EXAMPLES OF FIGURES AND TABLES

CONTENS

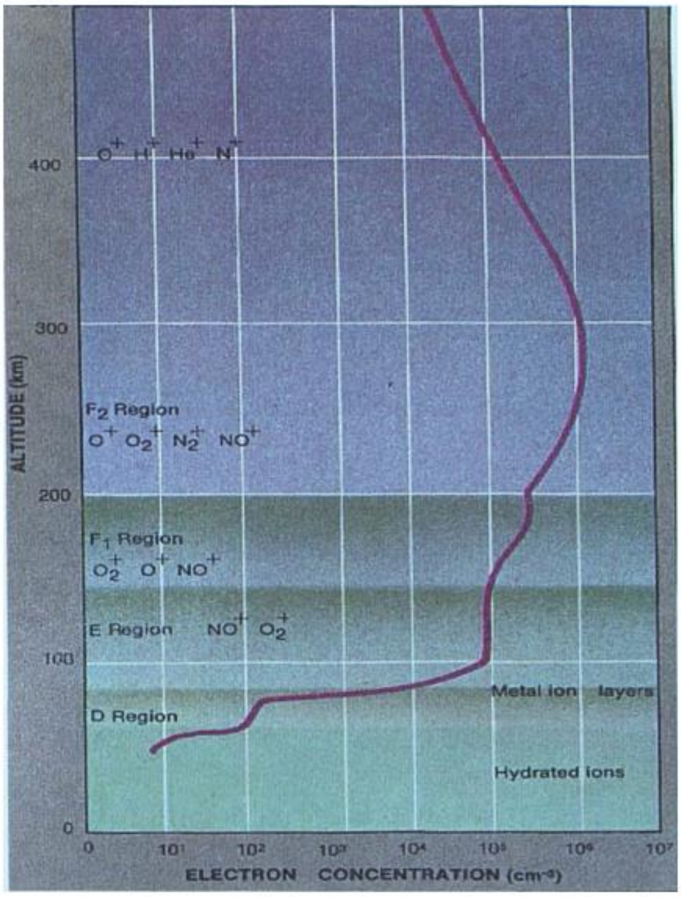
1. FIGURES

1.1 Figure title and source (produced by others)

<u>Figure title with a single line</u>: center aligned.

<u>Source</u>: center aligned with year in parentheses.

Figure 2.1 - A temperature profile of the Earth's ionosphere.



Source: Heelis (2004).

1.2 Figure title and source (produced by the author)

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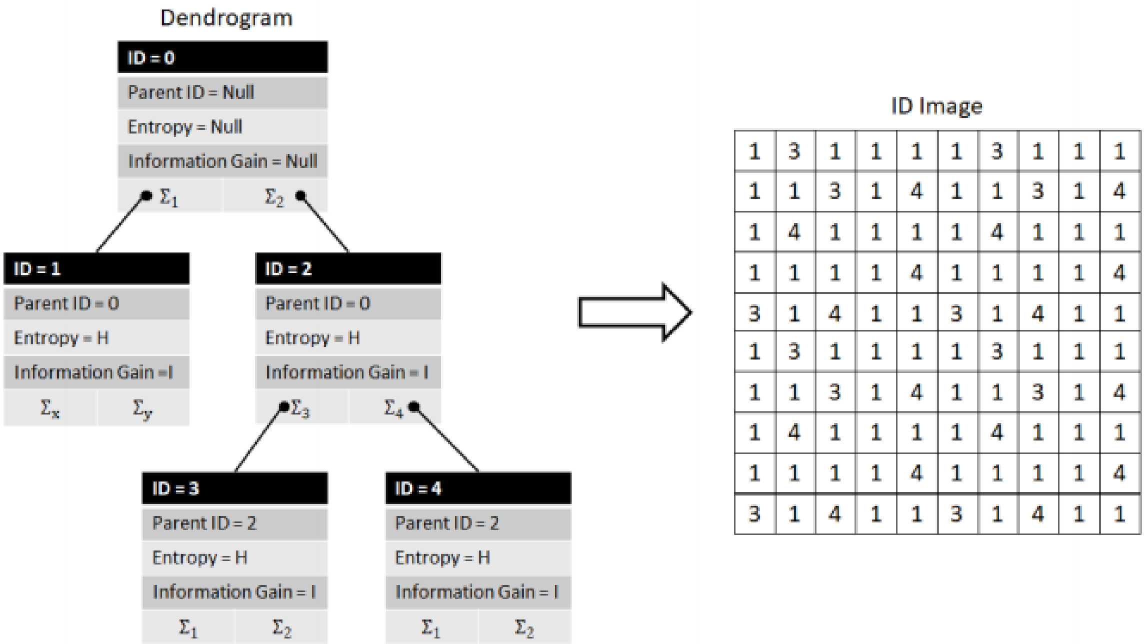
Figure 4.5 - Dendrogram Structure and ID image.



SOURCE: Author's production.

1.3 Figure title with two or more text lines

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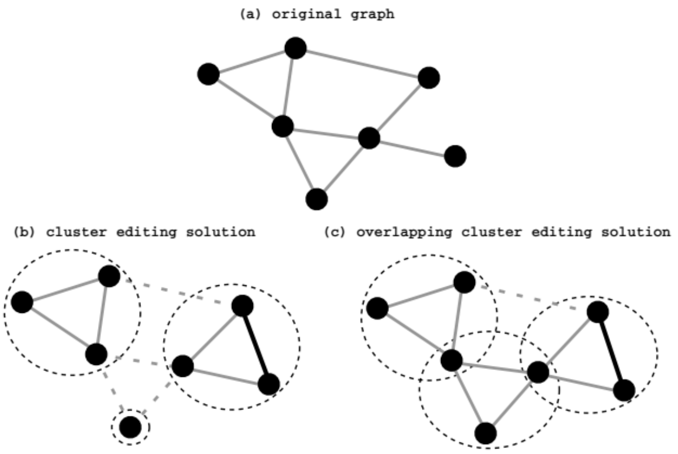
Figure 2.1 - An example of cluster editing and overlapping clustering editing solutions of a same input graph. In this figure, removed edges are represented by dotted lines and added edges are represented by bold ones. The original graph is represented by Figure 1a. A cluster editing solution, of cost five, is depicted by Figure 1b. Figure 1c shows an overlapping cluster editing solution of cost two.

