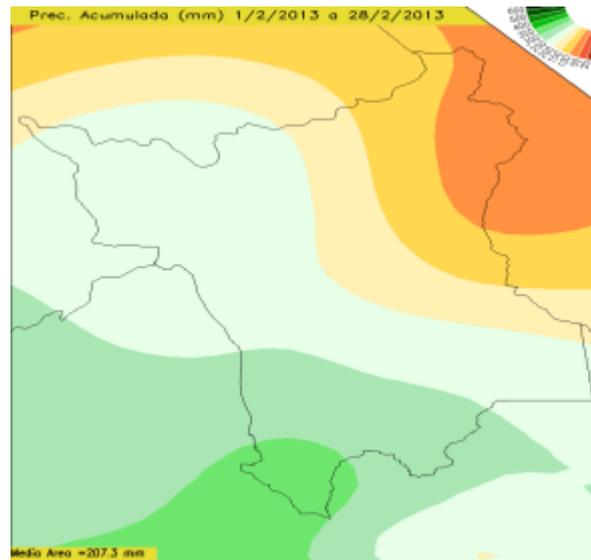


Figure 9. Accumulated Precipitation in February 2013 in State of Roraima. Source: INPE.

Such increased precipitation in the previous month led to a reduction of hotspots in the State of Roraima, as per the histogram below (Table 4).

Table 4. Histogram of fire outbreaks in the state of Roraima. Listing only of states municipalities with occurrence of outbreaks in February 2013. Source: INPE.



- HISTOGRAM OF FIRE OUTBREAKS -
01/02/2013 00:00: 00 TO 28/02/2013 23:59: 59
(AQUA Tarde)

Distribuição dos 10 focos de 2013-02-01 a 2013-02-28 em RR	
Municípios	(1) São Luiz / RR  (4)
	(2) Cantá / RR  (2)
	(3) Boa Vista / RR  (2)
	(4) Caracará / RR  (1)
	(5) Normandia / RR  (1)

In March 2013, Figure 10 shows the weekly oceanic pattern observed until the 24th day. The monitored areas in the Equatorial Pacific show large spatial and temporal variability of SST anomalies, predominantly colder water than average in the first two weeks of March. In the period from 17 to 24 March there was a significant increase in positive SST anomalies in the equatorial Pacific region, with warmer water than average.

In the Atlantic Basin Tropical there was no significant change over the past three weeks, keeping two extensive areas with positive SST anomalies in the northern portion. In the Subtropical South Atlantic, near Brazil's east coast, there was a slight reduction in the negative SST anomalies, with an almost neutral standard.

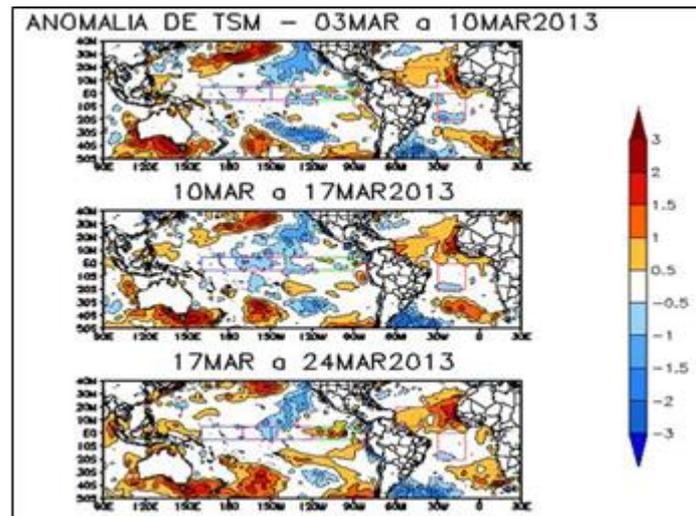


Figure 10. Weekly SST Anomaly ($^{\circ}$ C) for month of March 2013 over the range between 40° N and 50° S. Source: Data from NWS / CPC processed by SIPAM.

The performance of the Intertropical Convergence Zone (ITCZ) to the north of its climatological position contributed to the below average precipitation in Roraima during the month of March 2013. The anomalous position of the ITCZ is occurring in response to warming of surface waters in the tropical North Atlantic.

Another reason that explained the lack of rain in much of the state was the anomalous westward displacement of the flow at high levels between the past months of January and February. Over the past few months, signs of intraseasonal variability have interfered in oceanic and atmospheric patterns in tropical areas around the globe.

As a result, these same patterns sometimes contribute to the occurrence of precipitation, sometimes to the inhibition of the rains. As a result Figure 11 shows that the accumulated precipitation was below normal in March 2013.

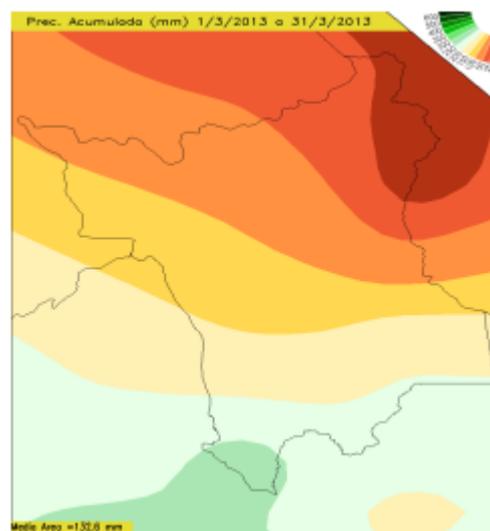


Figure 11. Accumulated Precipitation in March 2013 in the State of Roraima. Source: INPE.

Making a general summary, the data from INMET show that in the quarter January-February-March there was low precipitation as per Figure 12.

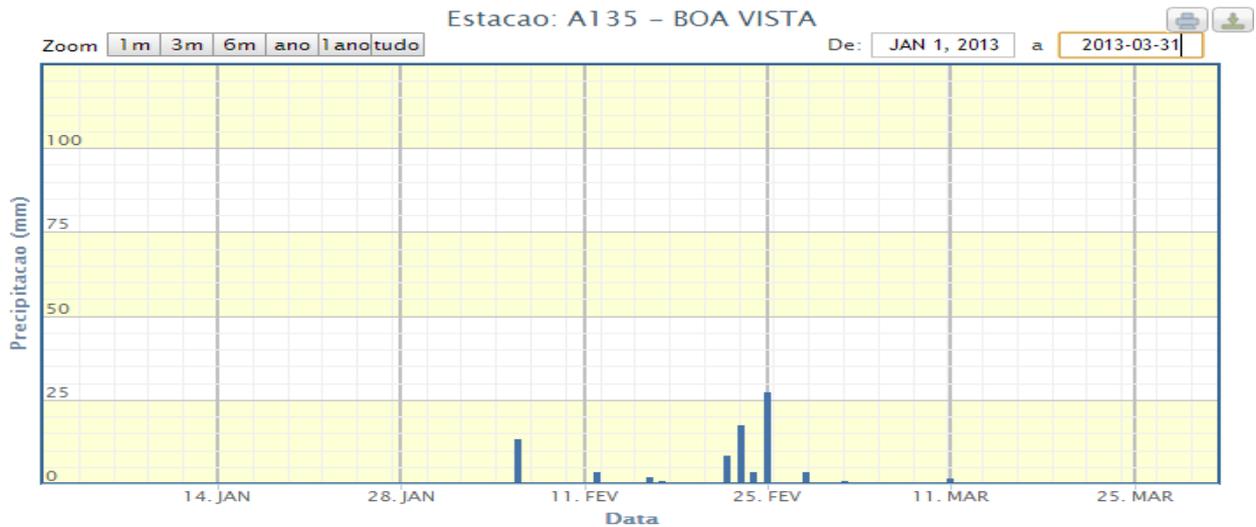


Figure 12. Monthly accumulated precipitation of Boa Vista-RR in the months of January, February and March. Source: INMET. http://www.inmet.gov.br/portal/index.php?r=home/page&page=rede_estacoes_auto_graf

That is, in January no precipitation was recorded in Boa Vista. Back in February there were 10 days with rains, registering a cumulative 81.4 mm in the capital. In March the record was 14.5 mm in 5 days of rain. These values indicate a low precipitation for the whole northeast sector of Roraima, where the major cities at risk of fire and wildfires are located. As per the histogram below (Table 05) 267 outbreaks were recorded in this critical quarter of low precipitation, thus showing that this joint operation of CIMAM RR achieved the expected success.

Table 05 - Histogram of fire outbreaks in the state of Roraima. Listing only of states municipalities with occurrence of outbreaks in the period presented. Source: INPE.



