



**INPE**  
Programa  
Queimadas

# RISCO DE FOGO

## Anuário 2018

Registro histórico de todos os mapas de Risco de Fogo de 2018 e sua metodologia.

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# RISCO DE FOGO

## Anuário 2018

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### RESUMO

Esse documento tem como objetivo mostrar de forma resumida os cálculos necessários para obter o Risco de Fogo, uma variável importante que fornece informações sobre a possibilidade que uma determinada região pode ter para iniciar uma queimada de origem antrópica na vegetação. São necessárias algumas variáveis meteorológicas (precipitação, umidade relativa mínima e temperatura máxima do ar à superfície) e o mapa de vegetação para o obter o risco de fogo. Alguns cálculos matemáticos e correções são feitas para obter essa variável. O produto final desse documento consiste em mapas diários de Risco de Fogo desde o dia 01 de janeiro a 31 de dezembro de 2018.

**Palavras-chave:** risco de fogo, precipitação, temperatura, umidade relativa.

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### ABSTRACT

This document aims to summarize the calculations needed to obtain the Fire Risk, an important variable that provides information about the possibility that a given region may have to initiate anthropogenic burn in the vegetation. Some meteorological variables (rainfall, minimum relative humidity and maximum air temperature at surface ) and the vegetation map are necessary to obtain the fire risk. Some mathematical calculations and corrections are made to obtain this variable. The final product of this document consists of daily Fire Risk maps from January 1 to December 31, 2018.

**Keywords:** fire risk, precipitation, temperature, relative humidity.

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## 1 Introdução

O princípio do Risco de Fogo (RF) é o de que quanto mais dias seguidos sem chuva em um local, maior o risco de queima da sua vegetação. Adicionalmente, são incluídos no cálculo os efeitos do tipo da vegetação e do ciclo natural de seu desfolhamento, da temperatura máxima e umidade relativa mínima do ar diária, assim como a presença de fogo na área de interesse.

O RF foi desenvolvido no Centro de Previsão de Tempo e Estudos Climáticos/Instituto Nacional de Pesquisas Espaciais (CPTEC/INPE), com base na análise da ocorrência de centenas de milhares de queimadas/incêndios nos principais biomas e tipos de vegetação do País durante as últimas décadas, em função das condições e históricos meteorológicos (SETZER et al., 1992; SISMANOGLU e SETZER, 2004). Sua primeira versão operacional data de 2002. O cálculo do RF é um dos produtos do Programa de Monitoramento de Queimadas e Incêndios Florestais do INPE (<http://www.inpe.br/queimadas/portal>), por sua vez inserido na Ação 20V9 do MCTIC no atual PPA-Plano Pluri Anual do Governo Federal.

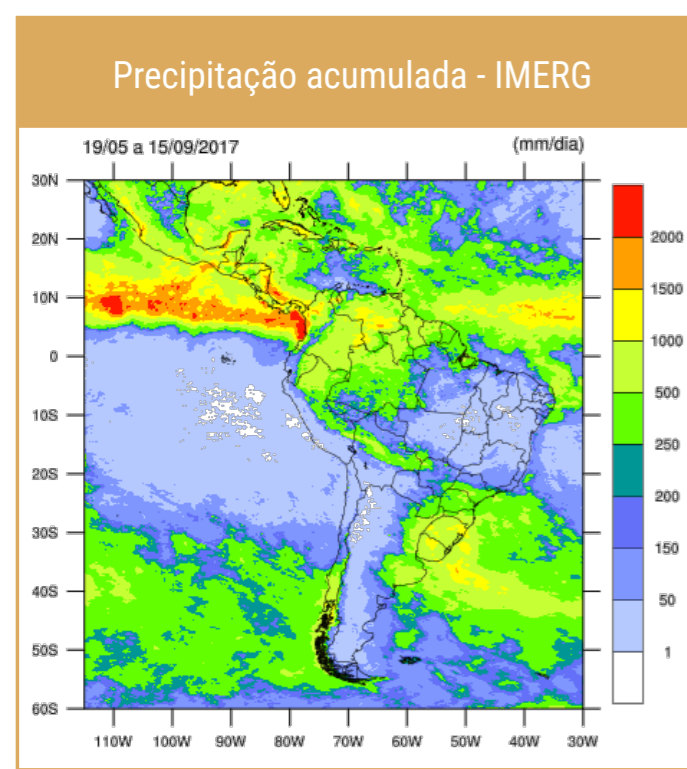
A base dos cálculos do RF está no conceito dos “Dias de Secura” ou “Secura” (PSE), que corresponde ao número de dias seguidos sem nenhuma precipitação durante os últimos 120 dias em relação à data de interesse. No caso de ocorrência de precipitação no período analisado, o PSE calcula um número hipotético correspondente de dias consecutivos sem chuva. É fundamental levar em conta que o RF indica quão propícia a vegetação está para ser queimada do ponto de vista meteorológico e, que o fogo na grande maioria dos casos é iniciado pelo homem e não naturalmente, como por exemplo, por raios.

## 2 Fonte de Dados

Para o cálculo do Risco de Fogo são necessárias informações diárias das seguintes variáveis: precipitação diária (mm/dia), temperatura do ar (°C) e umidade relativa (décimos).

### 2.1 PRECIPITAÇÃO

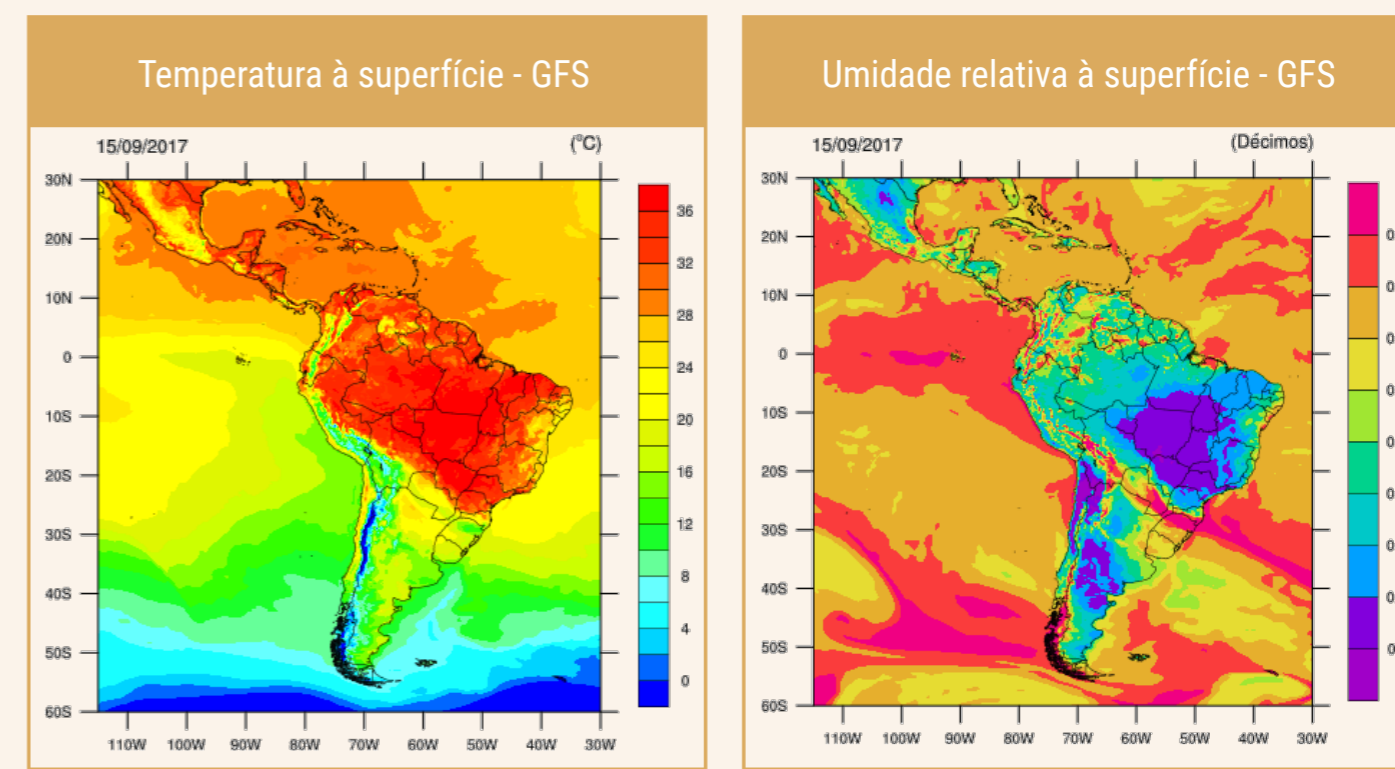
O campo de precipitação, que é a componente de maior peso do RF, é obtido na resolução espacial de 10 km a partir das estimativas de precipitação do IMERG - Integrated Multi-satellitE Retrievals for GPM (HUFFMAN et al., 2014, 2015), as quais combinam dados observacionais das estações de superfície com as medidas em micro-ondas dos atuais satélites do programa Global Precipitation Measurement (GPM, HOU et al., 2014) e dos antigos Tropical Rainfall Measuring Mission (TRMM, VILA et al., 2008). As estimativas IMERG são particularmente indicadas nas áreas com baixa densidade de estações de superfície, como por exemplo, na Amazônia. Exemplo desse campo pode ser observado na Figura 2.1.



**Figura 2.1** - Precipitação acumulada para 120 dias (19 de maio a 15 de setembro de 2017) obtida do IMERG. Estes campos são produzidos diariamente para períodos de 1 a 120 dias anteriores em relação ao dia do cálculo.