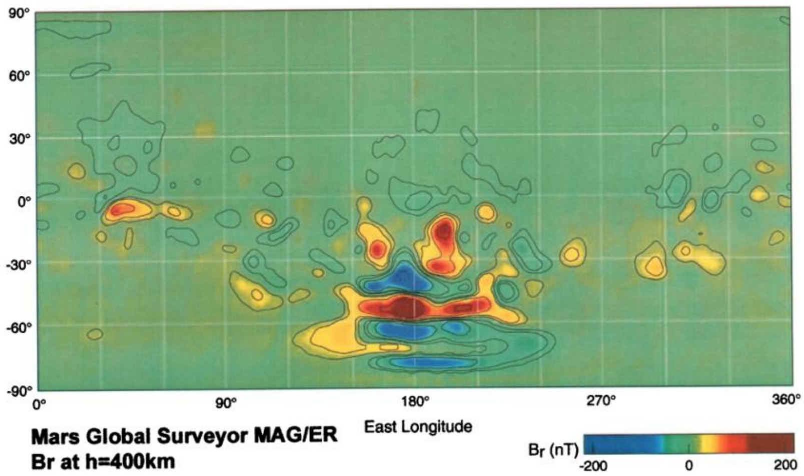


1.4 Figure with caption

Figure title with a single line: center aligned

Caption and Source: both with justified alignment.

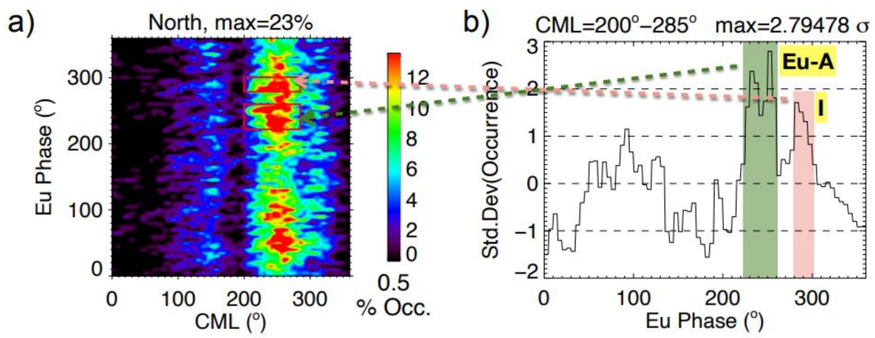
Figure 1.3 - Map of the crustal magnetic field of Mars.



Contour map of the radial component of the magnetic field, observed at an altitude of 400 ± 20 km. Notice that the longitude axis is displaced when compared to Figure 1.2.

SOURCE: Acuña et al. (2001).

Figure 6.4 - Selected peaks of occurrence probability of northern emissions.



The yellow tags show the new designation for the selected peaks. The emissions of the Eu-A are possible originated in the source A.

1.5 Figure title with two or more text lines

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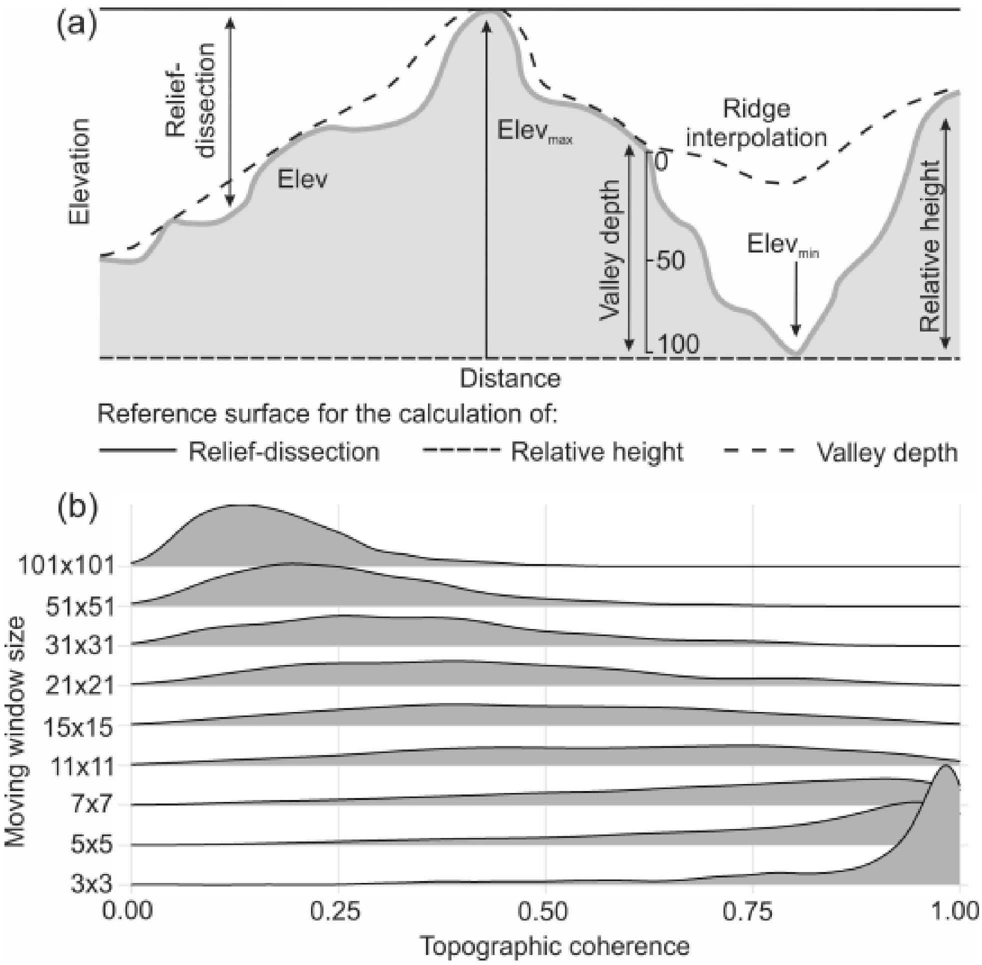
Caption and Source: both with justified alignment.