- HISTOGRAM OF FIRE OUTBREAKS -
01/01/2013 00:00p.m.: 00 to 30/03/2013 11:59 p.m.: 59
(AQUA Tarde)

Distribuição dos 267 focos de 2013-01-01 a 2013-03-30 em RR		
Municipalidades	(1) Bonfim / RR	(34)
	(2) Rorainópolis / RR	(33)
	(3) Boa Vista / RR	(33)
	(4) Caracaraí / RR	(25)
	(5) Amajari / RR	(20)
	(6) Pacaraima / RR	(20)
	(7) Cantá / RR	(19)
	(8) Normandia / RR	(19)
	(9) São João da Baliza / RR	(13)
	(10) Iracema / RR	(13)
	(11) Alto Alegre / RR	(11)
	(12) Uiramutã / RR	(10)
	(13) São Luiz / RR	(7)
	(14) Caro Ebe / RR	(7)
	(15) Mucajaí / RR	(3)

4. Statistics of hotspots

4.1. Quantitative Analysis

Hotspot is the heat record captured in the ground surface by a satellite sensor, the sensor captures and records any temperature above 47 ° C and interprets it as "hotspot" The data are generated and made available by the National Institute for Space Research - INPE, on <http://www.dpi.inpe.br/proarco/bdqueimadas> .

When comparing with other years (2007/2008 and 2012/2013), the detection of hotspots of the years 2012/2013 is below the expected average for the period (Table 6 and Figure 13).

Table 6. Comparison of the number of hotspots for the period described.

Ano	Número acumulado de focos entre 01/12/2013 a 31/03/2013 de cada ano utilizando o satélite referência	Percentual dos focos de 2012/2013 em relação aos anos anteriores
2007/2008	813	-13,55
2008/2009	379	47,07
2009/2010	1528	-113,41
2010/2011	501	30,03
2011/2012	695	2,93
2012/2013	716	

Tabela de análise quantitativa de focos de calor entre o período de 01/12 a 31/03 do ano de 2007/2008 ao período de 01/12 a 31/03 do ano de 2011/2012 com relação ao período de 01/12 a 31/03 do ano de 2012/2013.
Fonte dos dados: INPE.

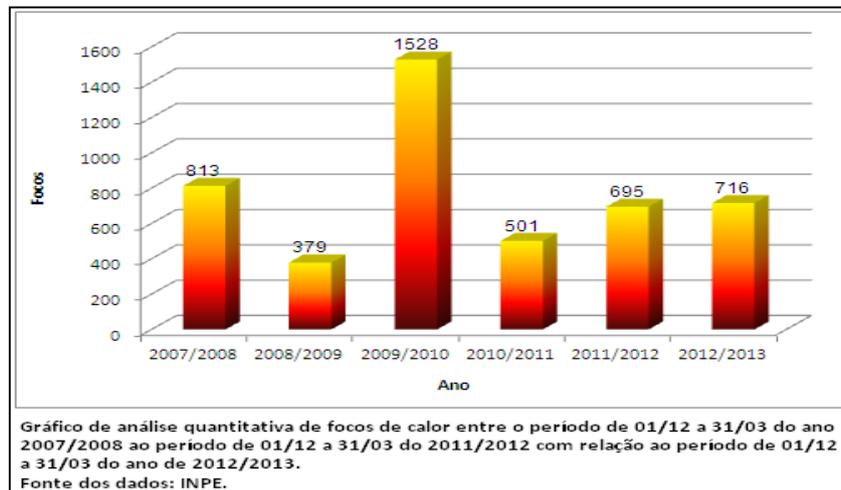


Figure 13. Graph comparing the number of hotspots for the period described.

According to historical concentration of hotspots (reference sensor) grouped by month for the period 2007-2013, the most critical period of the occurrence of fire in Roraima is between November and March, with the peak detection in months from January to March (Figures 14 and 15).

This year the hotspots showed the same trend, but there was considerably greater number of hotspots detected in January (analysis through the reference satellite in the period from 12/01/2012 to 03/31/2013), and this number has decreased considerably in the following month (Figure 16).

The distribution of hotspots (reference satellite) was also analyzed for the same period, between the municipalities of Roraima where hotspots occurred and the result is shown in Figure 17.

We emphasize that the most critical region in this period (12/01/2013 to 03/31/2013) was the Northwest region, an area with predominant savannah vegetation, for this analysis all hotspot monitoring sensors were used in the period described for the case of monitoring of hotspots (Figure 18).



Figure 14. Graph comparing the number of hotspots for the period described.

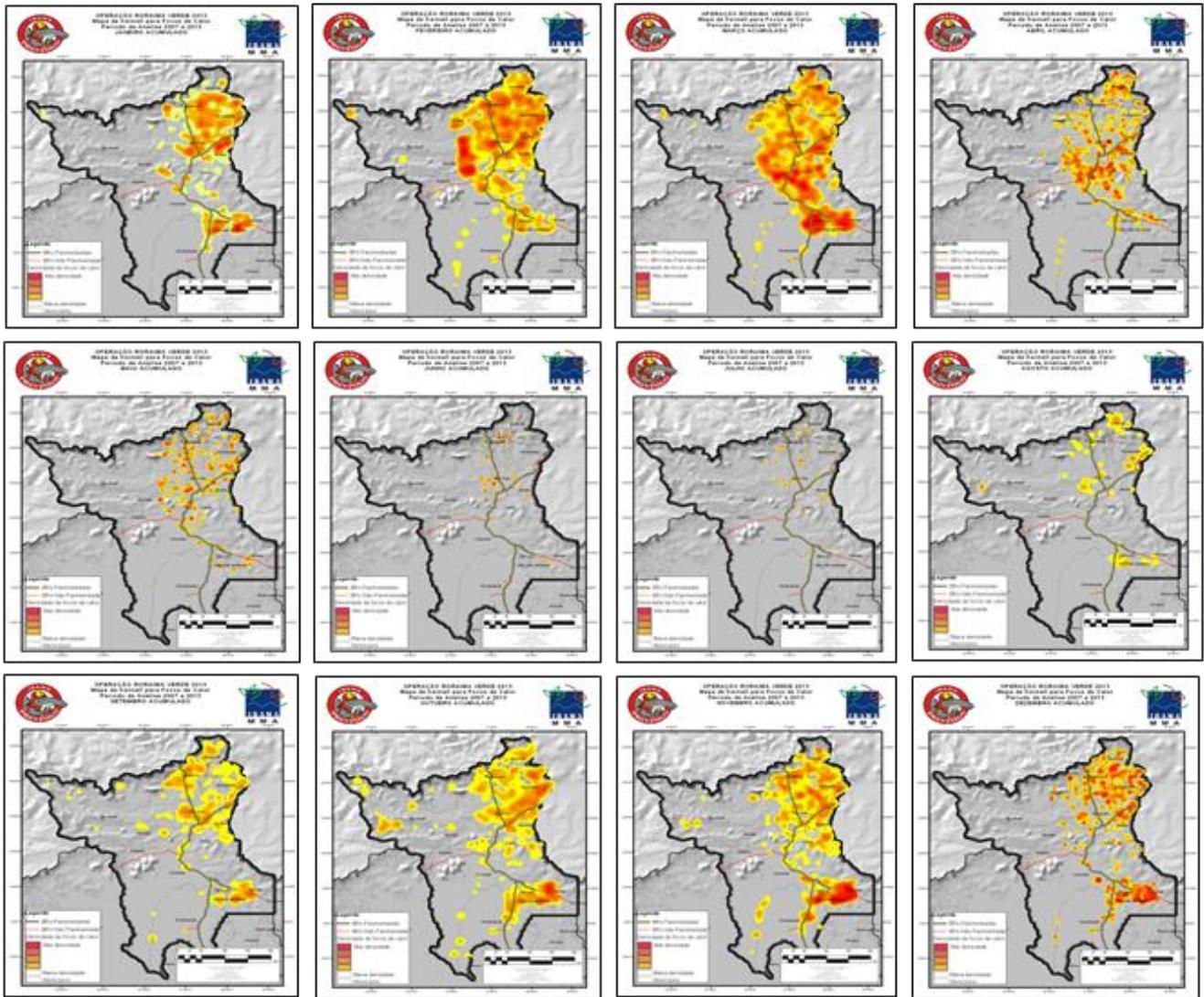


Figure 15. Comparison of the number of hotspots by month, grouped for the period 2007-2013. Source: INPE data processed by CIMAN RR / Federal. 2013 Green Roraima Operation.

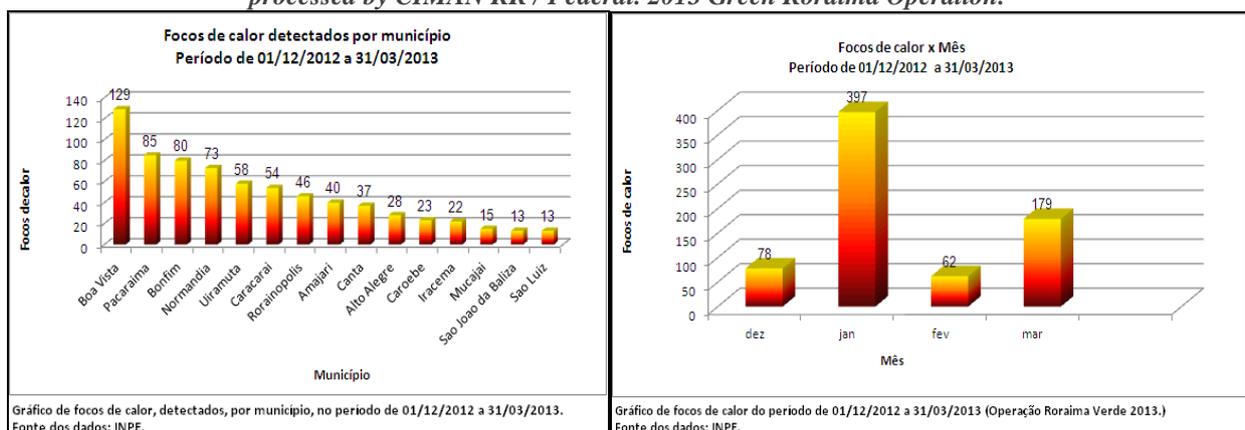


Figure 16. Graph comparing the number of hotspots for the period described.