### 2.2 TEMPERATURA E UMIDADE DO AR À SUPERFÍCIE

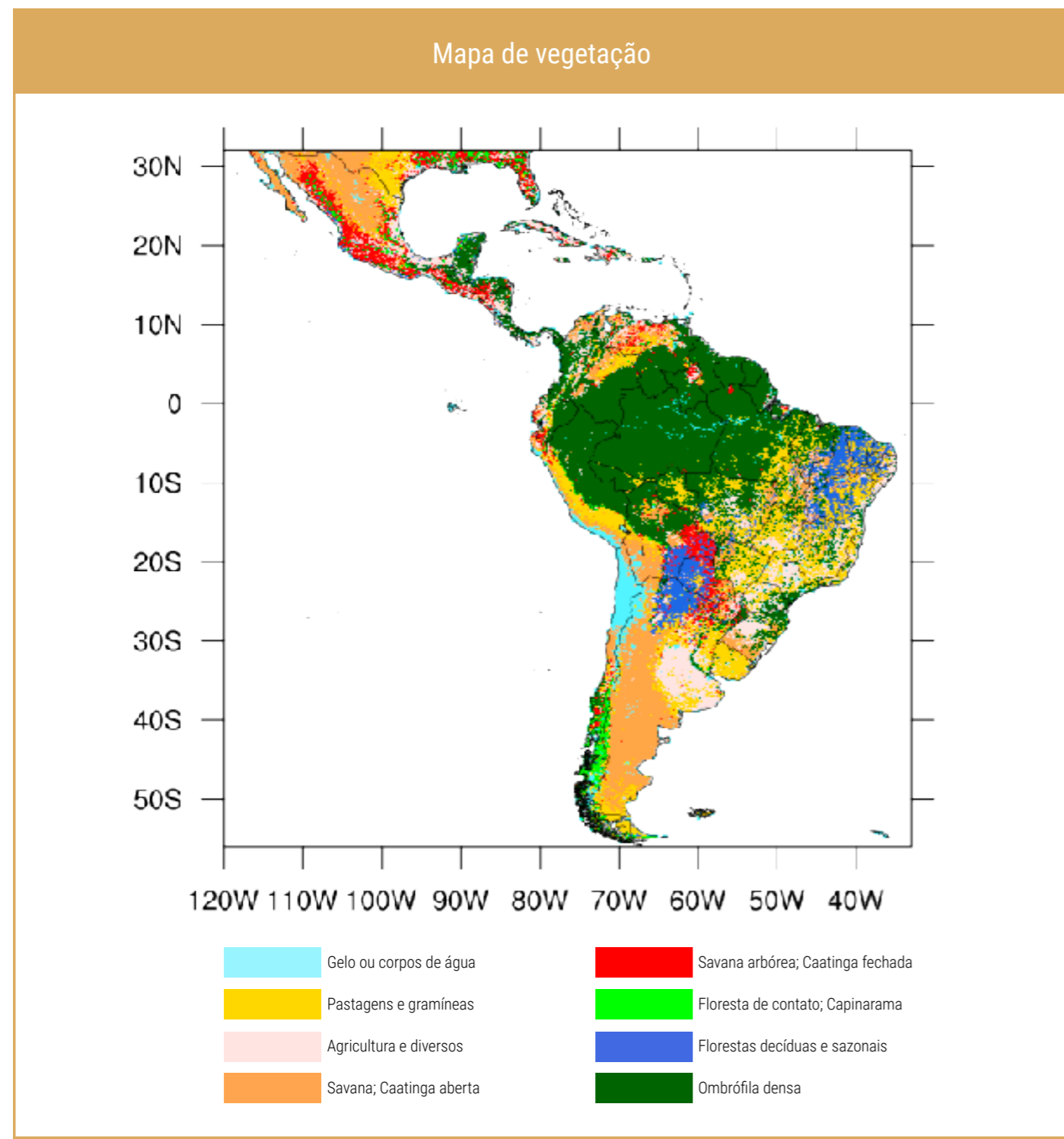
Os campos de temperatura máxima (K) e de umidade relativa mínima do ar (%) no horário das 18UTC à superfície são obtidos das análises do modelo GFS (Global Forecast System, <http://www.emc.ncep.noaa.gov/GFS/doc.php>) na resolução espacial de 25 km. Exemplos desses campos podem ser observados na Figura 2.2a e 2.2b.



**Figura 2.2** - a) Temperatura do Ar à superfície às 18UTC; b) Umidade Relativa do Ar à superfície às 18UTC.

### 2.3 MAPA DE VEGETAÇÃO

O mapa de tipos de vegetação (Figura 2.3) para os cálculos do RF foi adaptado do produto anual do International Geosphere-Biosphere Programme (IGBP, <http://www.igbp.net>), por sua vez gerado pela National Aeronautics and Space Administration (NASA) a partir dos mosaicos do Moderate Resolution Imaging Spectroradiometer (MODIS) com resolução espacial de 1 km do satélite AQUA (FRIEDL et al., 2010). O mapa mais atual do IGBP é referente ao 2017.



**Figura 2.3** - Mapa de vegetação do IGBP combinado com o MapBiomas utilizado no cálculo do Risco de Fogo observado.

As 17 classes originais (Tabela 2.1) de vegetação adotada pelo IGBP foram condensadas em sete classes principais:

- 1) Pastagens e Gramíneas;
- 2) Agricultura e Diversos;
- 3) Savana; Caatinga aberta;
- 4) Savana arbórea; Caatinga fechada;
- 5) Floresta de contato; Campinarana;
- 6) Florestas decíduas e sazonais;
- 7) Ombrófila densa.

A nomenclatura usada foi a do Instituto Brasileiro de Geografia e Estatística (IBGE), apresentada em <http://mapas.ibge.gov.br/tematicos/vegetacao.html>. O “-x-” indica que não é atribuído nenhum valor a essa constante. Os valores da constante “A” (constante de flamabilidade) são utilizados para calcular o Risco de Fogo.

A partir desse mapa de vegetação foram feitas atualizações apenas para o Brasil utilizando o projeto MapBIOMAS (<http://mapbiomas.org>). As informações são disponibilizadas desde 2016 até 2017. Dessa forma, a representação das mudanças no padrão de vegetação podem ser avaliadas anualmente.

As informações do mapa de vegetação são utilizadas para informar o quão propícia a vegetação estará para iniciar um incêndio dependendo do seu tipo.

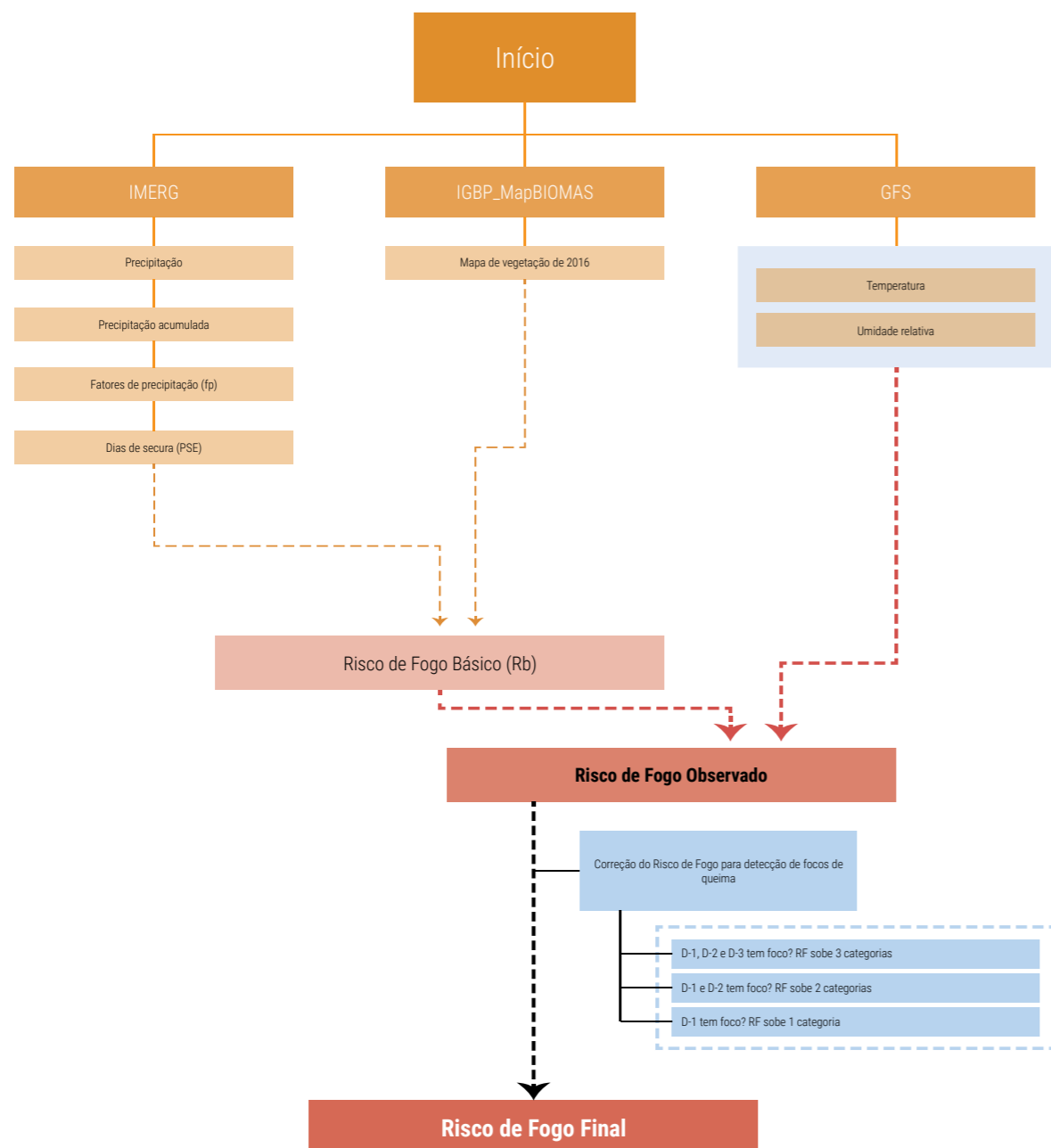
**Tabela 2.1** - Classes de Vegetação, Classes principais e valores da constante “A”.

Classes de Vegetação do IGBP	Classes principais	Classes IBGE (agrupadas)	Constante “A”
0 Water	0	Corpos d’água	-x-
1 Evergreen Needleleaf forest	5	Floresta de contato; Campinarana	2,0
2 Evergreen Broadleaf forest	7	Ombrófila densa	1,5
3 Deciduous Needleleaf forest	5	Floresta de contato; Campinarana	2,0
4 Deciduous Broadleaf forest	6	Florestas decíduas e sazonais	1,72
5 Mixed forest	5	Floresta de contato; Campinarana	2,0
6 Closed shrublands	4	Savana arbórea; Caatinga fechada	2,4
7 Open shrublands	3	Savana; Caatinga aberta	3,0
8 Woody savannas	4	Savana arbórea; Caatinga fechada	2,4
9 Savannas	3	Savana; Caatinga aberta	3,0
10 Grasslands	1	Pastagens e gramíneas	6,0
11 Permanent wetlands	0	Alagados permanentes	1,5
12 Croplands	2	Agricultura e diversos	4,0
13 Urbanand built-up	0	Áreas urbanas e construídas	-x-
14 Cropland/Natural vegetation mosaic	2	Agricultura e diversos	4,0
15 Snow and ice	0	Neve e gelo	-x-
16 Barren or sparsely vegetated	0	Solos expostos; mineração	-x-

# 3 Metodologia para o cálculo do Risco de Fogo

Inicialmente, calculam-se as precipitações acumuladas para 11 períodos distintos que serão utilizados para obter os fatores de precipitação. Obtido esses fatores, calculam-se os dias de seca (PSE) combinados com o tipo de vegetação para em seguida gerar o Risco de Fogo Básico. Posteriormente, a partir da Umidade Relativa Mínima e da Temperatura Máxima do Ar à superfície realizam-se alguns cálculos matemáticos para obter-se o Risco de Fogo Observado. Finalmente, realiza-se a correção do risco por meio das ocorrências dos focos de queimadas nos últimos 3 dias.