Source without caption: center aligned.

Figure 2.8 - Reference surfaces to calculate regional geomorphometric variables and moving window effects.



(a) Diagram representing the reference surfaces to derive the relative height, relief-dissection and valley depth (a). Elev = elevation; $Elev_{max}$ = maximum elevation; and $Elev_{min}$ = minimum elevation. (b) Effect of the size of the moving window in the derivation of topographic coherence, a scale-dependent variable. Note in b that there is a shift in the distributions, as the size of the moving window increases.

SOURCE: Diagram was modified from Muñoz and Valeriano (2009).

1.6 Figure split on two pages in the text

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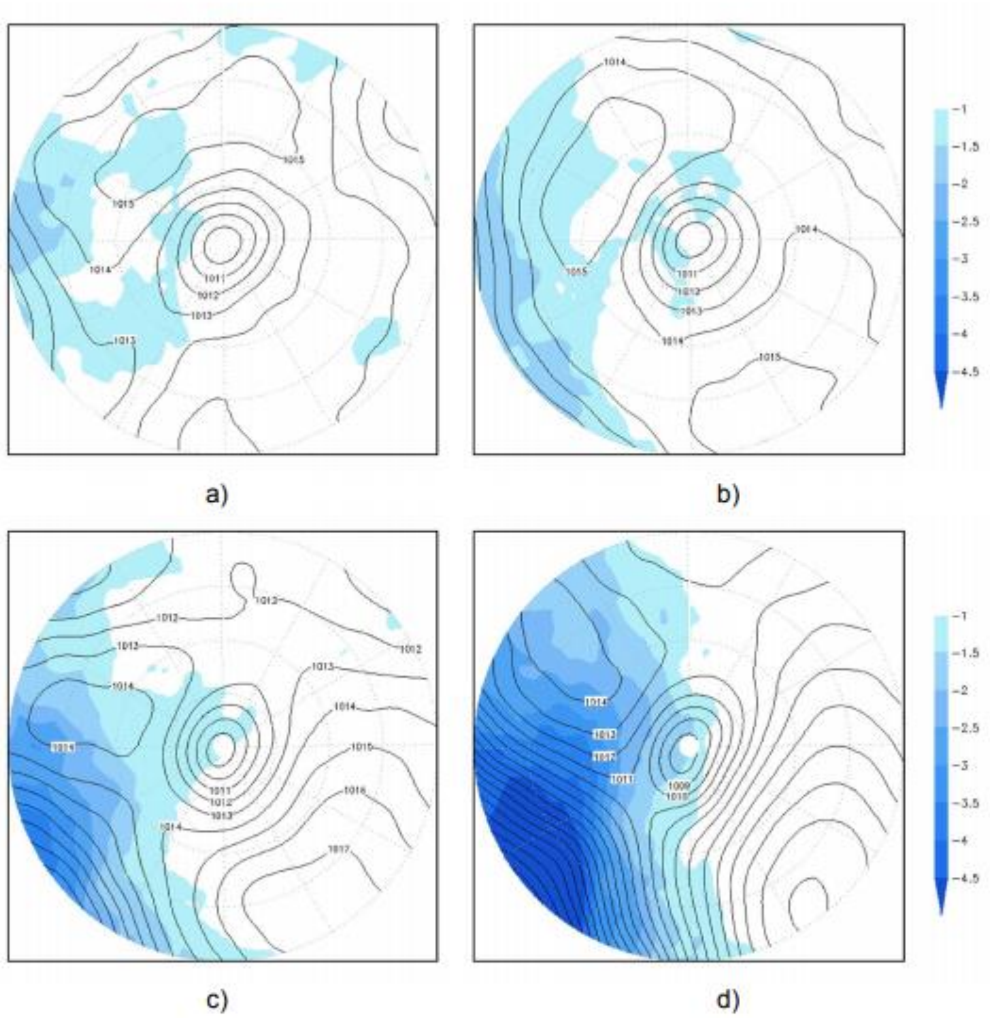
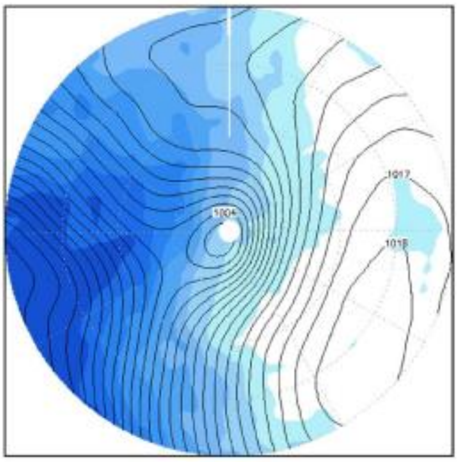
<u>Caption</u>: If the figure has caption, add it at the end of the figure in the last page following the previous orientations.

Figure 4.12 – Composites of SLP (contour) and Potential Vorticity at250 hPa (shaded) of SCET in a) t = -72h, b) t = -48h, c) t = -24h, d) t = 0, e) t = +24h, f) t = +48h e g) t = +72h. Units of PV and SLP are PVU and hPa, respectively.