Figure 17. Graph comparing the number of hotspots per municipality in the state of Roraima for the period described.

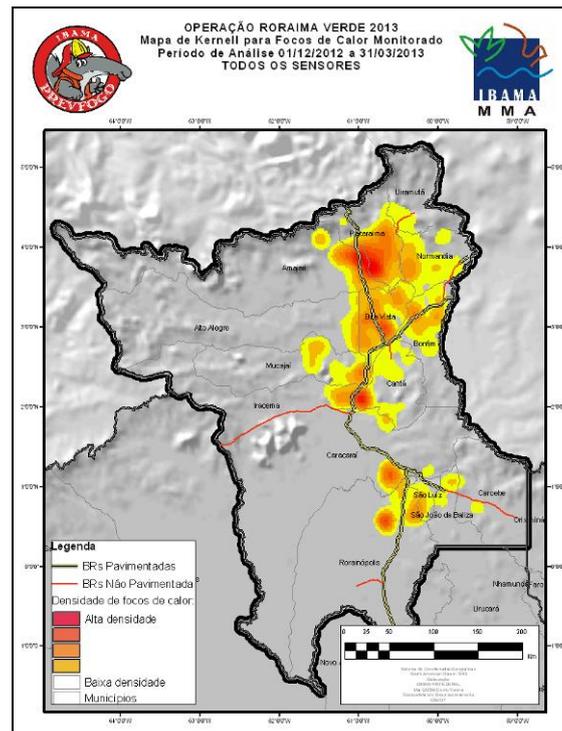


Figure 18. Density map for hotspots for the period described. Source: CIMAN RR / Federal.

4.2. Spatial Analysis

To better understand the dynamics of fires during the operational period of 2012/2013 (2013 Green Roraima Operation), an analysis of the evolution of hotspots was made from 12/01/2012 to 03/31/2013 within federal areas: military areas, border area, federal highways, settlement projects, indigenous lands, federal protected areas and other areas (Figure 19). The maps for hotspots were generated using parameters for kernel¹ map (Figures 15, 18, 20, 21, 22, 23, 24 and 25) the result enables better visualization of the region where the hotspots occur during the year.

¹ Statistical method for estimating concentration density of events and highlighting critical points

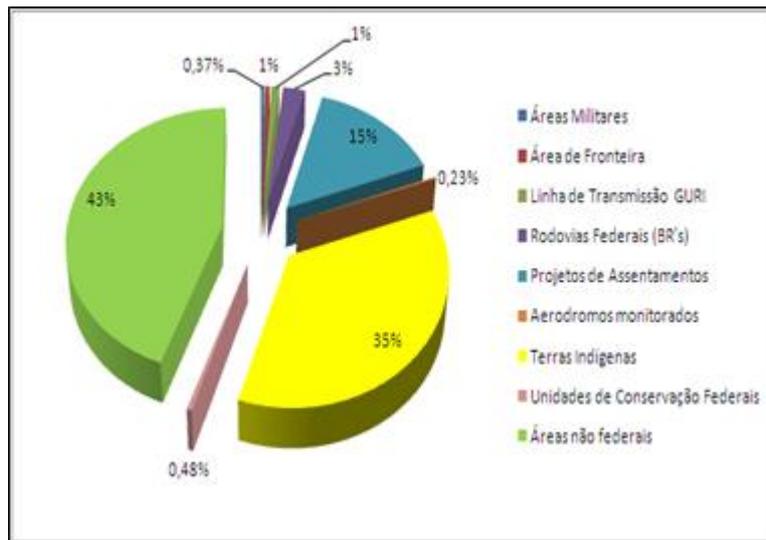


Figure 19. Distribution of hotspots (all sensors, for the case of monitoring) for the period from 12/01/2012 to 03/31/2013 in the areas monitored by CIMAN RR / Federal. 2013 Green Roraima Operation. Source: CIMAN RR / Federal.

Military areas:

Concerning military Areas of the State of Roraima only plots used by the Brazilian Army were considered for monitoring, specifically the 1st Jungle Brigade with a forest area of 279,421.00 ha.

Among the military areas monitored by CIMAN RR / Federal, the plot Serra do Tucano, located in the municipality of Bonfim - RR, was the one with the highest concentration of hotspots (Figure 20). The monitored Military Areas represent 0.37% of the hotspots for the operational period.

Military areas were used for military exercises, being totally bounded with signs indicating the property and warning the use, in some places there are physical barriers that prevented the passage of people in risk areas. This care to warn the military use of the space, in addition to enclosure thereof, prevented the passage of pedestrians in the military unit.

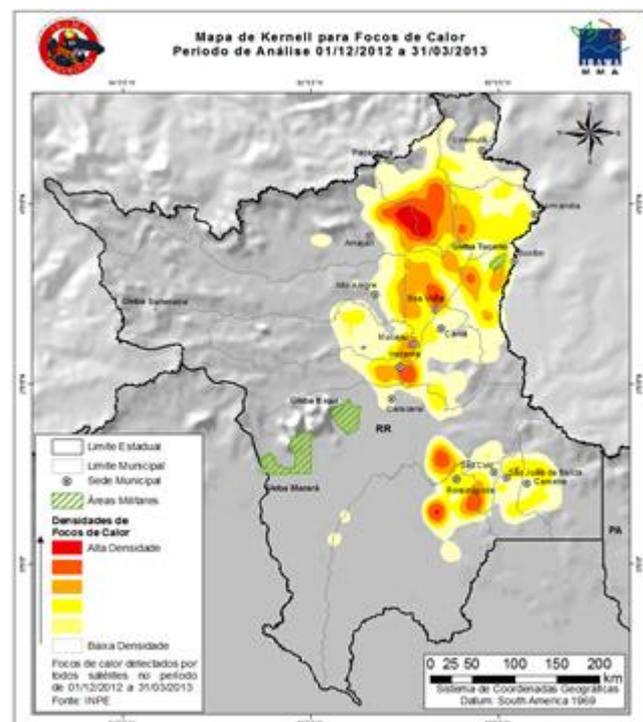


Figure 20. Concentration of hotspots x Military Areas. Source: CIMAN RR / Federal

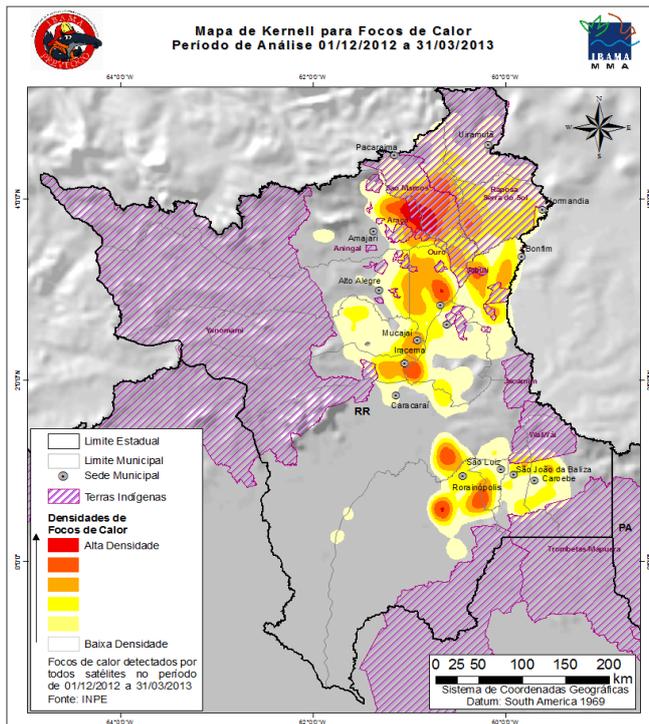


Figure 21. Concentration of hotspots x Indigenous Lands.
Source: CIMAN RR / Federal.