**Figura 3.1** - Mapa de vegetação do IGBP combinado com o MapBiomas utilizado no cálculo do Risco de Fogo observado.



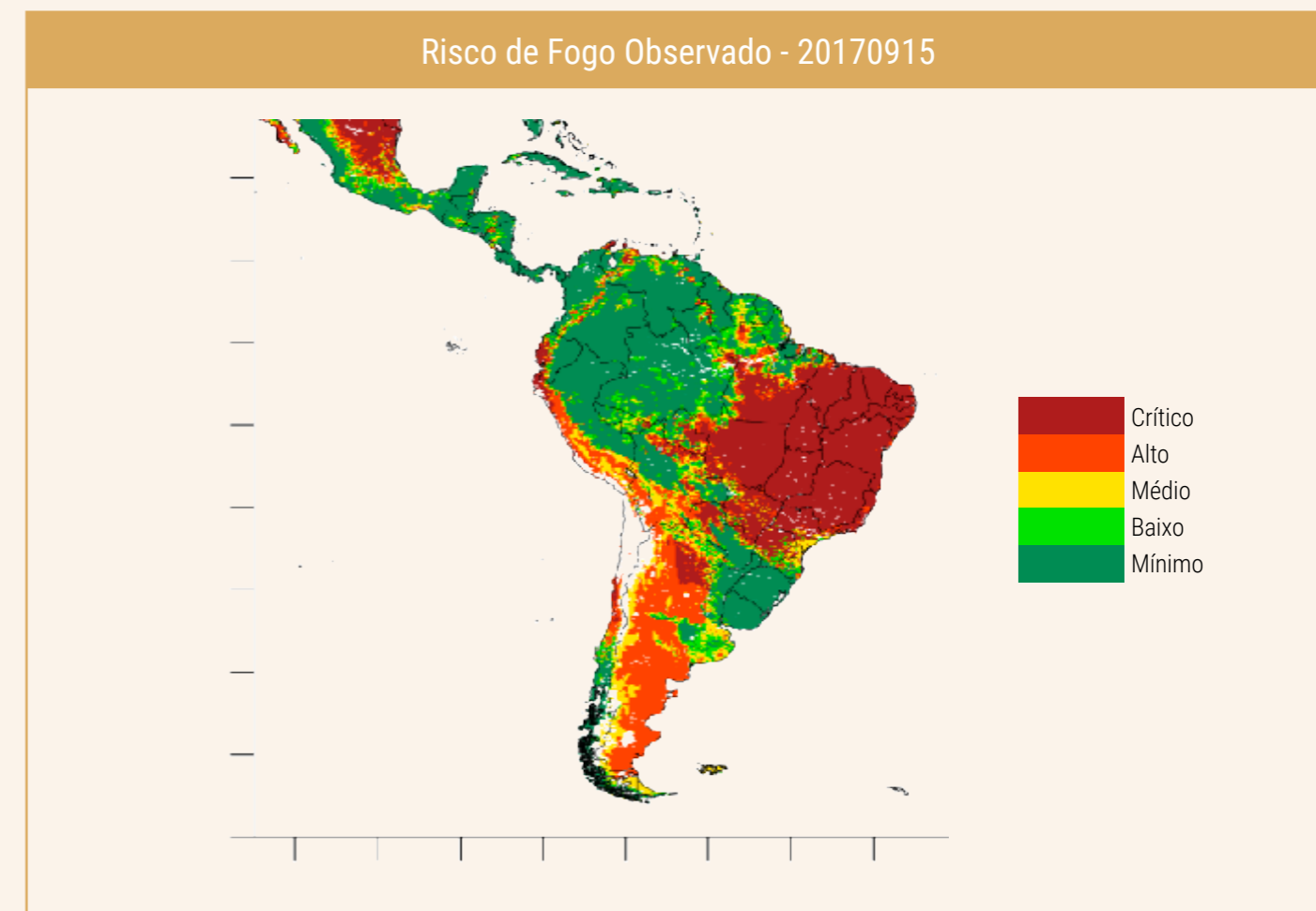
Para informações mais detalhadas sobre o cálculo do Risco de Fogo, acessar o link abaixo: [http://queimadas.cptec.inpe.br/~rqueimadas/documentos/RiscoFogo\\_Sucinto.pdf](http://queimadas.cptec.inpe.br/~rqueimadas/documentos/RiscoFogo_Sucinto.pdf)

Após calcular o Risco de Fogo Final, é feita a sua classificação por categorias, como mostra a Tabela 3.1.

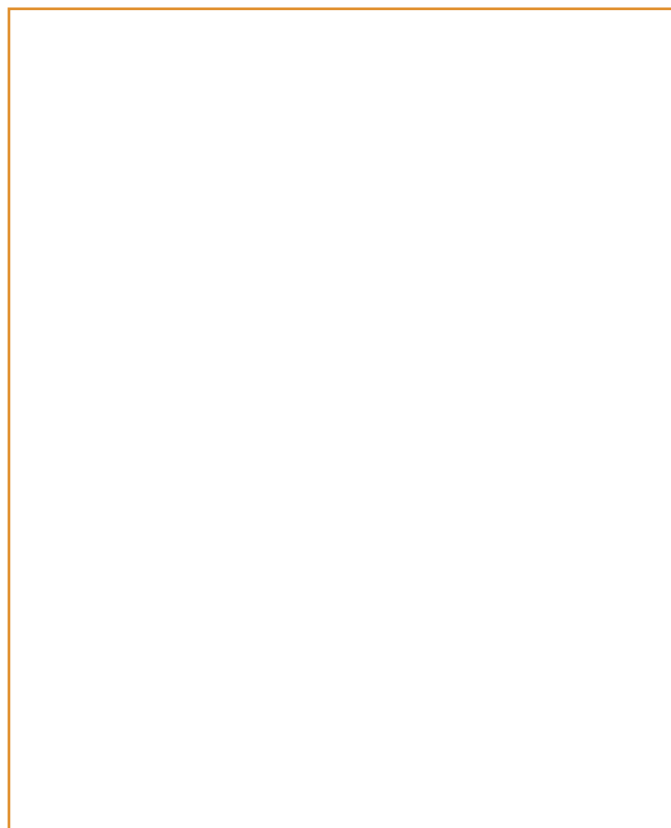
**Tabela 3.1** - Categorias de Risco de Fogo

Risco	Valores do Risco de Fogo (RF)	Cor
Mínimo	$RF < 0,15$	Verde
Baixo	$0,15 < RF \leq 0,40$	Verde-claro
Médio	$0,40 < RF \leq 0,70$	Amarelo
Alto	$0,70 < RF \leq 0,95$	Laranja
Crítico	$RF > 0,95$	Marrom

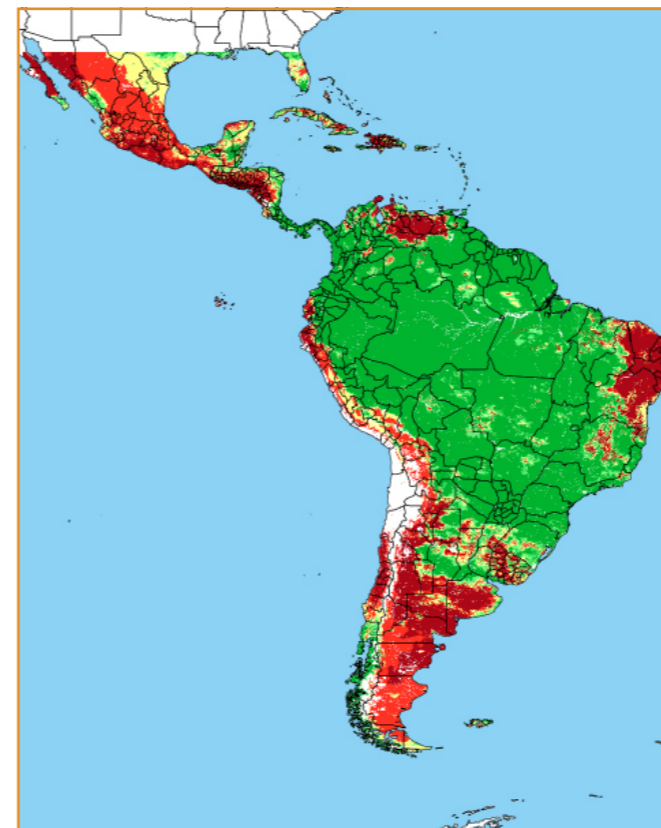
A Figura 3.2 mostra graficamente o resultado do cálculo do Risco de Fogo para o dia 15 de setembro de 2017 com base nas informações das Figuras 2.1, 2.2 e 2.3.



**Figura 3.2** - Risco de Fogo Observado para o dia 15 de setembro de 2017 e classificado em 5 categorias que variam de mínimo (verde = 0) a crítico (marrom = 1).



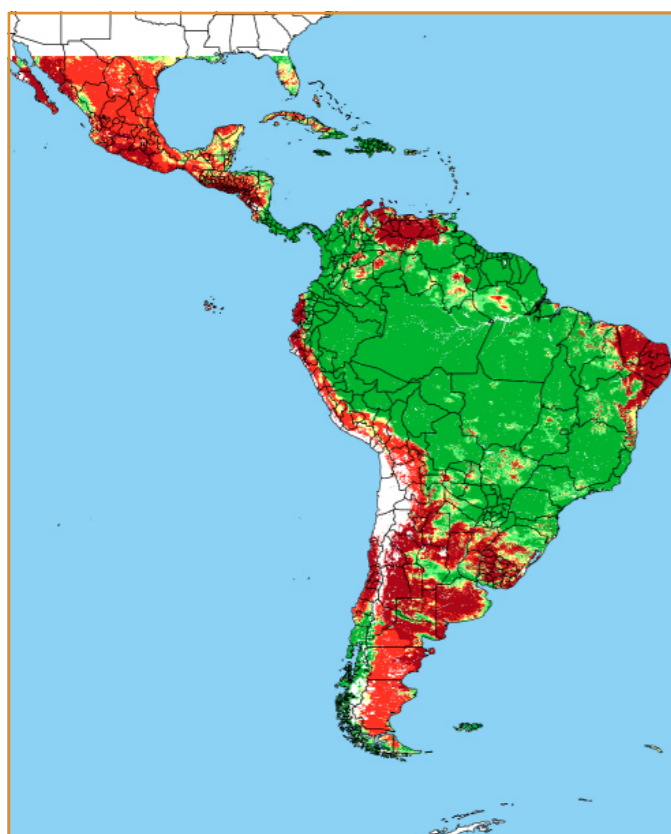
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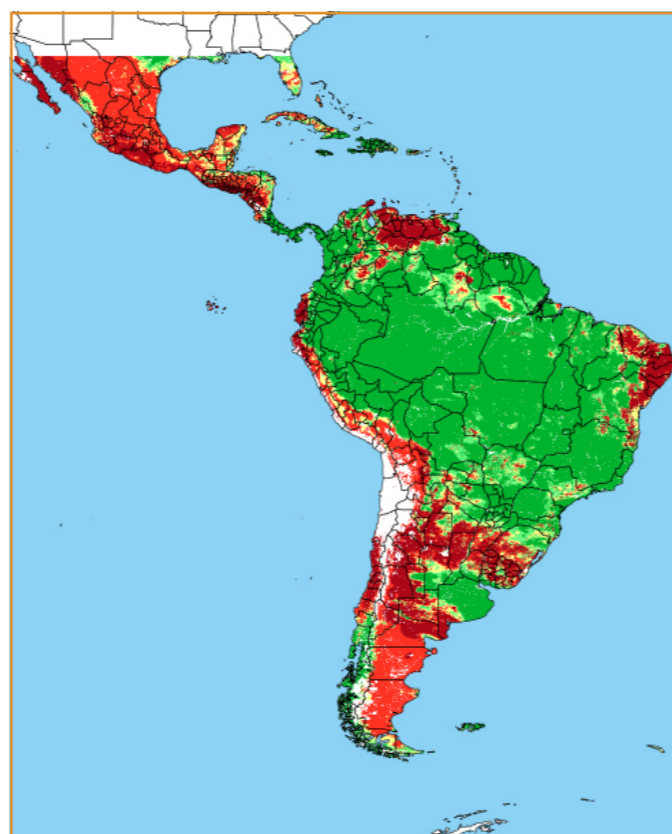
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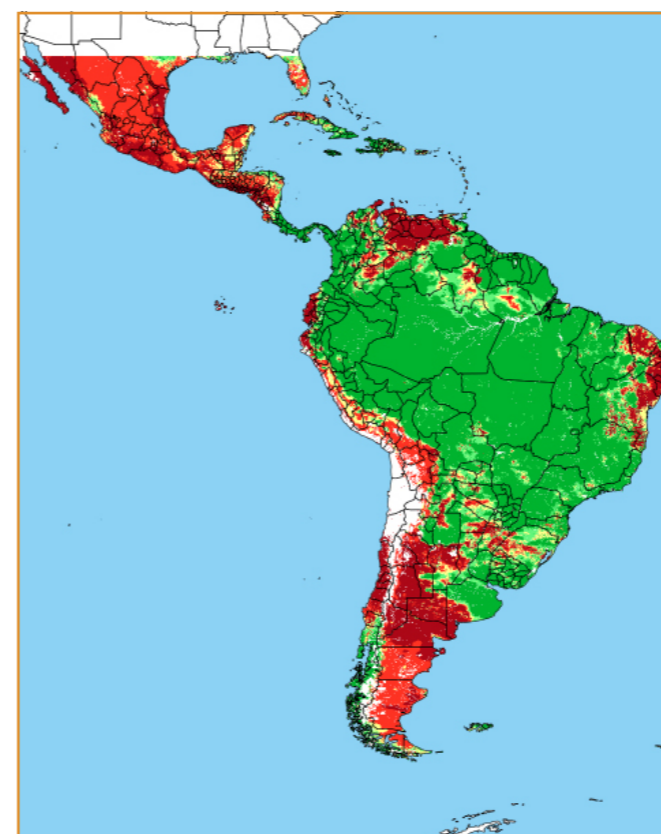
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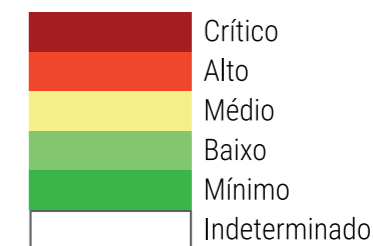
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sexta-feira, 5 de janeiro