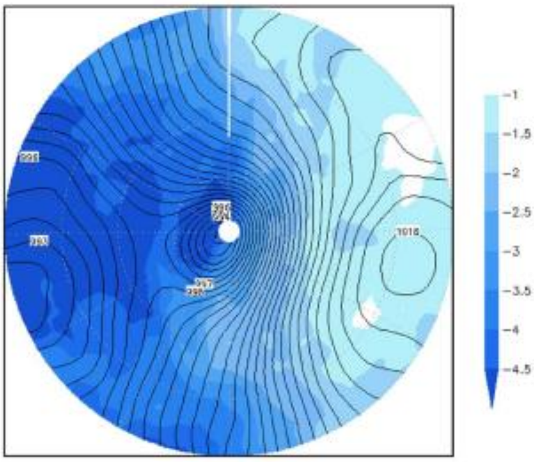


(continue)

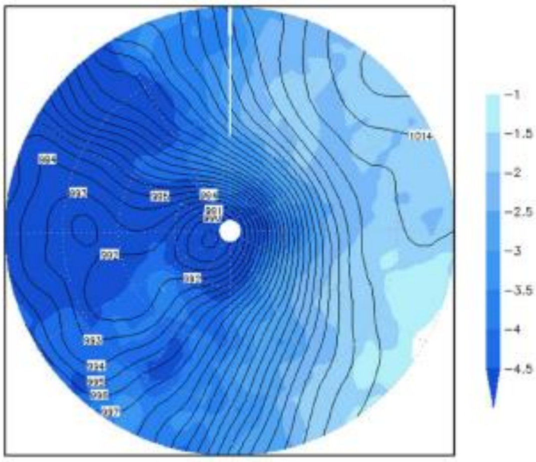
Figure 4.12 – Conclusion.



e)



f)



g)

Source: Author's production.

1.7 Figure that take up more than two pages of the text

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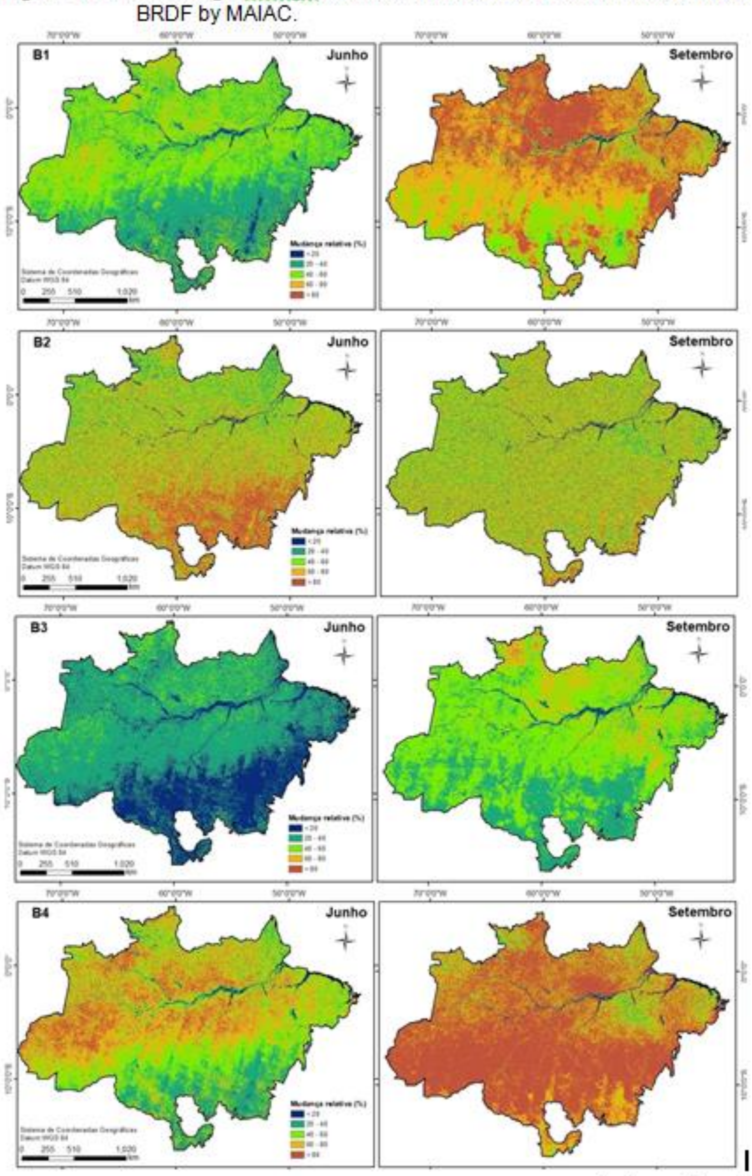
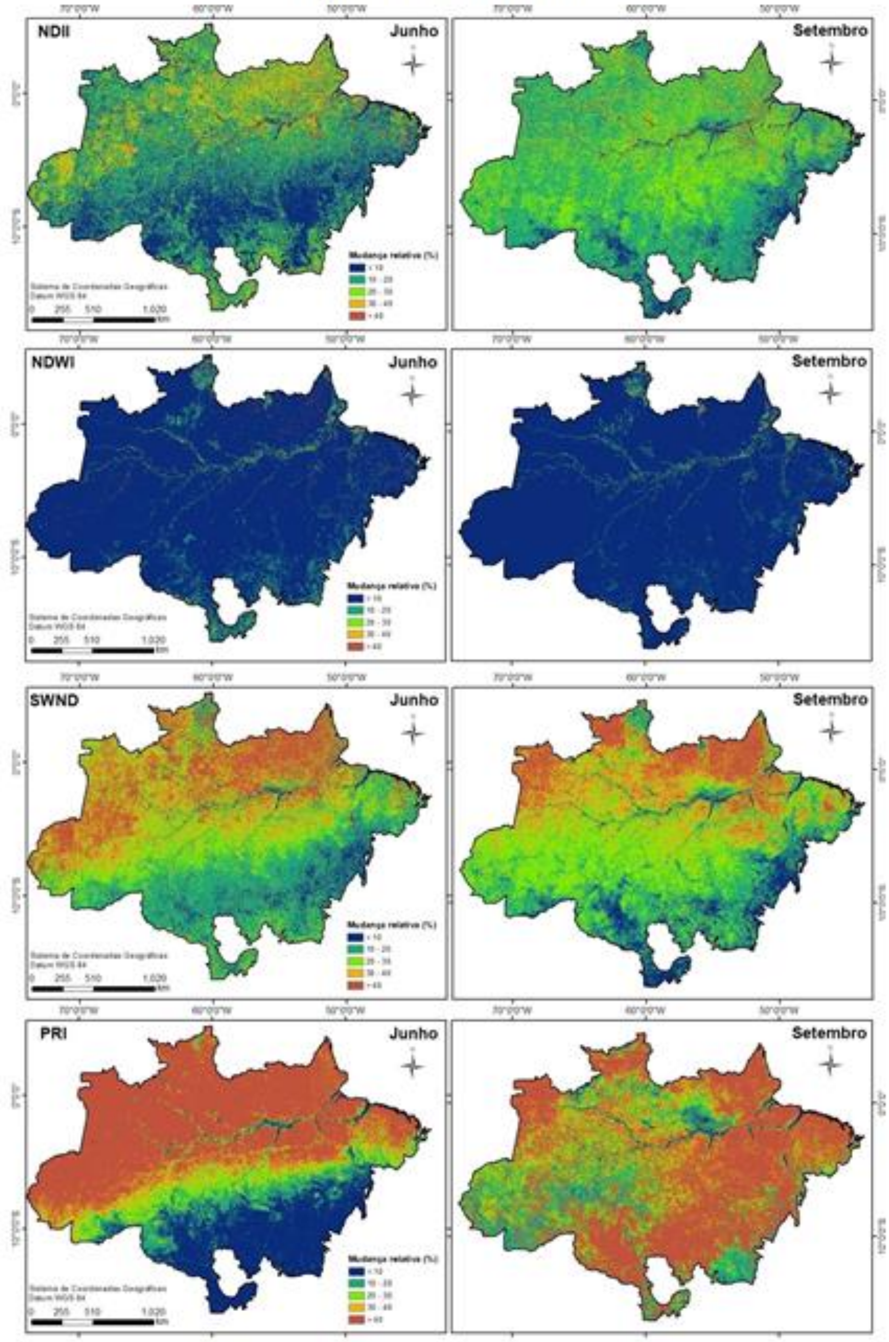
Caption: If the figure has caption, add it at the end of the figure in the last page following the previous orientations