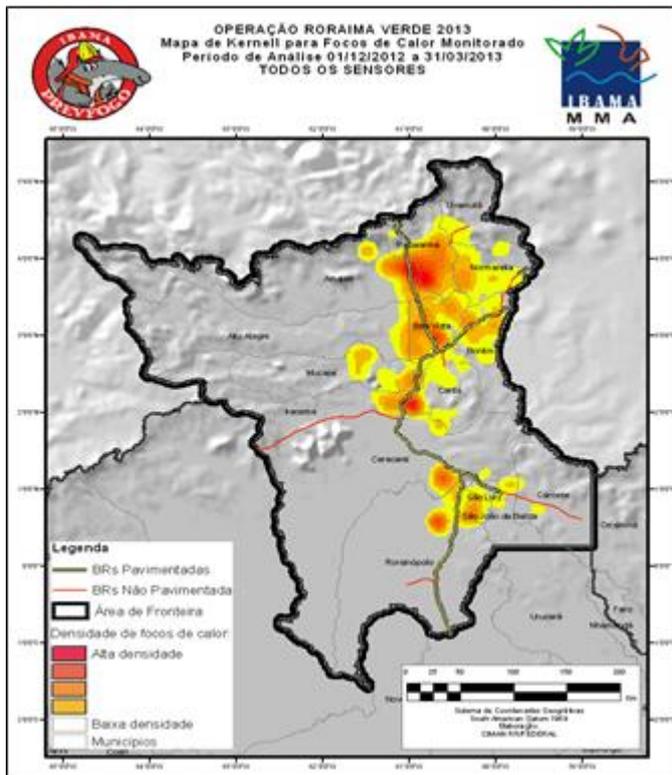


Figure 22. Concentration of hotspots x Border Area. Source:
CIMAN RR / Federal.

Indigenous lands:

CIMAN RR / Federal monitored Indigenous Lands in the period from 12/01/2012 to 03/31/2013, i.e., throughout the 2013 Green Roraima Operation, and the Indigenous Lands had the highest number of outbreaks (35% of total outbreaks recorded for the period), compared with the areas monitored by the Multi-Agency Integrated Centers. Indigenous lands with more numbers of hotspots were Raposa Serra do Sol and São Marcos, which together represent approximately 55% of the hotspots detected on indigenous lands (Figure 24).

A part of the natives has also given good contribution to the increase of fires in Roraima, because they usually set fires to process food, get rid of undesirable insects or just put fire in the forest without any purpose.

Border Area:

The boundaries that border with the State of Roraima were monitored by CIMAN RR/ Federal, Venezuela (954 km from the border) and Guyana (964 km from the border), and the hotspots for the period from 12/01/2013 to 03/31/2013, 2013 Green Roraima Operation, concentrated on the border with Guyana and the municipalities of Bonfim and Normandia and of the state of Roraima (Figure 21). The Border Area monitored represents 1% of the hotspots for the operational period.

Through the Sub Consulate of Brazil a contact was made with the institutions of neighboring countries to exchange information related to the prevention and fighting of wildfires in the border area.

In the event of an accident there would be no physical intervention unless we were contacted through diplomatic channels. But the exchange of information related to fire behavior in potential accidents was planned..

INCRA Settlement Projects:

In Settlement Projects, 15% of hotspots monitored for the period were detected, as shown in Figure 23.

The highest incidence of wildfires is undoubtedly due to lack of care when causing burning, whether for pasture renewal, elimination of rest of cultivation or for pest control. These typically agricultural activities without due care to contain the advancing flames have generated the largest wildfires in Roraima.

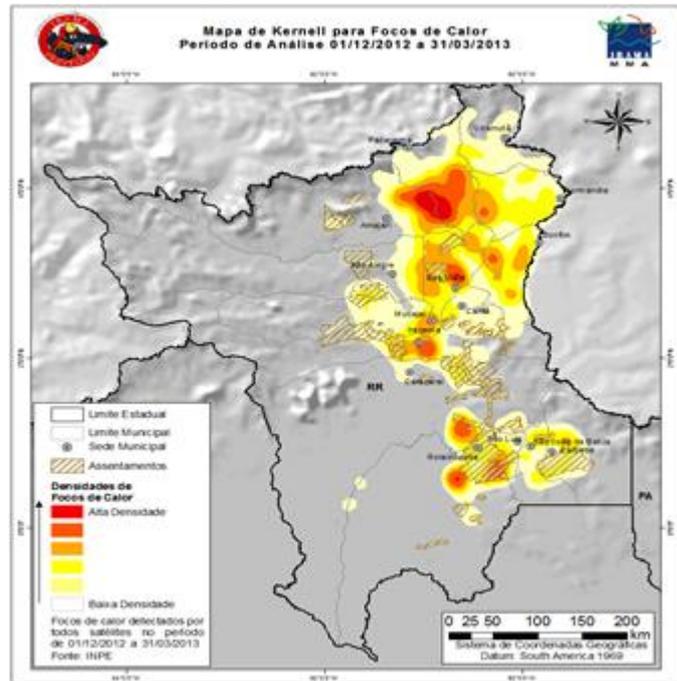


Figure 23. Concentration of hotspots x INCRA Settlement Projects. Source: CIMAN RR / Federal.

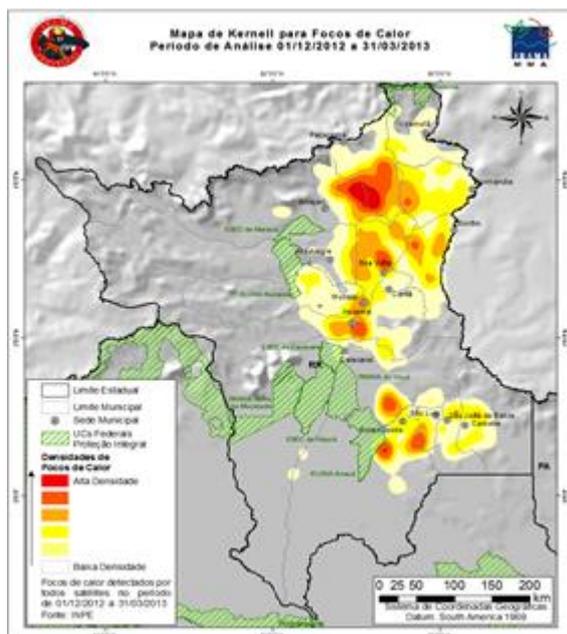


Figure 24. Concentration of hotspots x Federal Protected areas Source: CIMAN RR / Federal. Source: CIMAN RR / Federal.

Protected areas:

The analysis was made for Federal Protected areas of full protection and sustainable use. 0.48% of hotspots were detected during the analysis period. From this number, only one spot is on protected areas for sustainable use: FLONA of Roraima. The rest is on Full Protected areas: ESEC Caracará and PARNA and Monte Roraima (Figure 25).

Protected areas of Roraima, though protected by equipped brigades, are of difficult access, which prevents the presence of the main causal agent of fire, man.

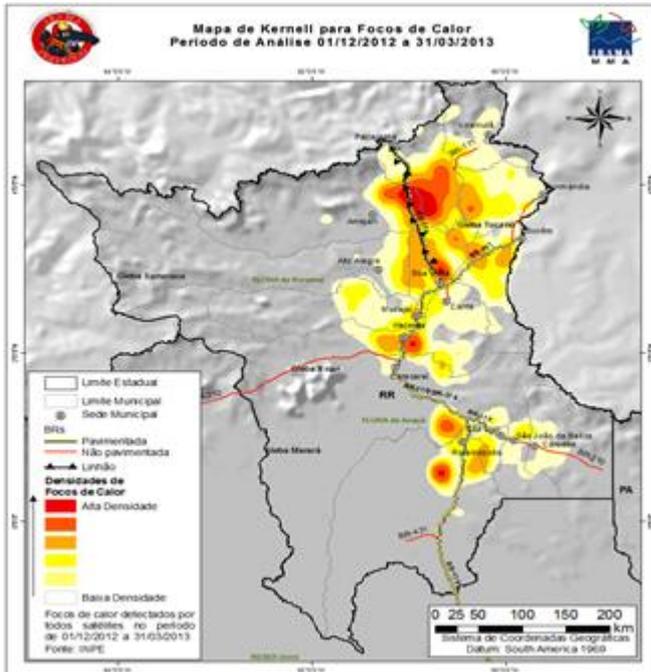


Figure 25. Concentration of hotspots x Federal Highways, GURI line and monitored Airstrip. Source: CIMAN RR / Federal.

Federal Highways, GURI Transmission Line and Monitored Airstrip:

1404 km of Federal Highways were also monitored (3% of hotspots for the period), 190 km of Transmission Line (1% of hotspots for the period) and a radius of 6 km from the center point of aerodromes in the municipalities of Boa Vista, Caracará and Pacaraima (0.23% of total hotspots for the period), as shown in Figure 22.

Wildfires in federal, state and municipal roads and highways occur due to lack of maintenance of the right of way, combined with the traffic of vehicles with low compression engines. These engines tend to accumulate carbon particles in the cylinders and the exhaust system when used for long periods and overheat causes softening and loosening of the accumulation of deposited carbon, whose deposited particles can be expelled by the exhaust, usually when the vehicle shifts gears.

The high-voltage lines in forests and lack of maintenance of the easements in transmission networks can cause serious problems, because the contact of wires with vegetation can cause sparks that will cause the fire. And also with the occurrence of fire in these lines wires can heat up, causing network outages resulting in disconnection of power supply.