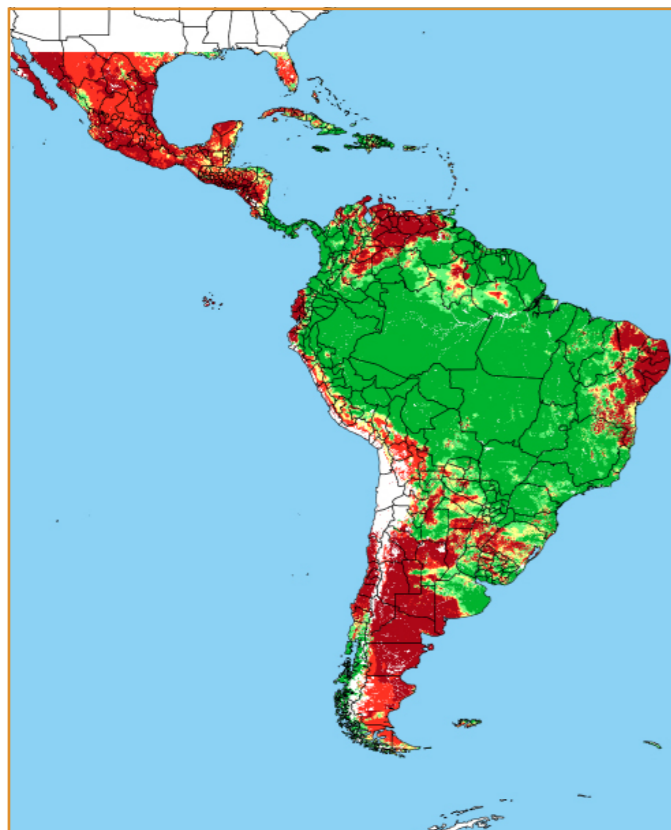
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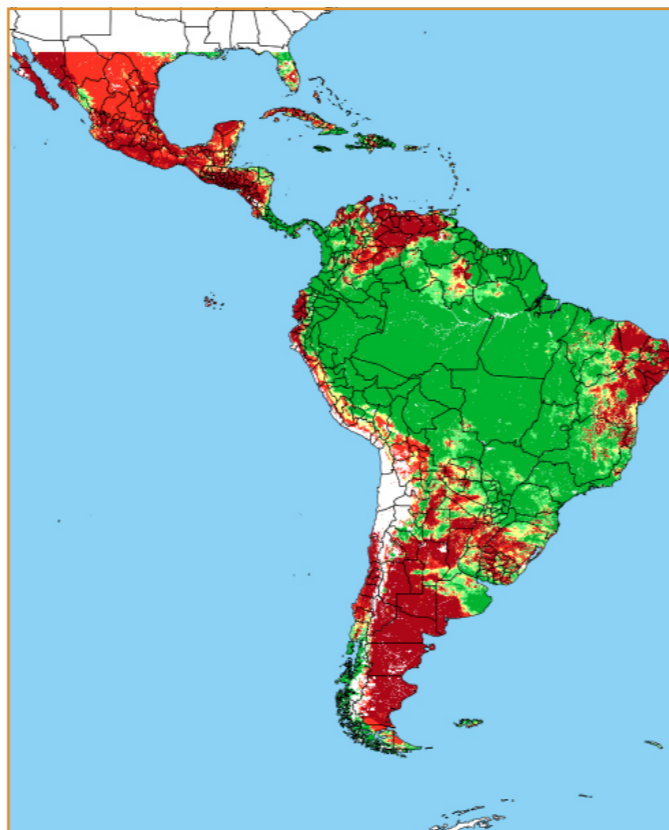
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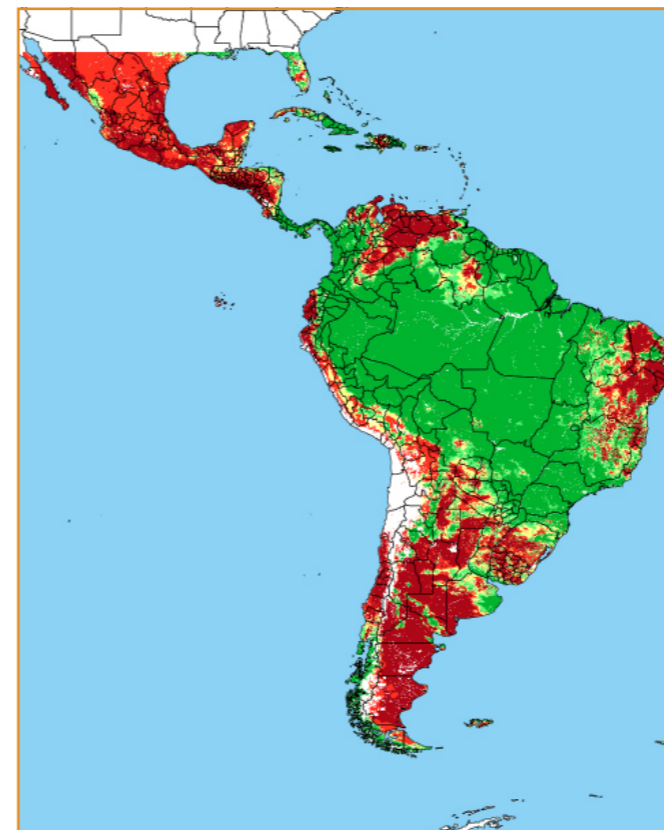
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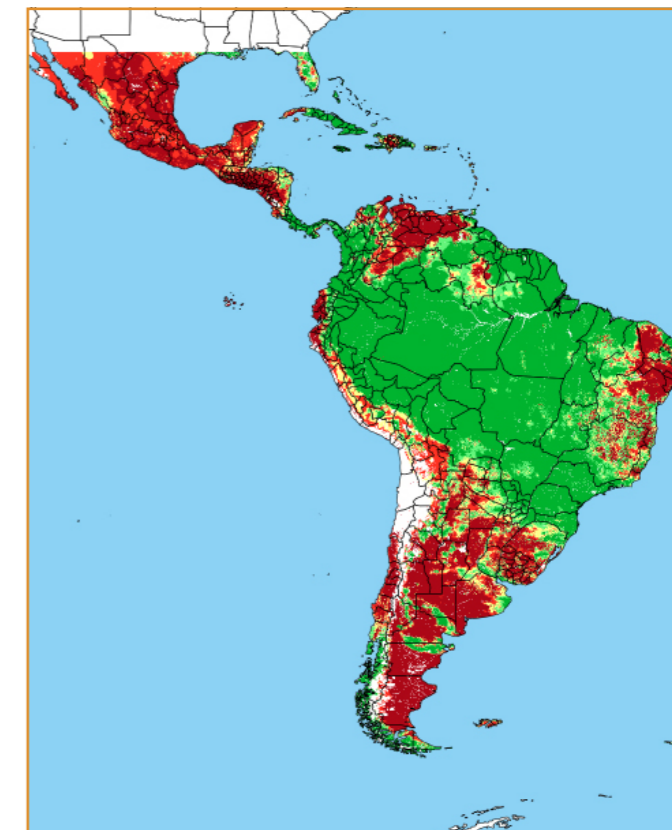
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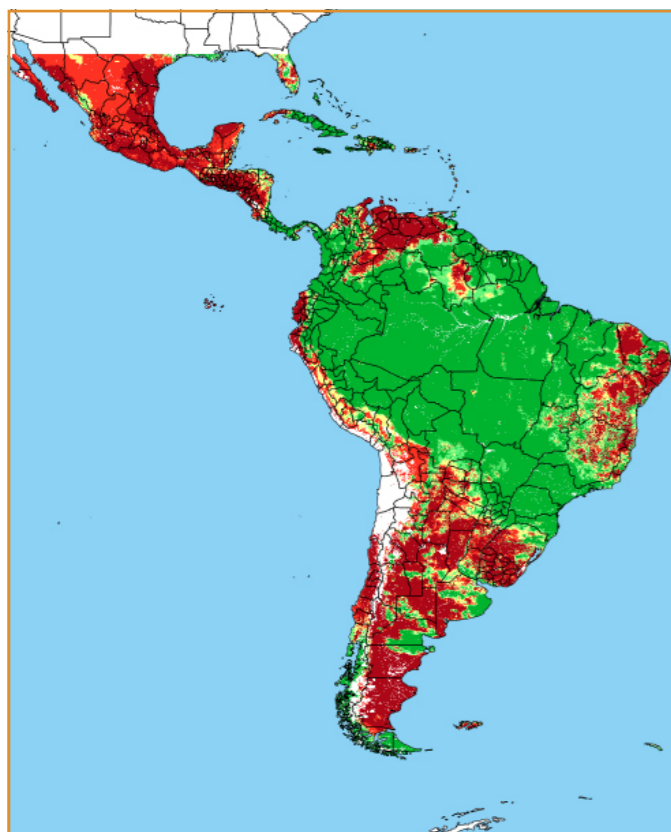
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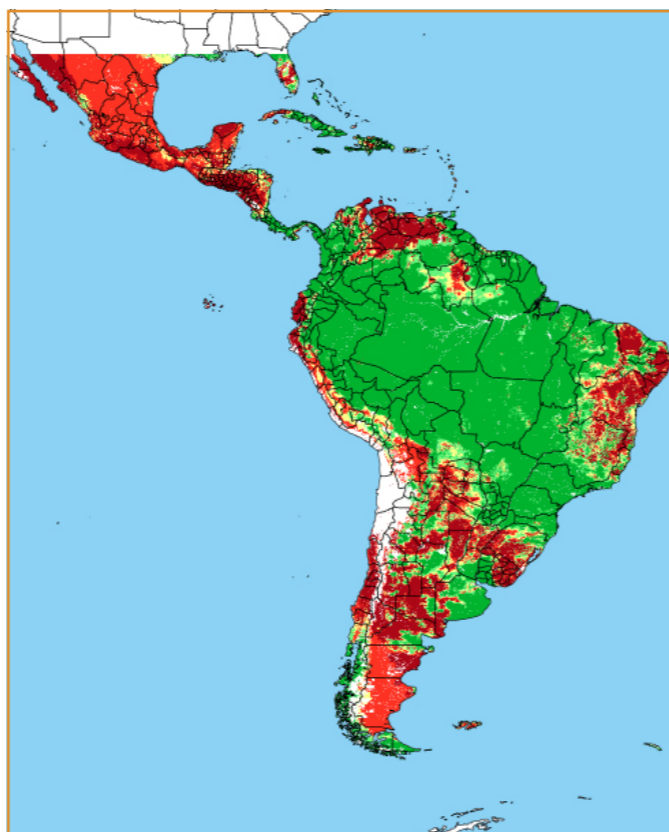
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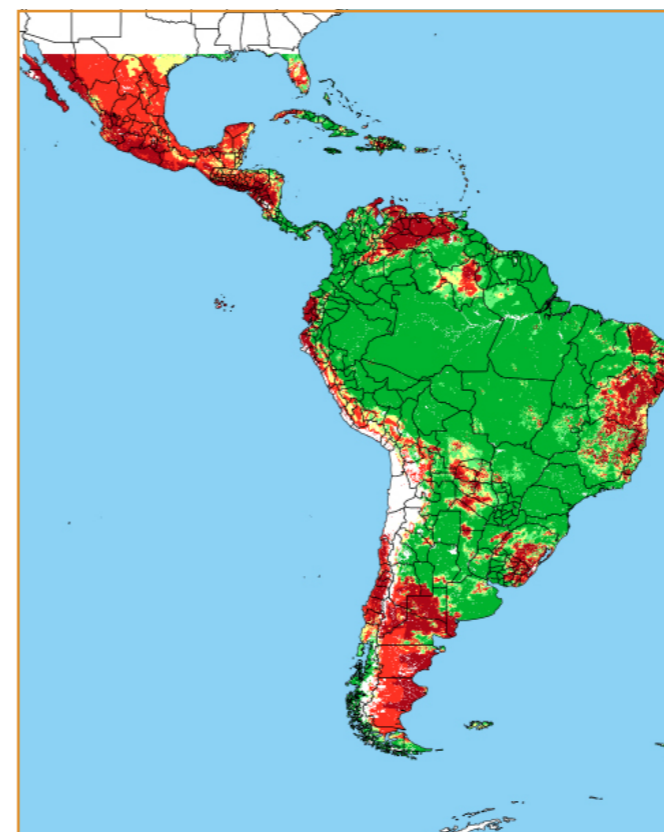
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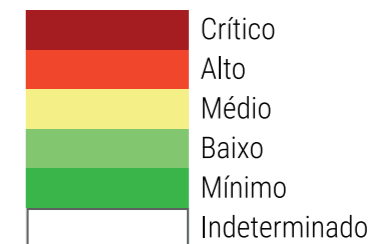
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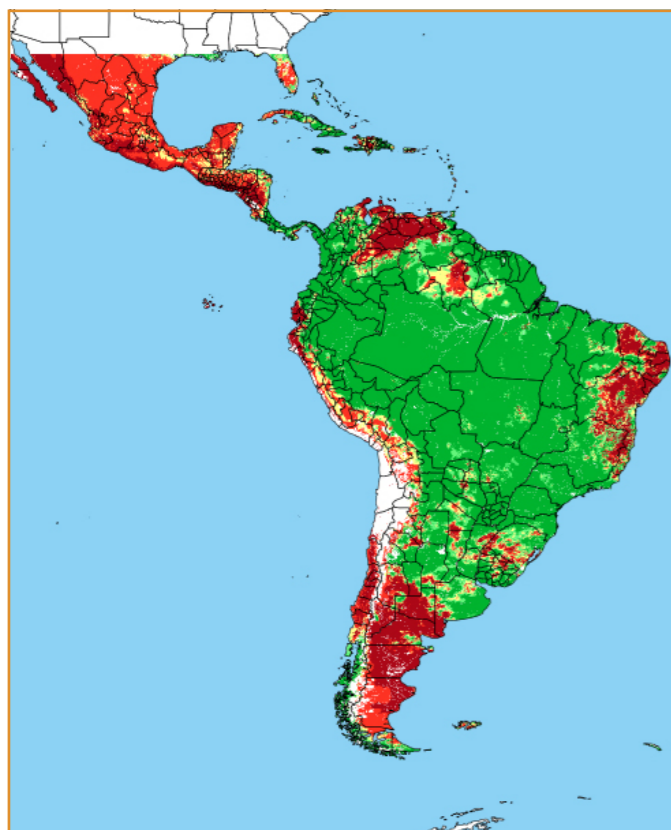