Figure 4.12: Percentage change between corrected and uncorrected data for BRDF by MAIAC.



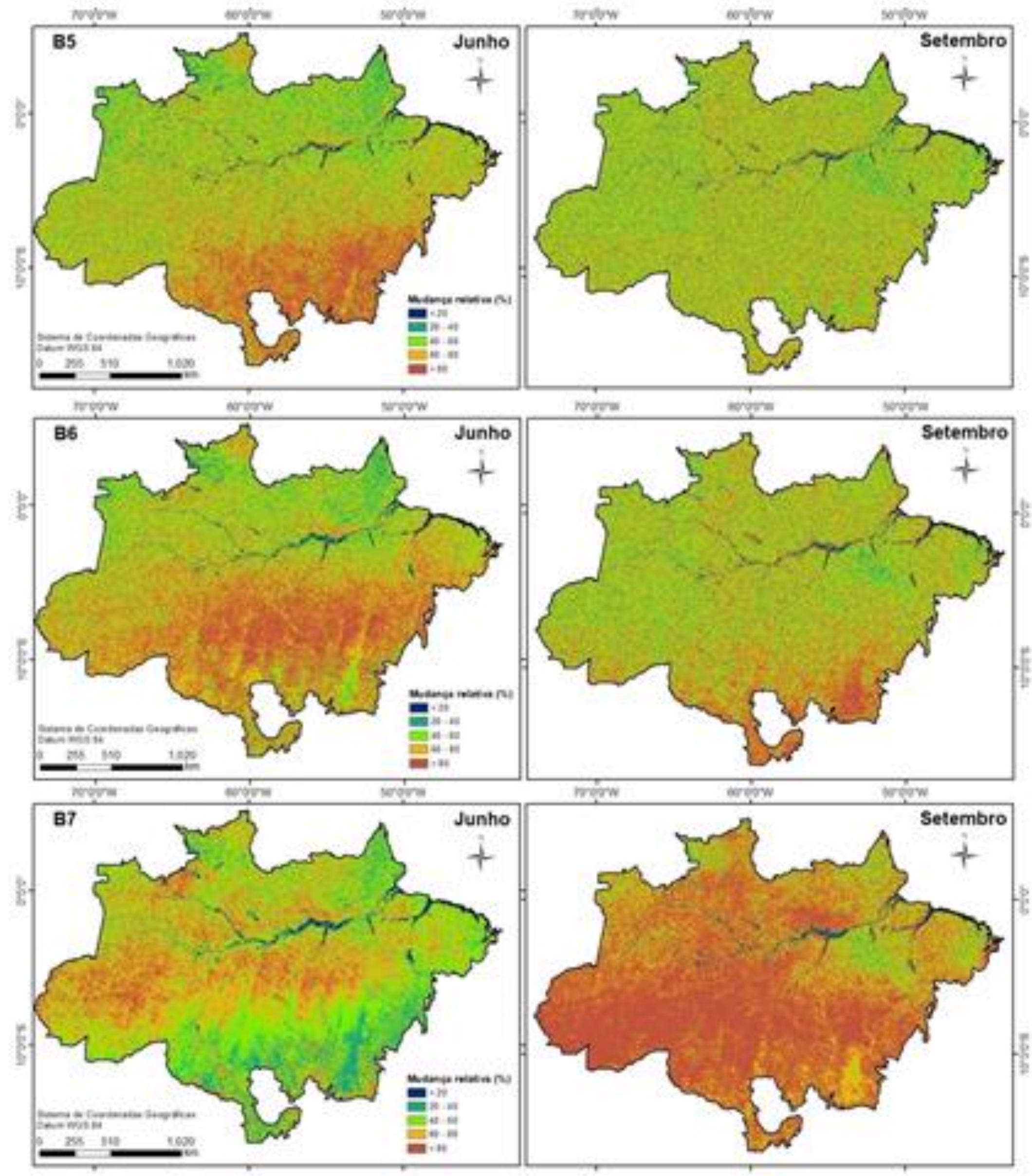
to be continued

Figure 4.12: Continuation.



to be continued

Figure 4.12: Conclusion.