The accumulation of particles in suspension near the aerodromes, particularly in the headwaters of the strips, can hinder or impede landing and takeoff procedures. As in previous years, it can even close the aerodromes for takeoffs and landings.

5. Preventive Actions

With preventive actions implemented when the brigades were not acting in firefighting, the main activity was visiting indigenous communities, settlements or farms aiming to educate the local population about the consequences of the problems arising from fires and burning in the region and disseminate controlled burning techniques seeking to establish a safety belt between the edges of the settlements and the rest of the forest, as per Table 07 and Figures 26 and 27.

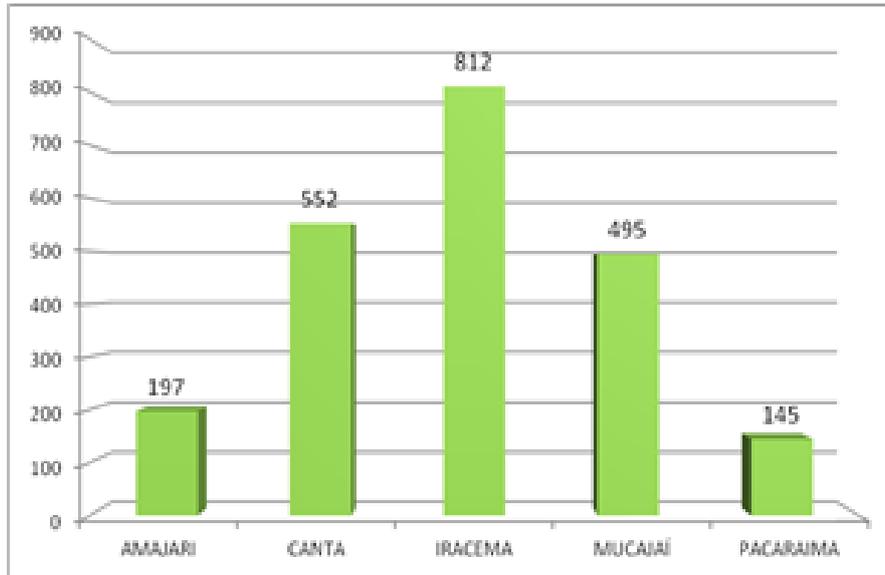


Figure 266 Graph of the distribution of preventive visits in municipalities having Brigades. Source: CIMAN RR / Federal.

Table 7. Distribution of preventive visits in municipalitie having Brigades Source: CIMAN RR / Federal

PREVENTIVE VISIT	
LOCATION	GRAND TOTAL
AMAJARI	197
CANTA	552
IRACEMA	812
MUCAJÁI	495
PACARAIMA	145
GRAND TOTAL	2201
Updated on 03/31/2013	

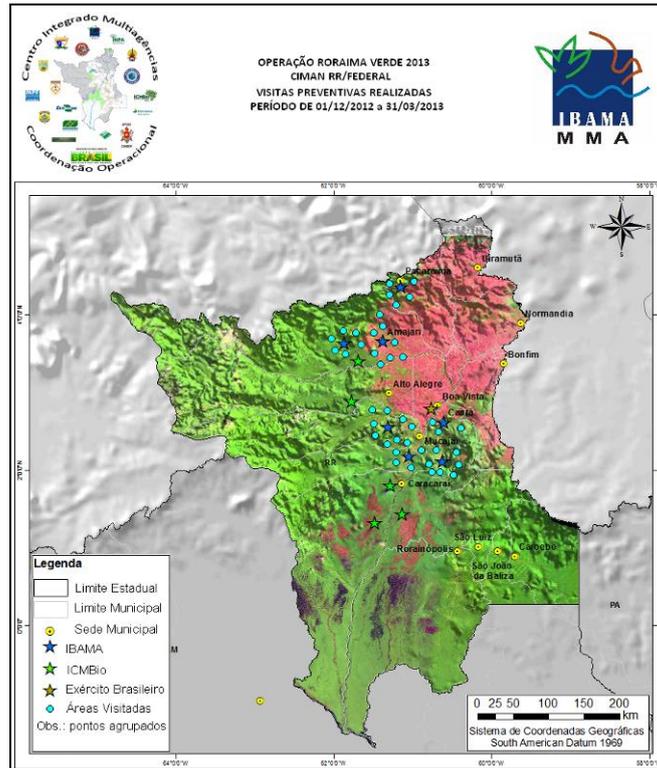


Figure 27. Distribution of the areas visited by the Brigades, grouped points. Period from 12/01/2012 to 03/31/2013. Source: Source: CIMAN RR / Federal.

In a joint effort between the State Foundation for the Environment and Water Resources - FEMARH, IBAMA-RR and RR CIMAN / Federal for the dissemination and issuing of controlled burning. The permits were issued on the basis of the Federal Wildfire Brigades / BRIFF 'S of Prevfogo / IBAMA, as shown in Table 08 and Figure 28.

Table 8. Commitments of controlled burning. Source: Source: CIMAN RR / Federal

AUTORIZAÇÕES DE QUEIMA		
LOCALIDADE	PERÍODO	QUANTIDADE
AMAJARI	18/02 a 20/02	16
CANTA	14/02 a 16/06	25
CARACARAI	24/02 a 26/02	2
CAROEBE	03/03 a 05/03	70
IRACEMA	09/02 a 10/02	4
MUCAJÁ	11/02 a 12/02	36
SÃO JOÃO DA BALIZA	03/03 a 05/03	0
SÃO LUIS DO ANAUÁ	22/02 a 23/02	6
TOTAL		159

1- Calendario estabelecido pelo Comitê Gestor de combate as queimadas em Roraima , no dia 06/02/2013.
 2- Os municipios desta tabela são os que o CIMAN RR atua.
 Fonte: FEMARH-RR (Informativo : DPMA/DMCA)

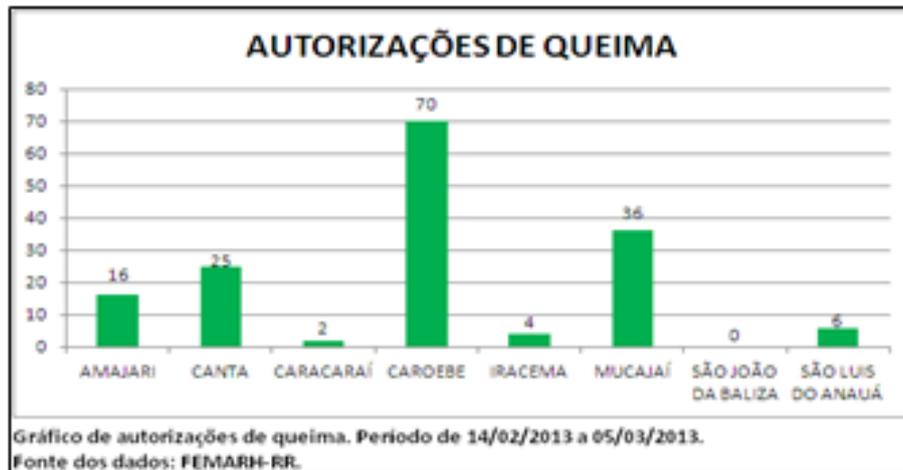


Figure 28. Comparison of controlled burns released by municipalities of Roraima. Source: Source: CIMAN RR / Federal

Preventively a helicopter became available for operation aiding in preventing and fighting wildfires, as well as in enforcement actions. We conducted a flight next to conservation areas and settlement projects, at the time instructions and guidelines were given to the Brigades on procedures for boarding and unboarding. There were two monitoring flights, one in the mosaic of military areas and another to the northeast of the state, such location covering Indigenous Lands and Military Areas (Table 09 and Figure 29).

Figure 29. Graph of distribution of flight hours. Source: Source: CIMAN RR / Federal.

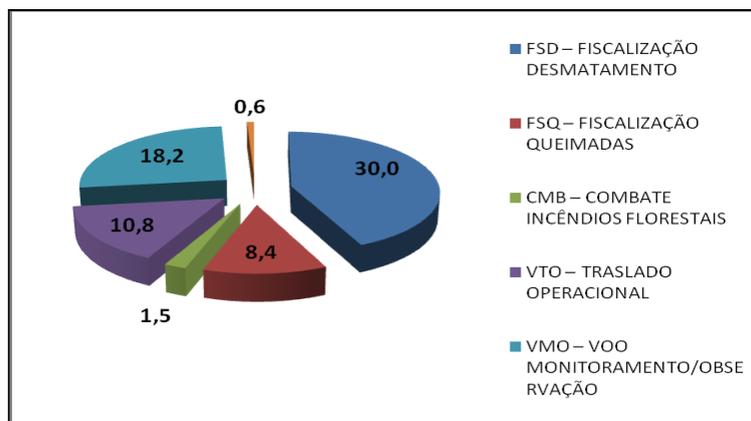


Table 9. Distribution of flight hours. Source: Source: CIMAN RR / Federal.