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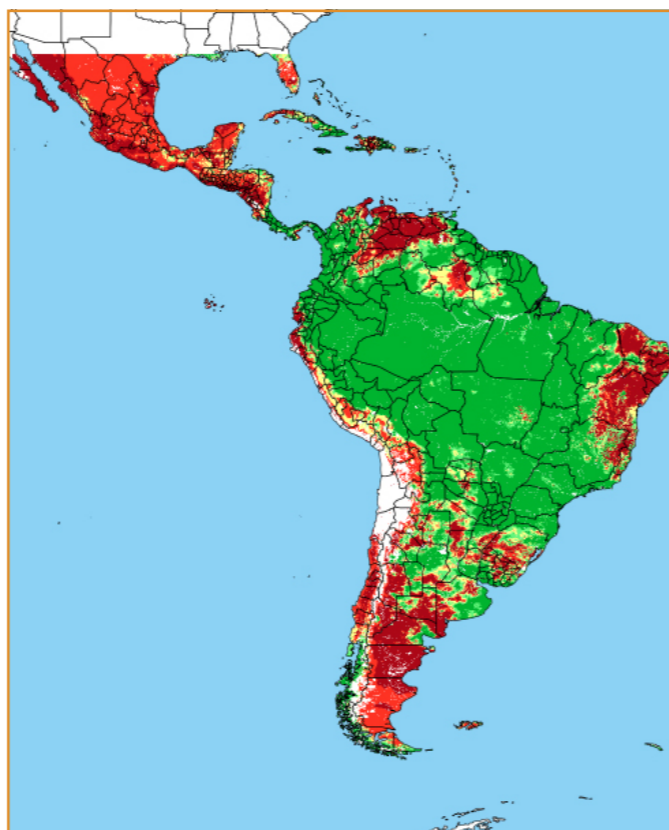
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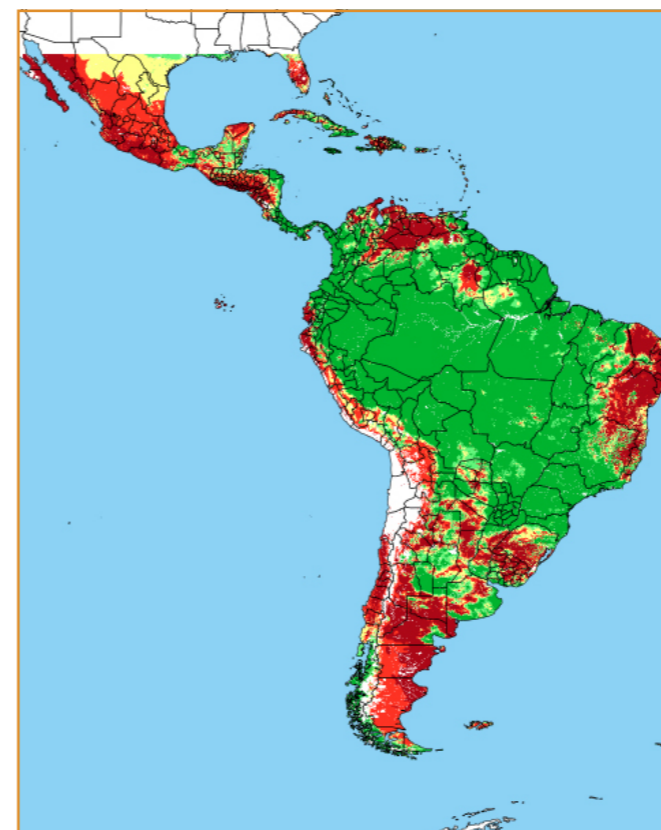