2. TABLES

2.1 Table title and source (produced by others)

Table title with a single line: center aligned.

Source: center aligned with year in parentheses.

Table 1.1 - Characteristics of propellants used in chemical propulsion.

Feature	Solid	Liquid	Hybrid	Slurry	Gel
Controllable thrust	-	✓	✓	✓	✓
Engine shutdown	-	✓	✓	✓	✓
Reignition	+/-	✓	✓	✓	✓
Simple handling/storage	✓	-	-	-	✓
Increase energy by particle add	✓	-	✓	✓	✓
Insensitive to accidental ignition	✓	-	✓	✓	✓
Insensitive to leaks	✓	-	✓	-	✓
Impact insensitive/friction/electric discharge	-	✓	✓	✓	✓
Insensitive to cracking	-	✓	-	✓	✓
Insensitive to sedimentation of additives	✓	-	-	-	✓
Insensitive to boiling	✓	-	✓	-	✓
Insensitive to propellant movement	✓	-	✓	-	✓

SOURCE: Adapted from Ciezki et al. (2014).

2.2 Table title and source (produced by the author)

Table title with a single line: center aligned

Source: center aligned.

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Table 5.3 - Percentages of CPU/GPU data transfers and GPU kernel launches.

	system01		system02	
Dataset	Purus	Niger	Purus	Niger
Data transfer	22.33 %	21.02 %	18.47 %	13.84 %
Kernel launches	46.57 %	33.55 %	53.41 %	39.95 %
Total	68.90 %	54.57 %	71.88 %	53.79 %

2.3 Table title with two or more text lines

Table title with two or more text lines: justified text with the second line aligned with the beginning of the first line – not with the table number.

Source: center aligned.

Table 6.1 - General characteristics of the ACRIDICON-CHUVA cloud profiling missions referred in this study: aerosol number concentration (N_a, in cm^{-3}), Cloud Condensation Nuclei number concentration (N_{CCN} in cm^{-3}, for supersaturation $S = 0.48 \pm 0.033\%$) and cloud base altitude (z_{base}). The names in the third column have the following meaning: M1 – Maritime 1; RA1 and RA2 – Remote Amazon 1 and Remote Amazon 2; AD1, AD2, and AD3 – Arc of Deforestation 1, Arc of Deforestation 2, and Arc of Deforestation 3.

Region	**Flight**	**Name**	$\mathbf{N_a}$	$\mathbf{N_{CCN}}$	$\mathbf{z_{base}}$
Atlantic coast	AC19	M1	465	119	550
Remote Amazon	AC09	RA1	821	372	1125
	AC18	RA2	744	408	1650
Arc of deforestation	AC07	AD1	2498	1579	1850
	AC12	AD2	3057	2017	2140
	AC13	AD3	4093	2263	2135

SOURCE: Cecchini et al. (2017).

2.4 Table with caption

Table title with a single line: center aligned

Caption and Source: Both with justified alignment.

Table 3.4 - Equations of the texture features extracted based on the GLCM.

GLCM feature	Equation
Contrast	$\sum_{i,j=0}^{N-1} P_{i,j}(i-j)^2$
Dissimilarity	$\sum_{i,j=0}^{N-1} P_{i,j}\|i-j\|$
Entropy	$\sum_{i,j=0}^{N-1} P_{i,j}(-\ln P_{i,j})$
Homogeneity	$\sum_{i,j=0}^{N-1} \frac{P_{i,j}}{1+(i-j)^2}$
Correlation	$\sum_{i,j=0}^{N-1} P_{i,j}\left(\frac{(i-\mu_i)(j-\mu_j)}{\sqrt{(\sigma_i^2)(\sigma_j^2)}}\right)$
Second angular moment	$\sum_{i,j=0}^{N-1} P_{i,j}^2$

where P is the element in the position i, j of the GLCM with N gray levels, μ is the mean and σ^2 is the variance.

SOURCE: Adapted from Haralick et al. (1973) and Hall-Beyer (2017).

Table 3.1. List of variables about cattle ranching farming that were used in this study.