Purpose of flight	HOURS
FSD – DEFORESTATION SUPERVISION	30.0
FSQ – PURPOSE OF FLIGHT	8.4
CMB – WILDFIRE FIGHTING	1.5
VTO – OPERATING TRANSFER	10.8
VMO – FLIGHT MONITORING/OBSERVATION	18.2
VOU – OTHER	0.6
TOTAL FLIGHT HOURS	69.5

As actions of interaction with Civil Society, 25 dampers were donated to the Club of jeeps the State of Roraima for purposes of fighting small wildfires, Fire Brigade training for handling GPS-Global Positioning System and motor-pumps, lectures on labor unions and rural workers, indigenous communities and monitoring of environmental education project of Eletronorte.

The Brazilian Army, the Brazilian Air Force and employees of the company FIT Manejo Florestal Ltda., were trained on techniques for preventing and fighting wildfires in a course taught by experts of Prevfogo, 72 (seventy-two) students completed the course.

A mission of the National Institute for Space Research-INPE was conducted for monitoring and validation of hotspots detected during 2013 Green Roraima Operation. This validation consisted of analyzing the hotspots detected by the passage of satellites used by INPE, in relation to omission and commission, taking into account hotspots with the indications of burning on images of medium spatial resolution sensors. The missions were conducted by land and air (aircraft assigned by FUNAI) to collect data on photographs, geographic coordinates and local information.

Aiming at the preparation of a Letter of Intent on rebuilding of affected areas, three meetings were held at IBAMA / SUPES RR-03 in the scope of the Green Roraima Operation, where the following entities were present: IBAMA, the Brazilian Agricultural Research Corporation- Embrapa, the National Indian Foundation - FUNAI, Eletronorte and Department of Agriculture and Food Supply and Production of Roraima and the company FIT Manejo Florestal Ltda., which assume the commitments listed below:.

A Climate Meeting was held with the participation of the Head of the Meteorology Division of the Amazon Protection System-Sipam, who discussed in his presentation the mission of Sipam, diagnosis, analysis and prognosis for the weather in Roraima.

At the meeting, where ABIN, UFRR, IBAMA, ICMBio, FUNAI, FEMARH, EB, CBMDF, CBMRR, Civil Defense and SIPAM were present, the importance of creating a representation of SIPAM in the State of Roraima was highlighted, as well as the need to identify weather stations available, assess conditions and provide access by establishing a minimum network of shared information.

Find below a summary of preventive actions during the Green Roraima Operation (table 10).

Table 10. Summary of preventive activities. Source: Source: CIMAN RR / Federal.

Activity	Performers / Participants	Dec	Jan	Feb	Mar
Preventive orientation visits in PA's and TIs.	IBAMA.				
Disclosure and issuance of controlled burning permits.	FEMARH and IBAMA.				
Helicopter available in the operation.					
Check easement of the GURI transmission line under indigenous lands and settlements by INCRA.	IBAMA, FUNAI, DPRF and ELETRONORTE.				
Check possible risks in the Brazil / Venezuela border area.	IBAMA, Consul and THE ARMY.				
Assessment of risk areas in BR 174 and Indigenous Lands. Suggested setting: IBAMA, FUNAI, DPRF.	IBAMA, DPRF, FUNAI.				
Instructions and guidelines for the Brigade on boarding and unboarding procedures.	IBAMA.				
Monitoring flights conducted at UC's mosaic of Baixo Rio Branco and the army areas.	IBAMA, ABIN and ICMBio.				
Flight on the northeastern region of the state covering Military Areas and Indigenous Lands.	IBAMA, ABIN and THE ARMY.				
Donation of dampers for jeeps.	IBAMA and the Club of jeeps.				

Training in techniques for preventing and fighting wildfires (Brigade Training).	IBAMA AND THE ARMY.				
Training in techniques for preventing and fighting wildfires (Brigade Training).	IBAMA, Air Force, Fit Manejo Florestal.				
GPS Training to the Brigade.	IBAMA.				
Training on motor-pumps to the Brigade.	IBAMA.				
Monitoring and validation of hotspots detected by INPE in the state of Roraima.	INPE, IBAMA and FUNAI.				
Meetings for the preparation of the letter of intent concerning the Rebuilding of Affected Areas affected by Fire.	IBAMA, EMBRAPA, FUNAI, ELETRONORTE SEAPA/RR and FIT.				
Climate Meeting – diagnostic, analysis and prognosis for the climate in Roraima.	SIPAM, IBAMA, ABIN, UFRR, ICMBio, FUNAI, FEMARH, THE ARMY, CBMDF, Civil Defense of Roraima and CBMRR.				
Lectures on unions and indigenous communities.	IBAMA.				
Environmental Education Project of ELETRONORTE.	ELETRONORTE and IBAMA.				

As part of the preparation for the fight five (05) Brigades of IBAMA were hired, with 143 (one hundred and forty-three) Brigades installed inside or near Settlement Projects and Indigenous Lands. ICMBio also hired its Brigades to prevent and fight wildfires with a total of 77 (seventy seven) Brigades distributed in the units that offer greater risks, added to 52 (fifty two) soldiers of the Armed Forces, who were trained and equipped by IBAMA, CIMAN RR / Federal had 272 (two hundred seventy-two) Brigades directly for preventing and fighting wildfires in Roraima during the 2013 Green Roraima Operation (table 11).

Table 11. Human and material resources. 2013 Green Roraima Operation. Source: Source: CIMAN RR / Federal.

LOCAL	INSTITUIÇÃO	RECURSOS HUMANOS UTILIZADOS						RECURSOS MATERIAIS							
		BRG IBAMA	Coord. de fogo	BRG ICMBIO	Coord. ICMBIO	EB	FAB	TOTAL	RODOFOG	VIATURA	HEL. IBAMA	HEL. ICMBIO	AV. CISTERNA	AV. MONITOR	AV. FAB
BOA VISTA	IBAMA		11					10		4	1				
BRIF TRAIRÃO	IBAMA	14	1					15		2					
BRIF VILA BRASIL	IBAMA	15	1					16		2					
BRIF FÉLIX PINTO	IBAMA	14	1					15		2					
BRIF TABA LASCADA	IBAMA	13	1					14		2					
BRIF IRACEMA	IBAMA	29						29		2					
BRIF APIAU	IBAMA	29						29		2					
BRIF BOCA DA MATA	IBAMA	29						29		2					
ESEC MARACÁ	ICMBIO			14	1			15		1					
FLONA RORAIMA	ICMBIO			14	1			15		1					
PARNA VIRUÁ	ICMBIO			28	1			29		1					
ESEC CARACARÁ	ICMBIO			14	1			15		1					
ESEC NIQUIÁ	ICMBIO			7	1			8		1					
10º GAC SI	EB					15		15		2					
12º ESQD. C. Mec.	EB					15		15		1					
C front. RR/7 BIS	EB					15		15		1					
BABV	FAB					7		7		1					
TOTAL		143	15	77	5	45	7	291		28	1				

6. Federal brigades for the Prevention and Fighting of Wildfires of IBAMA-BRIFs / IBAMA

Since 2001, the National Center for Prevention and Control of Wildfires - Prevfogo seeks to establish control over wildfires through the hiring of prevention and fighting brigades. Primarily restricted to the federal protected areas, such brigades have achieved important goals for the conservation of local

biodiversity by creating prevention routines, providing first response to frequent occurrences and composing field teams in large-scale fighting.

In 2009, hiring UC's brigades became the responsibility of the Chico Mendes Institute for Biodiversity Conservation - ICMBio. In 2008, Prevfogo began developing the "Wildfire Brigades of Prevfogo in Critical Municipalities" program, which aims to promote the prevention and fighting of fire incidents in locations especially threatened by wildfires.

The selection of municipalities for the implementation of the brigades observed the technical and objective criteria for detection of hotspots in remnants of native areas and coverage of protected areas (indigenous lands, and federal and state conservation), forest remnants and settlement projects.

In 2013 Prevfogo hired 143 (one hundred and forty-three) Brigades in five municipalities of Roraima: Cantá, Mucajaí, Iracema, Pacaraima and Amajari, which were located in forward bases, prioritizing the contact areas of savannah with temperate rainforest (Figure 30). The period of hiring Brigades in 2013 in the state is December to April, except Cantá whose hiring was during December extending until April.

When Prevfogo Brigades were not acting in firefighting, the main activity was visiting indigenous communities, settlements or farms aiming to educate the local population about the consequences of the problems arising from fires and burning in the region and promote controlled burning techniques. Altogether 2201 (two thousand two hundred and one) preventive visits (see Figure 27) were done. When possible, the brigade supported the authorized controlled burning.

7. Brigades for the Prevention and fighting of Wildfires of ICMBIO

The Chico Mendes Institute for Biodiversity Conservation has, among its duties, the responsibility for the protection of Federal Protected areas. Among the activities for the protection, Firefighting and prevention is one of the most important.

The existing fire brigades in federal protected areas has as their main goal to work under the command of the head of the unit and the manager of fire in all actions to prevent and fight wildfires within the protected areas and their surroundings provided in the Management Plans (Figure 30).