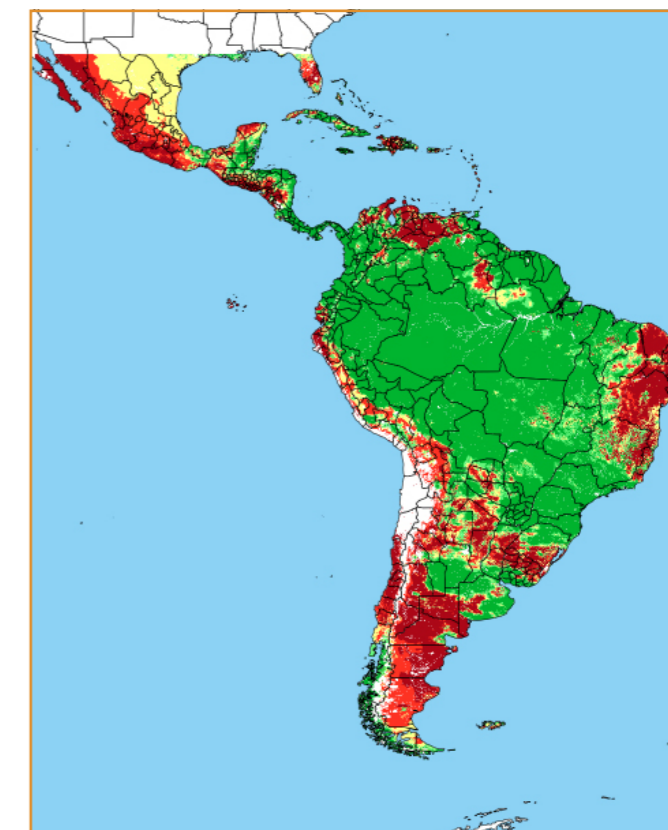
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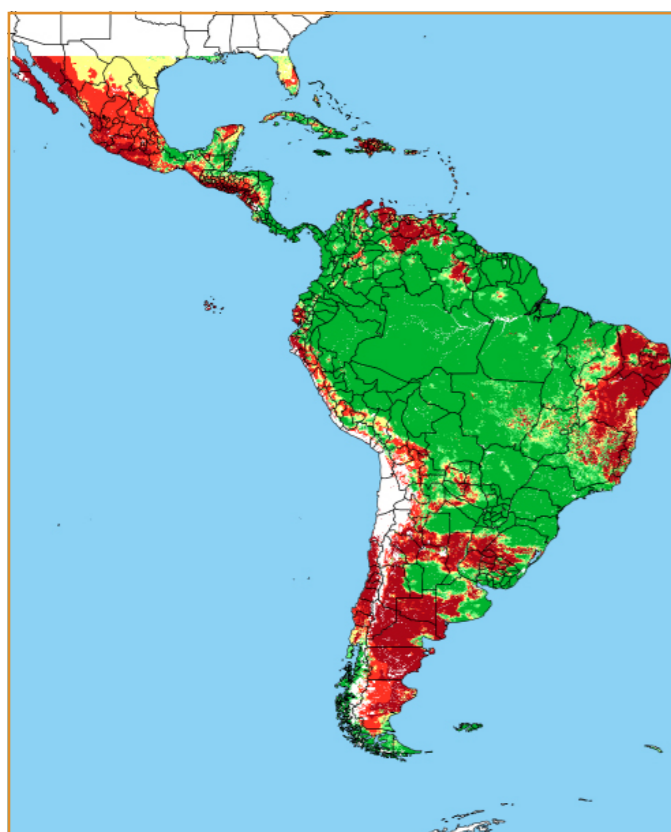
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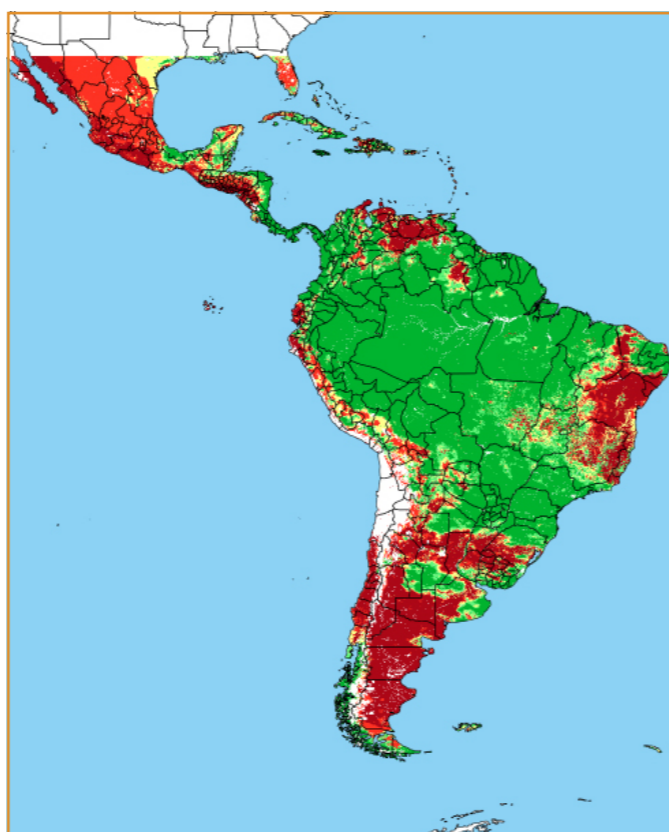
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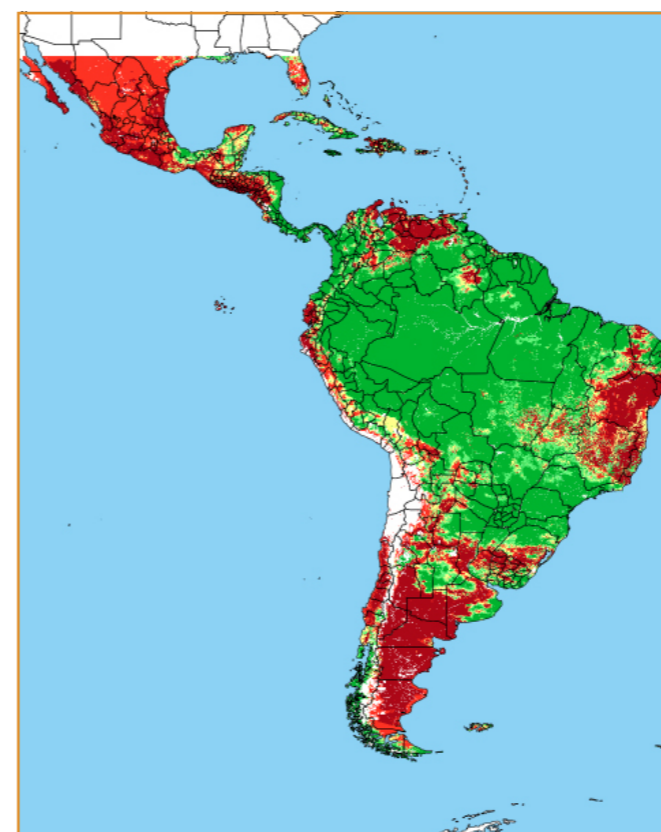
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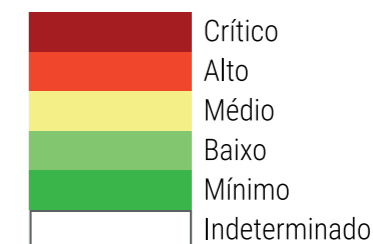
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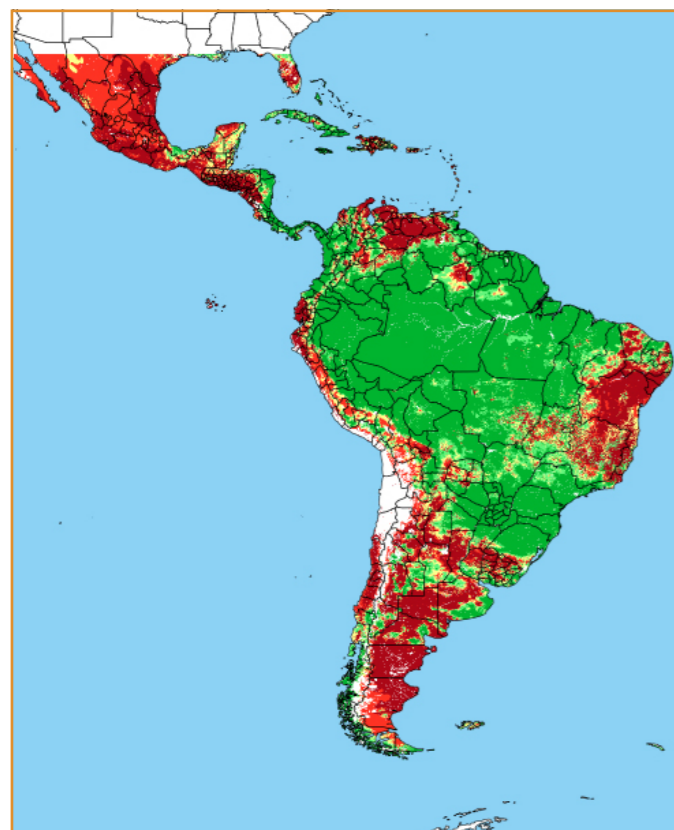
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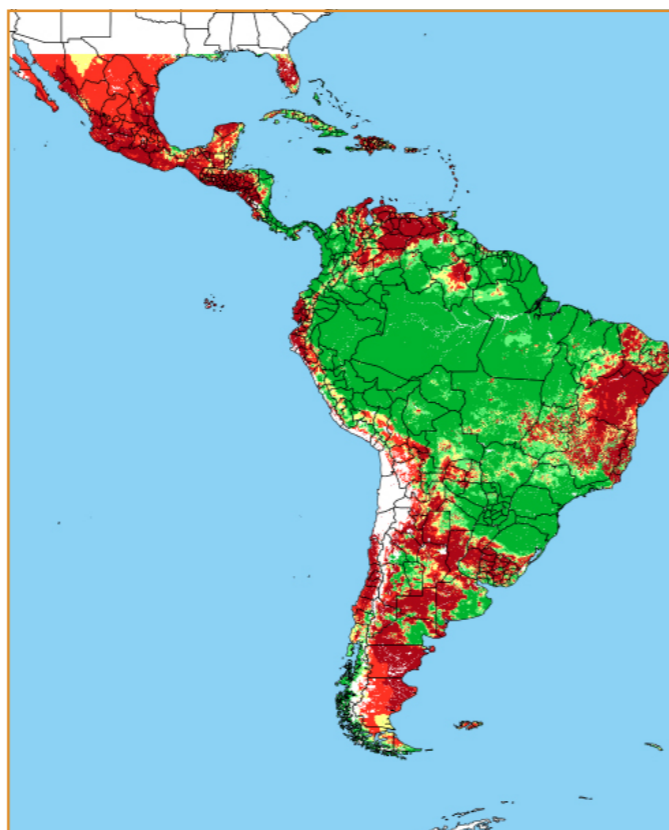
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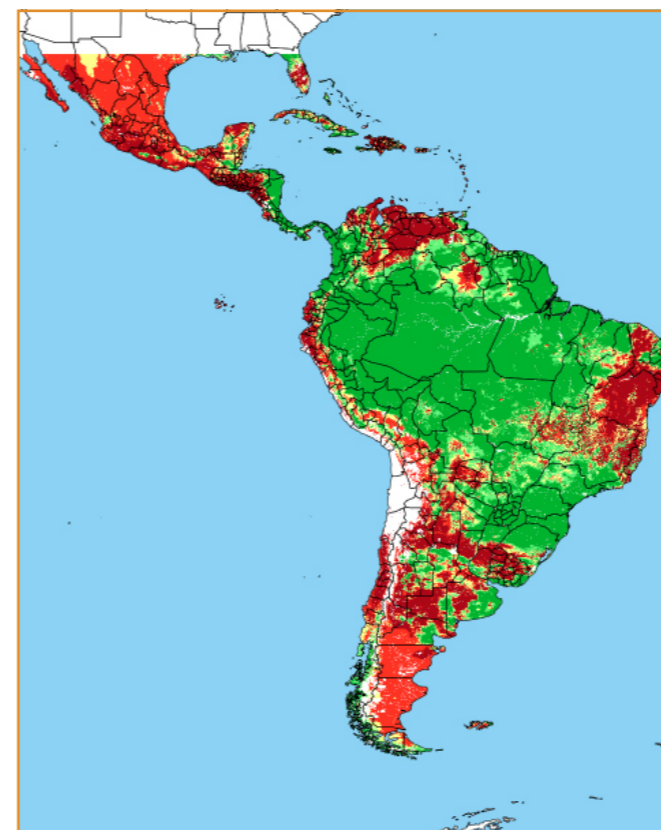
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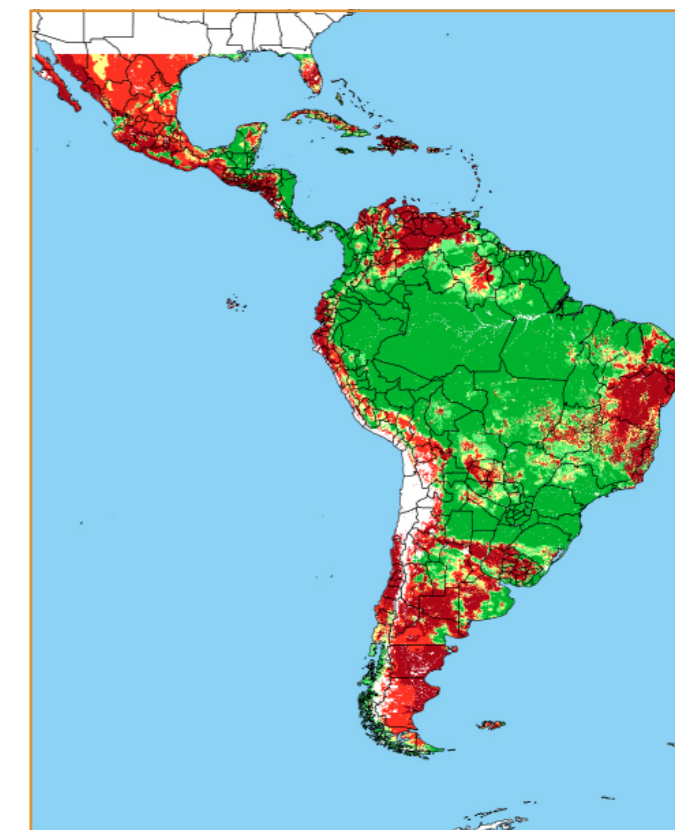
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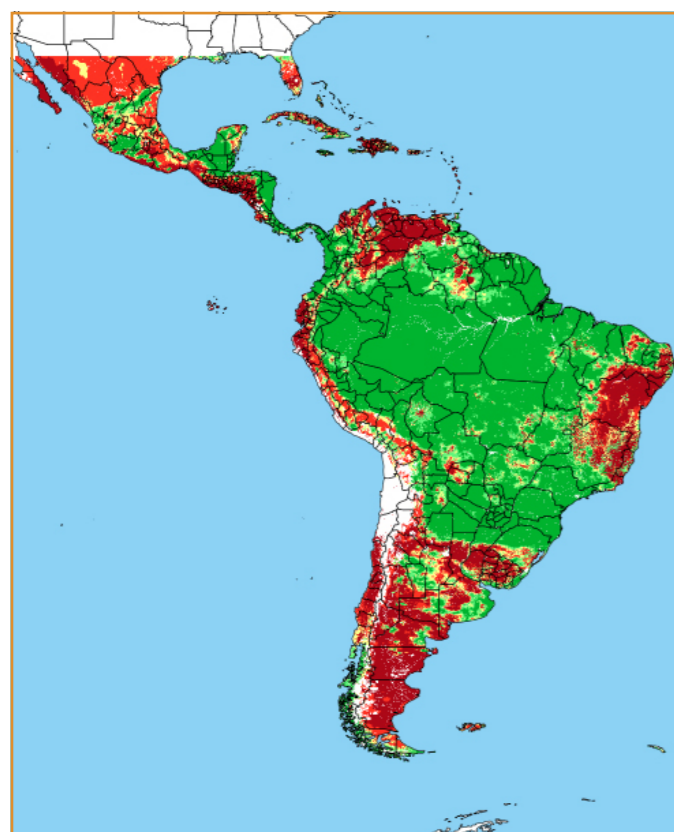
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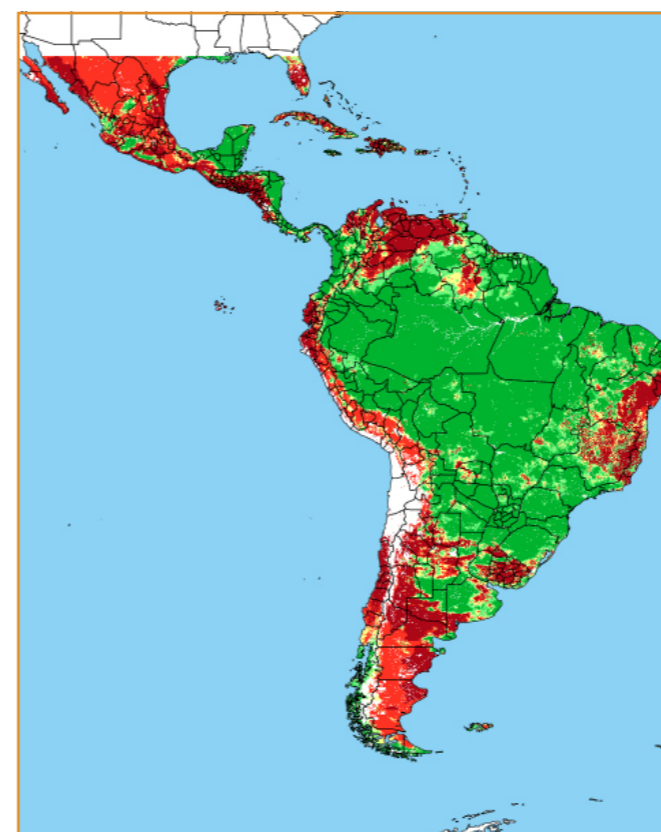
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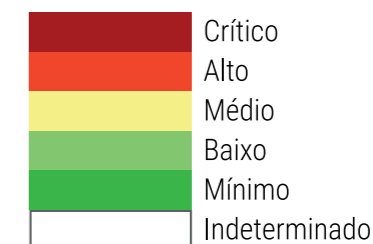
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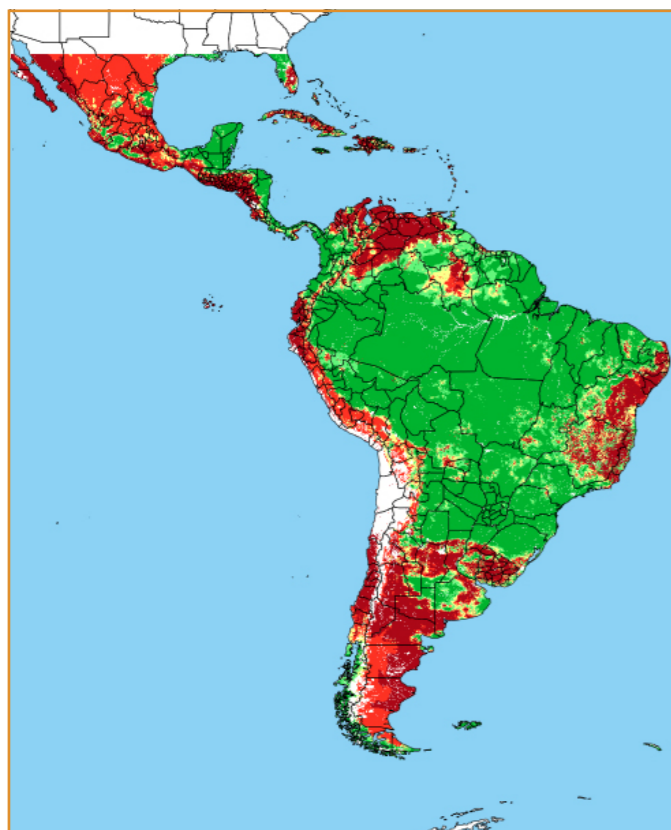
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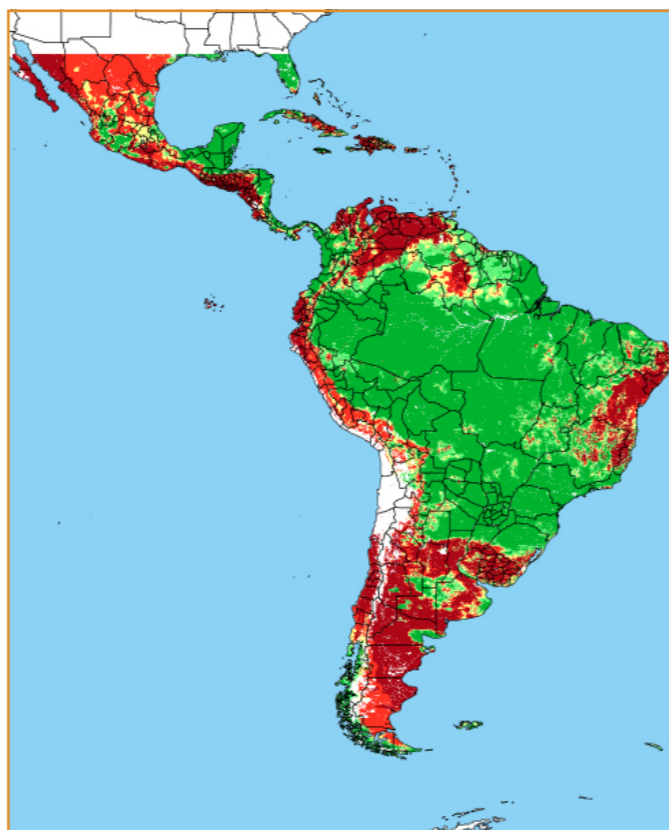
JANEIRO / 2018