VARIABLE	UNIT	DESCRIPTION	SPECIFICATION	STUDY SITES
Cattle raising farms	% farms	proportion of farms raising cattle.		Municipalities in the Forest Formation Zone*
Livestock farms	% farms	proportion of farms with livestock as the predominant production activity.		
Cooperative	% farms	proportion of farms in general participating in agricultural cooperatives.		Municipalities in the Cattle Ranching Zone**
Credit	% farms	proportion of livestock farms that used credit.	derived from any agent: banks, cooperative, enterprises, etc.	
Dairy production	% farms	proportion of cattle ranching farms raising cattle for dairy production.		
Dietary supplementation	% farms	proportion of farms in general that used dietary supplements for livestock.	any salt, grains, silage or other agro-industrial subproduct.	
Family farming	% farms	proportion of cattle ranching family farms.	definition is in accordance to law nº 11.326/06: a farm which predominantly uses family labor, the income comes predominantly from farming activities and farm size is up to 4 fiscal modules (one fiscal module varies from 5-110 hectares, depending on the municipality).	
Farms with production	% farms	proportion of livestock farms that sold big animals and/or produced milk during the reference period.		
Fertilization	% farms	proportion of farms in general that applied fertilizers.	any chemical or organic fertilizer.	
Land ownership	% farms	proportion of cattle ranching farms whose production is carried by the legal landowner.	farms in which the leading producer is also the legal landowner, alternative options include land-leasing contracts, illegally occupied farms, etc.	
Liming	% farms	proportion of farms in general that applied lime.		
Mean farm area	ha/farm	average farm area per livestock farm.	total area occupied by livestock farms, divided by the number of livestock farms.	
Nonfamily labor	% farms	proportion of cattle ranching farms that hired nonfamily employees.		
Pasture degradation	% farms	proportion of cattle ranching farms in which the farmer reported having pastures in bad conditions.	this variable was self-declared by the producer. Degradation here refers to pasture under bad conditions due to the absence of management, leading to weed invasion or soil erosion for example.	
Production value	R$ x 1000/farm/year	estimated monetary value of livestock production per livestock farm.	total monetary return from sale of big animals and the monetary value of milk production, divided by the total number of livestock farms.	
Slaughterhouse density	number of slaughterhouses/ 100km	number of slaughterhouses in a radius of 100 km from the municipality border.	Active slaughterhouses in 2016 were collected from IMAZON geoportal (IMAZON, 2020).	
Slaughterhouse distance	km	nearest distance in km to slaughterhouses.	Euclidean distance from a municipality border to the nearest slaughterhouse. If there is any slaughterhouse within a municipality, then the value is 0.	
Stocking rate	head of cattle/ha	number of cattle per hectare of pastureland.	Pasture area in 2017 was obtained from MapBiomas.	
Tractor	% farms	proportion of livestock farms that have one or more tractors.		
Technical assistance	% farms	proportion of livestock farms that received technical assistance.	includes any responsible institution: government, NGO, enterprises, etc.	
Tillage	% farms	proportion of farms in general that did tillage practices.	includes conventional tilling, minimum tilling or conservation tilling practices.	
Workers density	workers/farm	average number of people working in production per livestock farm.	total number of people working in livestock farming production, divided by the number of livestock farms.	

*This study refers to Forest Formation Zone as the set of selected Amazonian municipalities with 80% of their area in the natural range of forest formations and at least 10% of their area still covered by old-growth forests in 2016 (Figure 3.1).

**This study refers to Cattle Ranching Zone as the sub selection of municipalities in the Forest Formation Zone in which at least 75% of farms raised cattle and had livestock as the predominant production activity (Figure 3.1).

Source: Produced by this author.

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Source without caption: center aligned.

Table 3.2 - The mean statistical results of calibrated algorithms for TSM in the Curuai Lake, after 1000 interactions.

		Linear			Power			Polynomial		
Band	Dataset	R^2	RMSE ($g\ m^{-3}$)	MAPE (%)	R^2	RMSE ($g\ m^{-3}$)	MAPE (%)	R^2	RMSE ($g\ m^{-3}$)	MAPE (%)
$R_{rs}(B4_{oli})$	Mobley	0.66	10.3	60	0.7	10.4	53	0.68	11.3	54
	Kutser	0.61	11.3	60	0.65	12	52	0.63	13.1	53
	Merged	0.56	11.9	61	0.58	11.9	57	0.58	12.5	58
$R_{rs}(B6_{msi})$	Mobley	0.76	8.5	54	0.78	8.1	51	0.78	8.2	53
	Kutser	0.85	6.8	40	0.87	6.3	37	0.87	6.4	38
	Merged	0.55	11.9	62	0.55	12.1	62	0.55	12.2	62
$R_{rs}(B7_{msi})$	Mobley	0.77	8.3	53	0.78	8	51	0.78	8.1	52
	Kutser	0.85	6.7	40	0.87	6.3	37	0.87	6.4	38
	Merged	0.58	11.5	61	0.58	11.7	60	0.58	11.9	60

The columns are the linear, power, and polynomial adjustments, and their respective R^2, RMSE, and MAPE. The rows are the simulated bands and the datasets used for simulating the bands.

Source: The author.

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Table 5.1 Specific specifications for Andor Zyla 5.5 camera.

Model	**Zyla 5.5**
Sensor type	Front Illuminated Scientific CMOS
Active pixels (W x H)	2048 x 2048
Pixel readout rate (MHz)	200 (100 MHz x 2 sensor halves) 560 (280 MHz x 2 sensor halves)
Read noise (e^-) Median [rms]	Rolling Shutter / Global Shutter @200 MHz: 0.9 [1.2] / 2.3 [2.5] @560 MHz: 1.2 [1.6] / 2.4 [2.6]
Maximum Quantum Efficiency	60%
Sensor Operating Temperature	
Air cooled	0°C (up to 30°C ambient)
Water cooled	-10°C
Dark current, e^- /pixel/sec @ min temp	
Air cooled	0.10
Water cooled	0.019
Readout modes	Rolling Shutter and Global Shutter

Continue

Table 5.1 Conclusion.

Maximum dynamic range	33,000:1
Photon Response Non-Uniformity (PRNU)	
Half-light range	< 0.01%
Low light range	<0.1%
Pixel size (W x H)	6.5 µm
Pixel well depth (e^-)	30,000
Linearity (%, maximum)	
Full light range	Better than 99.8%
Low light range (< 1000 e^- signal)	Better than 99.9%

Source: Andor (2020).

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Table 2.2- Summary of studies exploring tree species classification using hyperspectral data. Works developed in tropical or subtropical forests are highlighted in gray. Those combining hyperspectral + LiDAR data contain the point density information at the ‘Spatial resolution’ column.