In 2012 ICMBio hired 77 (seventy-seven) Brigades to act in five protected areas in the state of Roraima. Their distribution was as follows: Parna do Viruá with 28 (twenty eight) Brigades; ESEC Caracará with 14 (fourteen) Brigades; ESEC Niquiá with 07 (seven) Brigades; ESEC Maracá with 14 (fourteen) Brigades and Flona Roraima with 14 (fourteen) Brigades. The hiring period of the brigades in the state starts in November and goes until April.

When the risk of fire within the UC's is zero, the brigades of ICMBio usually work on prevention of incidents along the nearby communities, conducting lectures, educational visits and supporting authorized controlled burning. In fact, firefighting in Federal Protected areas is the last resort of the unit, after completion of all the efforts in prevention and public awareness, causing Brigades of ICMBio, after all, to act as social actors in their communities.

8. Brigades for the Prevention and Fighting of Wildfires of the Army

During the month of November 2012, meetings between IBAMA servants and a representative of the 1st Jungle Infantry Brigade were held, where it was agreed that the Army would indicate a representative to participate in the situation room that would be installed and that IBAMA would promote prevention and fighting courses for one hundred (100) Soldiers.

At the beginning of December 2012, the Commander of the 1st Jungle Infantry Brigade signed Service Order No. 27, regulating the activities to be performed to support CIMAN in case of fighting wildfires in Roraima and determining the initial composition of fifty (50) Soldiers for the "Fire Brigade" of the Army in Roraima, after training with the staff of IBAMA - Prevfogo (Figure 30).

Thus, in the period from January 21st to 25th, 2013, the Course for the Prevention and Fighting of Wildfires was conducted, promoted by CIMAN, through IBAMA and the 1st Jungle Infantry Brigade. 46 (forty six) Soldiers successfully completed the course: 26 (twenty six) from C Fron RR / 7th BIS; 10 (ten) from the 12th Esqd C Mec and 10 (ten) from the 10th GAC S1.

Finally, the Brigade is interested in training more fifty (50) Brigades, with the goal of assigning them to the Special Border Platoons (with road access) in the future.

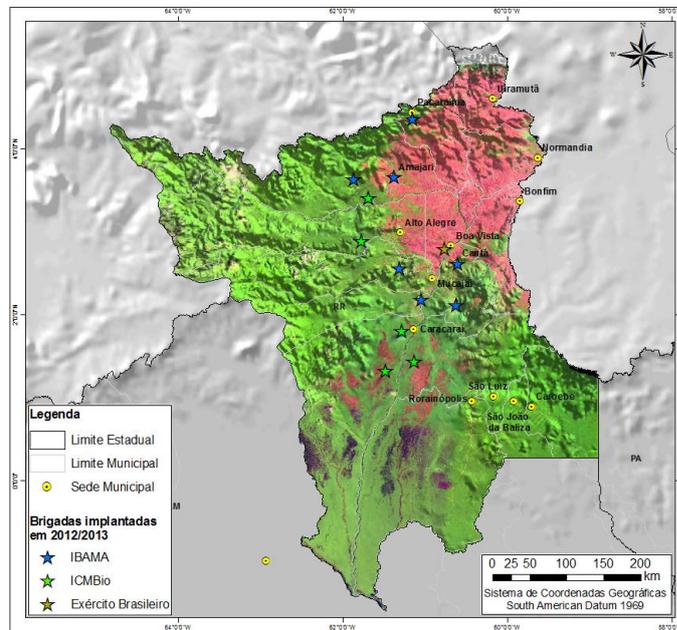


Figure 30. Distribution of brigades deployed in 2012/2013. Source: CIMAN RR / Federal.

9. Fire Record – ROI

The records of occurrences of wildfires and the statistical analysis thereof are essential tools for defining strategies for prevention and firefighting, indispensable for countries that seek to manage the issue of fire in an efficient and organized manner.

The ROI's are filled by field teams and entered into the National Fire Information System - SisFogo. It is a system of IBAMA in which it is possible to enter and search ROI's with information on the agency itself, ICMBio and Fire Stations. It integrates information and allows the use of data safely and autonomously by users and is available on the following website: <http://siscom.ibama.gov.br/sisfogo/>. Also according to the ROI's of the 2013 Green Roraima Operation, Canta is the municipality that has the highest number of records, followed by Pacaraima and Amajari. It is worth-mentioning that these data do not fully reflect the reality of the occurrences of wildfires, since there are a lot of gaps in the records, as well as records without dates and coordinates.

425 (four hundred twenty-five) firefighting actions were recorded by CIMAN RR / Federal during the 2013 Green Roraima Operation, distributed by the deployed Brigades (Table 12 and Figure 31).

Table 12. Firefighting actions. Source: CIMAN RR / Federal

BRIGADA/LOCAL	TOTAL
10º GAC SI	0
12º Esqd C Mec	0
BRIFF APIAU	61
BRIFF BOCA DA MATA	71
BRIFF CAMPOS NOVOS	52
BRIFF FÉLIX PINTO	61
BRIFF TABALASCADA	87
BRIFF TRAIRÃO	37
BRIFF VILA BRASIL	31
BRIFF VILA NOVA	0
C Fron RR/ 7º BIS	1
ESEC CARACARAÍ	4
ESEC MARACÁ	5
ESEC NIQUIÁ	0
FLONA RORAIMA	0
PARNA VIRUÁ	15
TOTAL	425

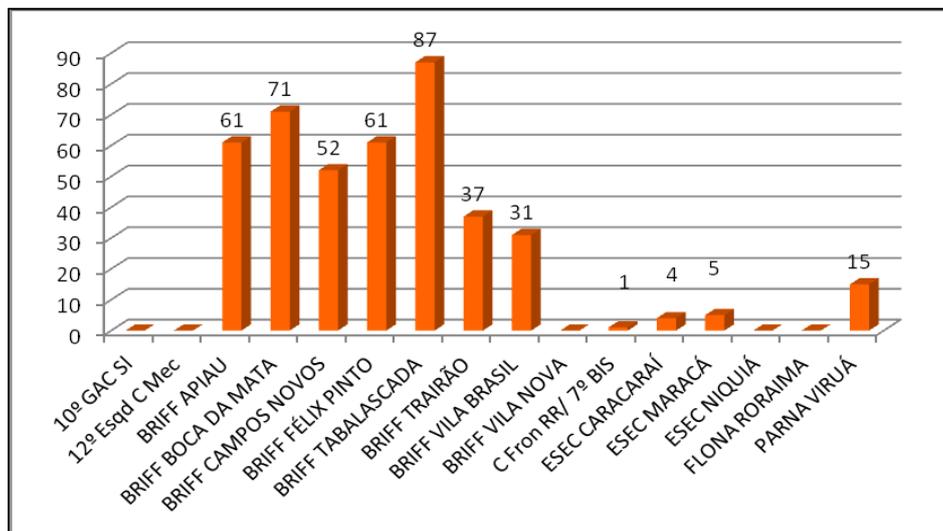


Figure 31. Graph of the firefighting actions distributed among deployed Brigades. Source: CIMAN RR / Federal.

10. Accountability for Environmental Crimes

In order to be successful, wildfire fighting actions were accompanied by actions of enforcement activities. The inspection teams conducted educational and repressive actions in the critical regions of fires, illegal deforestation, illegal logging and other illegalities. The intensive supervision contributed to the inhibition of infringing actions and reduction of environmental crimes, in particular those related to wildfires, fires and deforestation.

Table 13. Work done by NUCOF. Source: CIMAN RR / Federal

Ações de Fiscalização	Número
Autos	14
Embargo	8
Apreensão	8
Notificações	9
Visitas	29
Total	68

Tabela dos trabalhos realizados pelo Núcleo de Fiscalização da SUPES/IBAMA-RR. Período de 01/12/2012 a 31/03/2013. Fonte dos dados: NUCOF/DITEC/IBAMA-RR.

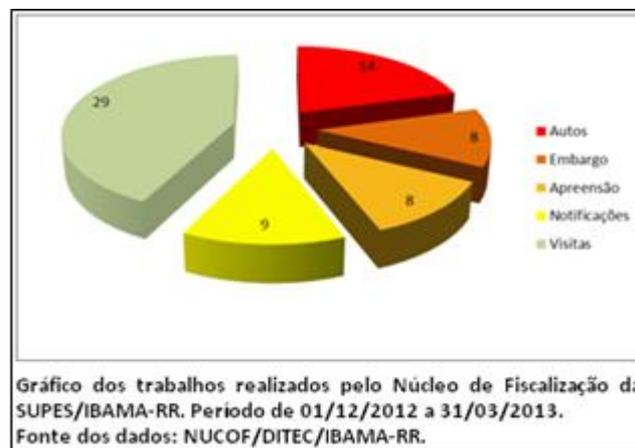


Figure 32. Graph of the work done by NUCOF. Source: CIMAN RR / Federal.

The years 2012/2013 prioritized the fight against deforestation, especially in the Amazon. Most of the inspection teams of IBAMA were focused on these activities, but by no means the supervisory activities of misuse of fire was impaired. 14 notices of violation were issued for illegal burning during 2013 Green Roraima Operation; such number is insignificant when compared to 2010, when 347 notices of violation (Table 13, Figures 32 and 33) were issued.