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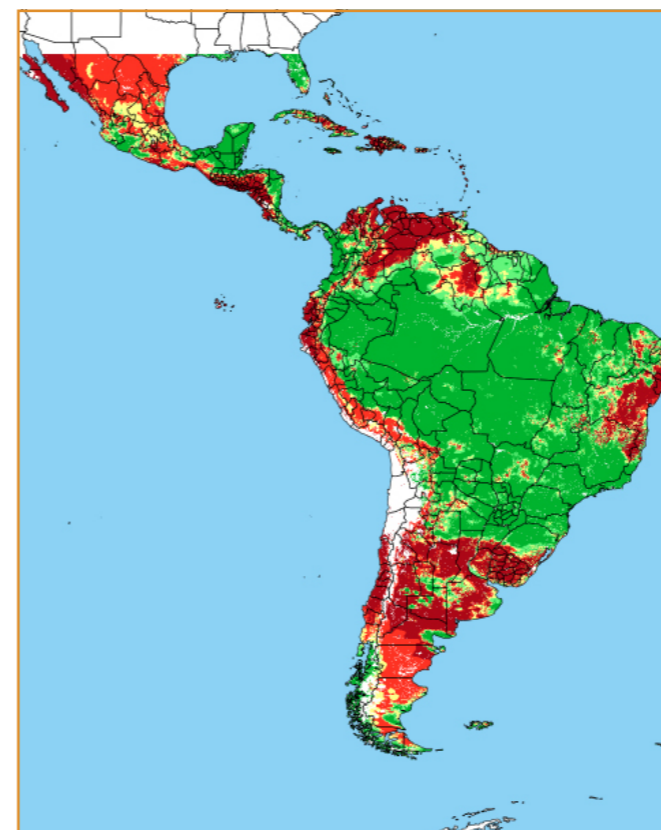
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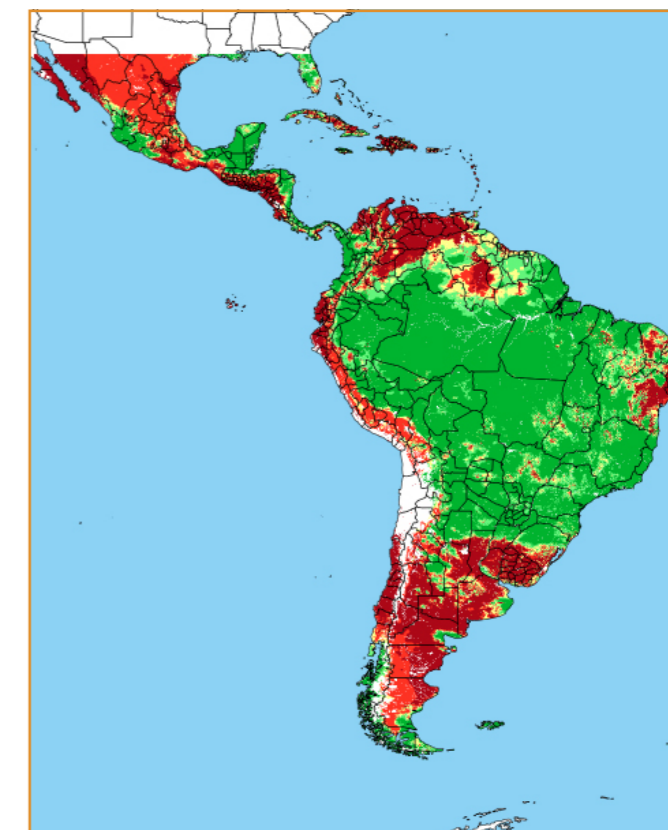
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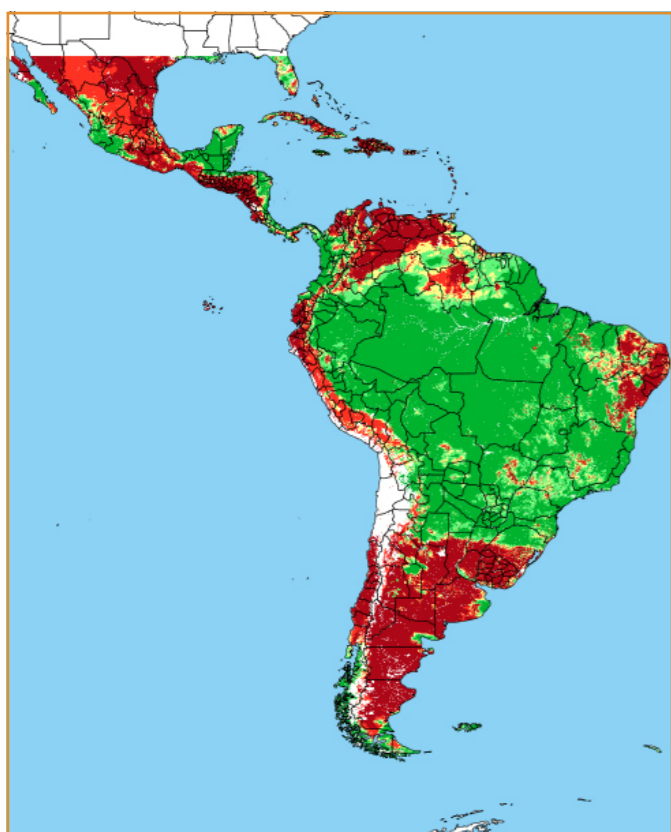
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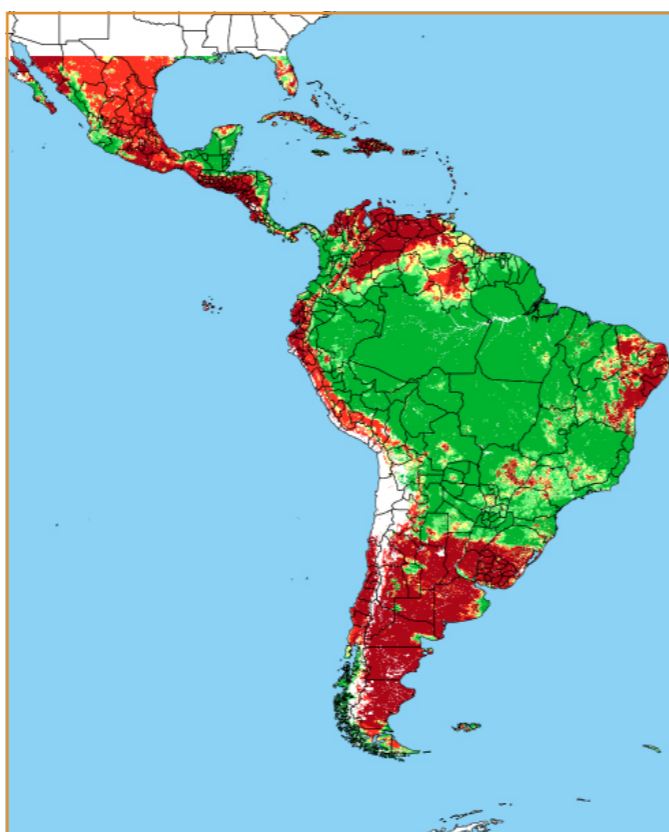
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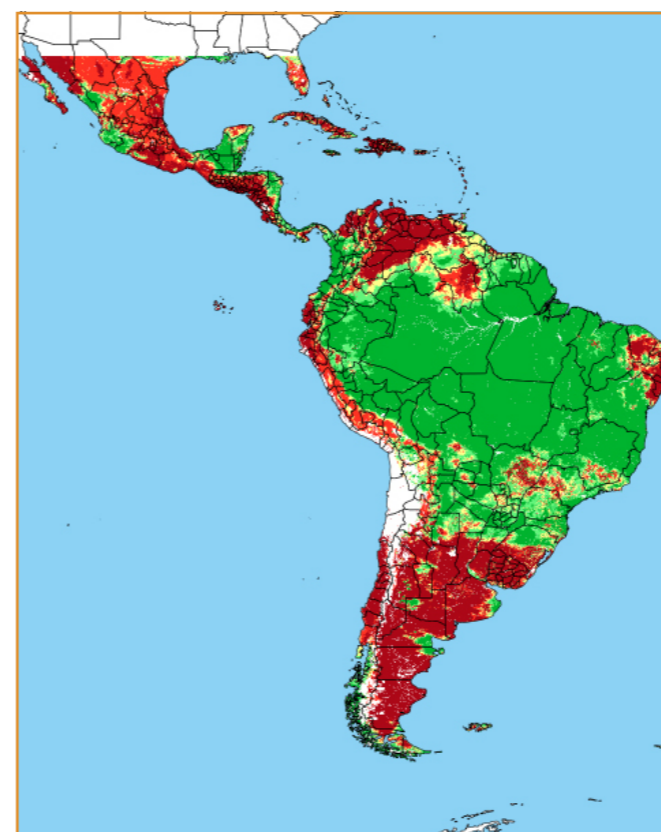
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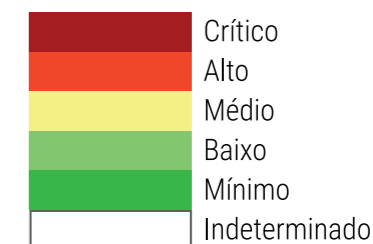
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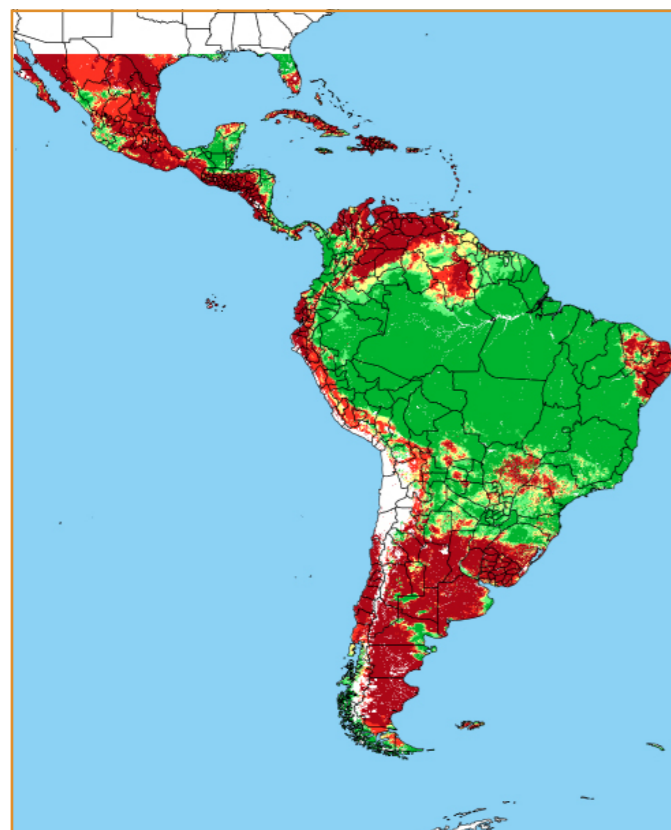