Study	Sensor	Spatial resolution (m)	Spectral resolution	Forest/ Country	Classifier	Number of species	Best accuracy (%)
Clark et al. (2005)	HYDICE	1.6	VNIR-SWIR (400–2500 nm; reduced to 30 bands selected)	Tropical Forest, Costa Rica	LDA, MLC, SAM	7	92
Jones et al. (2010)	AISA Dual	2 (0.4 points/m^2)	VNIR-SWIR (429–2400 nm, reduced to 40 spectral bands)	Boreal Forest, Canada	SVM	11	72
Clark; Roberts (2012)	HYDICE	1.6	VNIR-SWIR (400–2500 nm; 210 bands)	Tropical Forest, Costa Rica	RF	7	87
Cho et al. (2012)	CAO Alpha	1.1	VNIR (384–1054 nm; 72 bands)	Savanna, South Africa	MLC	6	65
Dalponte et al. (2012)	AISA Eagle, GeoEye and ALS Optech ALTM	1 and 0.5 (8.6 and 0.48 points/m^2)	VNIR (400–990 nm; 126 bands)	Temperate Forest, Italy	SVM e RF	7 species + non forest class	74
Naidoo et al. (2012)	CAO Alpha System	1.1 (1.3 point/m^2)	VNIR (348-1054 nm, 72 bands)	Savanna, South Africa	RF	8	87.7

continue

Table 2.2- Continuation.

Study	Sensor	Spatial resolution (m)	Spectral resolution	Forest/ Country	Classifier	Number of species	Best accuracy (%)
Ferét; Asner (2013)	CAO Alpha	0.56	VNIR (390–1044 nm; 24 bands)	Tropical Forest, Hawaii	LDA, QDA, RDA, KNN, ANN and SVM	17	73
Dalponte et al. (2014)	HySpex VNIR-160 and ALS Optech ALTM	0.4 (7.4 point/m^2)	VNIR (410-990 nm, 160 bands)	Boreal Forest, Norway	SVM	2 species + mixed class	93
Ghosh et al. (2014)	HyMap and Hyperion	4, 8 and 30 (12 point density)	VNIR-SWIR (450-2500 nm, 128 bands)	Temperate Forest, Germany	SVM and RF	5	86
Baldeck and Asner (2015)	CAO AToMS	1.12	VNIR-SWIR (380–2512 nm, 167 bands)	Tropical Forest, Panama	Single-class SVM	3	94
Ferreira et al. (2016)	ProSpecTIR-VS	1	VNIR-SWIR (450-2400 nm, 357 bands)	Subtropical Forest, Brazil	LDA, SVM and RF	8	84.9
Ballanti et al. (2016)	AISA Eagle and Leica ALS60	2 (4 and 8 points/m^2)	VNIR (397.78–997.96 nm, 128 bands)	Temperate Forest, USA	SVM and RF	8	90
Richter et al. (2016)	AISA dual	2	VNIR-SWIR (400- 2497 nm, 267 bands)	Temperate Forest, Germany	SVM, RF and PLSDA	10	78.4
Graves et al. (2016)	CAO AToMS	2	VNIR-SWIR (380–2512 nm)	Tropical Forest, Panama	SVM imbalanced	20 species + 1 mixed class	63
Nevalainen et al. (2017)	UAV-FPI	0.086	VNIR (507-819 nm, 33 bands)	Boreal Forest, Finland	RF, MLP, C4.5, KNN	4	95
Piiroinen et al. (2017)	AISA Eagle and Optech ALTM 300	1 (9.6 points/m^2)	VNIR (400-1000 nm, 129 bands)	Agroforestry, Kenya	SVM and RF	31	57.1
Raczko; Zagajewski (2017)	APEX	3.35	VNIR-SWIR (413-2447 nm, 288 bands)	Temperate Forest, Poland	ANN, SVM and RF	5	77
Shen; Cao (2017)	AISA Eagle and RIEGL LMS-Q680i	0.6 (10 points/m^2)	VNIR (398.55–994.44 nm, 64 bands)	Subtropical Forest, China	RF (object approach)	5	85.4

continue

Table 2.2- Conclusion.

Study	Sensor	Spatial resolution (m)	Spectral resolution	Forest/ Country	Classifier	Number of species	Best accuracy (%)
Tuominen et al. (2018)	UAV-FPI	0.08	VNIR-SWIR (409-1578 nm, 60 bands)	Arboretum, Finland	KNN+GA and RF	26	82.3
Maschler et al. (2018)	Hyspex VNIR 1600 (160SB)	0.4	VNIR (415-991 nm, 80 bands)	Temperate Forest, Austria	RF (object approach)	13	91.7
Dabiri; Lang (2018)	APEX	2.5	VNIR-SWIR (413-2451 nm, 288 bands)	Temperate Forest, Austria	RF	6	90
Marrs; Ni-Meister (2019)	G-LiHT imager	1 m (6 points/m^2)	VNIR (418-918 nm, 114 bands)	Temperate Forest, USA	SVM, CN2 rules, ANN	10 and 15	67 and 59
Sothe et al. (2019a)	UAV-FPI	0.11 (35 points/m^2)	VNIR (506-819 nm, 25 bands)	Subtropical Forest, Brazil	SVM	12	72.4
Fricker et al. (2019)	NEON AOP	1 m	VNIR-SWIR (280- 2510, 426 bands)	Temperate Forest, USA	CNN	7	87

Note: ANN= Artificial Neural Network; CNN= Convolutional Neural Network; GA= Genetic Algorithm; KNN= K-nearest neighbor; LDA= Linear Discriminant Analysis; MDA= Multiple Discriminant Analysis; MLC= Maximum Likelihood Classifier; MLP= Multilayer Perceptron; PLSDA= Discriminant Analysis based on Partial Least Square; QDA= Quadratic Discriminant Analysis; RDA= Regularized Discriminant Analysis; RF= Random Forest; SVM= Support Vector Machine; SWIR=short-wave infrared.

Source: Author's production.