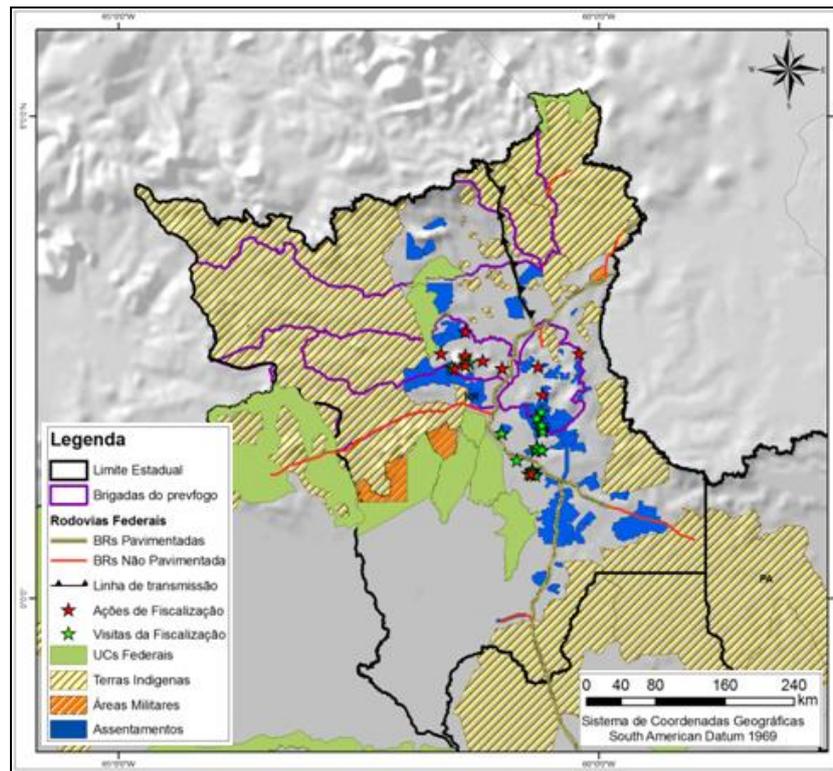


Figure 33. Work done by NUCOF. Source: CIMAN RR / Federal

11. Difficulties

Notably the lack of a specific and compatible structure of the agencies can be considered as the main obstacle to satisfactory response of CIMAN/RR Federal. The deficiencies are: insufficient system of communication, means of transport and capacity below what is needed.

11.1. Equipment

Regarding communication, the lack of adequate means results in difficulty of calling some Brigades located in the most isolated municipalities, loss of agility in firefighting activities and huge delay in informing the situation to the central coordination, which is critical for efficient management of available resources.

The personal and vehicle tracking devices, currently nonexistent, are an important and complementary part of a communication system, and increase situational awareness of national coordination and security of the Brigade members.

The transport was also deficient during the whole operation, making it difficult to mobilize teams for firefighting and prevention. Vehicles available for operation are rented, the maintenance and supply being the responsibility of the lessee. Even so, the maintenance issue was demonstrably very poor and there is a huge delay in service authorization and release of substitute vehicles. The supply is made only in Boa Vista, which complicates the operationalization of the brigades.

Brigades of Prevfogo were strongly damaged by the delay of delivery of PPE or the absence of some items.

11.2. Deficit of skilled personnel

While servants from other states have been made available to integrate the operation, some areas were not covered during the operation.

The lack of know-how on the Incident Command System-ICS, by some members of Ciman / RR caused the tool to be underused, jeopardizing the establishment of standardization activities. Another activity that was jeopardized was geoprocessing, where there were difficulties in providing technicians to work with the tool.

12. Final Remarks

The Green Roraima operation is a milestone in the implementation of the national policy for preventing and fighting wildfires with integrated and comprehensive management giving a new direction to actions of firefighting, prevention and control.

Again, the need for expansion and consolidation of the Integrated Centers - CIMAN was clear in all regions of Brazil where recurrent wildfires occur.

Participants of the Green Roraima Operation:

Alexandre Ramos	ABIN	Fabiano Morelli	INPE	Marcos da Conceição Rocha	IBAMA/SEDE
Alcides Galvão dos Santos	EMBRAPA	Flávio Rosas de Oliveira Júnior	IBAMA	Marlene da Costa Pinho	IBAMA/RR
Ahmed C. Sobrinho	INFRAERO	Flávio Marcelo de Souza	IBAMA/RR	Moisés Alves Barcelos	CBMDF
Aline Souza	FEMARH	Francisco Wilson de Oliveira Pequeno	IBAMA/RR	Nilton Barth Filho	ICMBIO
Adailton Paulino Vieira	IBAMA	Gildenio de Jesus Sousa	IBAMA/PI	Ozeli Izidorio Messias Junior	EMBRAPA
Antonio Francisco Beserra Marques	INCRA	Guilherme Silva Rodrigues	FEMARH	Oziel Furquim Pinto	FEMARH
Anderson F. Jose da Silva	EXERCITO	Guilherme Jose F. Colares	PRF	Operácio Alves Lobato	IBAMA/SEDE
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André Lopes dos Santos	ABIN	Hugo Américo Rubert Schaedler	IBAMA/PA	Paulo Roberto Lopes Soares	IBAMA/RR
Anderson Peixoto Amparo	IBAMA/AC	Hudson C. Felix	ICMBIO	Pedro Rogerio Rodrigues Coelho	FEMARH
Antonio Jorge Passos Balderramas	IBAMA/PA	Inayê Wiana Perz	FUNAI	Pedro Augusto Lagden de Souza	INPE
Antônio Carlos de Lima	IBAMA/SEDE	Italo Chaves de A. Barbosa	PRF	Raimundo Neto Alves Lopes	IBAMA/RR
Arivelto Mendes Borbas	FEMARH	Jaider da Silva Esbell	ELETROBRAS	Raimundo Nonato de C. Bezerra	IBAMA/RR
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Azemar Marques	IBAMA/RR	Jeferson dos Prazeres Silva	CIPA	Ramón Alves	FEMARH
Cap. Marcelo Marcant da Silva	EXERCITO	Jerffeson Sérgio Souza Soares	CIPA	Renata Bocorny de Azevedo	ICMBIO
Carlos José Dantas	IBAMA/RR	Joaquim Parimé Pereira Lima	IBAMA/RR	Ricardo Vianna Barreto	CBMDF
Celso Luiz Ambrosio	IBAMA/ESREG/SP	José Braz Oliveira Filho	FUNAI	Ricardo Luiz Godinho Dallarosa	CENSIPAM
Clemilton Firmino de Macedo	IBAMA/SEDE	José Carlos Mendes de Morais	IBAMA/SEDE	Rosangela Lima de Oliveira	FEMARH
Creusa Monteiro Olinto Olivato	IBAMA/SEDE	José Neto Francisco de Souza	IBAMA/SEDE	Roberto Fernando Abreu	IBAMA/RO
Diego Milleo Bueno	IBAMA/RR	José Gonçalves de Paula	IBAMA/SEDE	Rodrigo de Moraes Falleiro	IBAMA/SEDE
Dirlan Alves da Costa	CIPA	Josue Claudio da Silva Filho	IBAMA/RR	Sgt Lazaro Bessa	BASE AÉREA
Ediley da Silva Costa	CIPA	Lourival Pereira da Silva	DPRF	Sandra M. Gomes	INFRAERO
Emerson Luiz da Assumpção	ABIN-RR	Laurenço de Souza Cruz	EMBRAPA	Saul Abreu Lavor	FEMARH
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Erwin João de Morais	SEAPA/DATER	Luismar Araujo de Souza	IBAMA/RR	Sebastião Vicente Pereira	IBAMA/RR
Erisvaldo da Silva Pereira	IBAMA	Luiz Emi de Souza Leitão	FEMARH	Silvio Nogueira S. Junior	EB-1 BDA
Estevão Vieira Tanajura	IBAMA/GO	Luiz Carlos Lima Magalhaes	IBAMA/RR	Soraia Maria Peixoto de Caldas	IBAMA/RR
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Marcelo José Lourenço	IBAMA/NOA	Maria Soleane Lemos Barbosa	IBAMA	Taylor Nunes	ASSEMBREIA
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Wendell Rodrigues de Brito	IBAMA/NOA	Carlos Alberto Rofimann	IBAMA/NOA	Valdecir José Albino	CIPA
Pedro Ivo Bastos Baldo	IBAMA/NOA	Thiago de Souza	IBAMA/NOA	Valdecir P. da Costa	FEMARH
Ederson Souza da Silva	IBAMA/NOA	Ezequias Aguiar de Assis	IBAMA/NOA	Valdemar Soares dos Santos	IBAMA/SEDE
Everton Pimentel	IBAMA/NOA	Anderson Felippetto	IBAMA/NOA	Wanja Soraia de M. Carneiro	IBAMA/GO

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