sábado, 3 de fevereiro

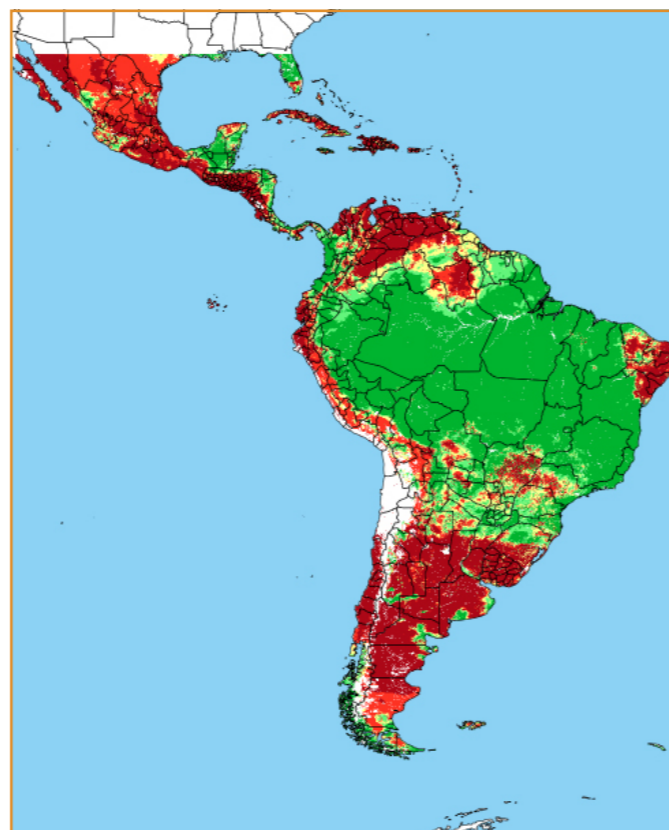


JANEIRO 2018						
D	S	T	Q	Q	S	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	32	33	34

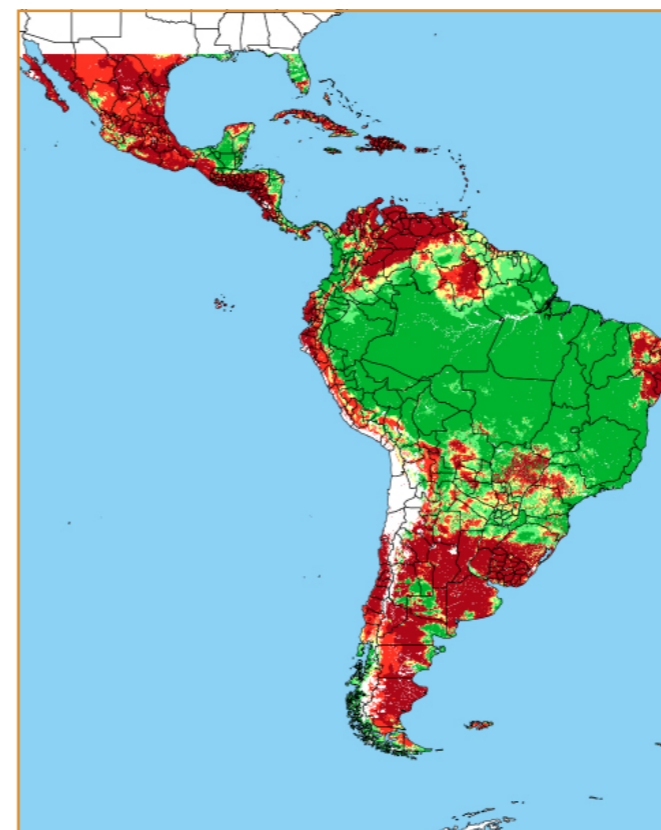
CALENDÁRIO JULIANO



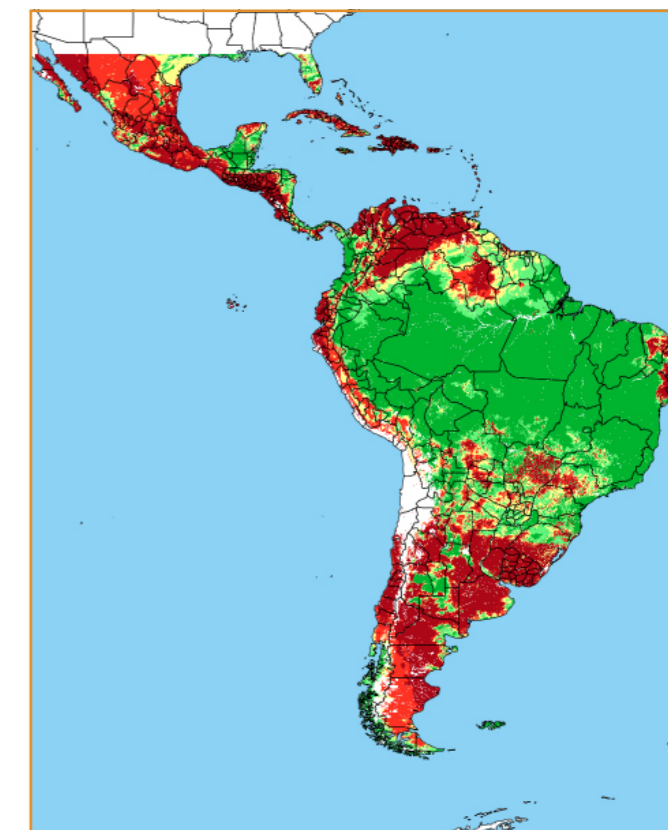
domingo, 4 de fevereiro



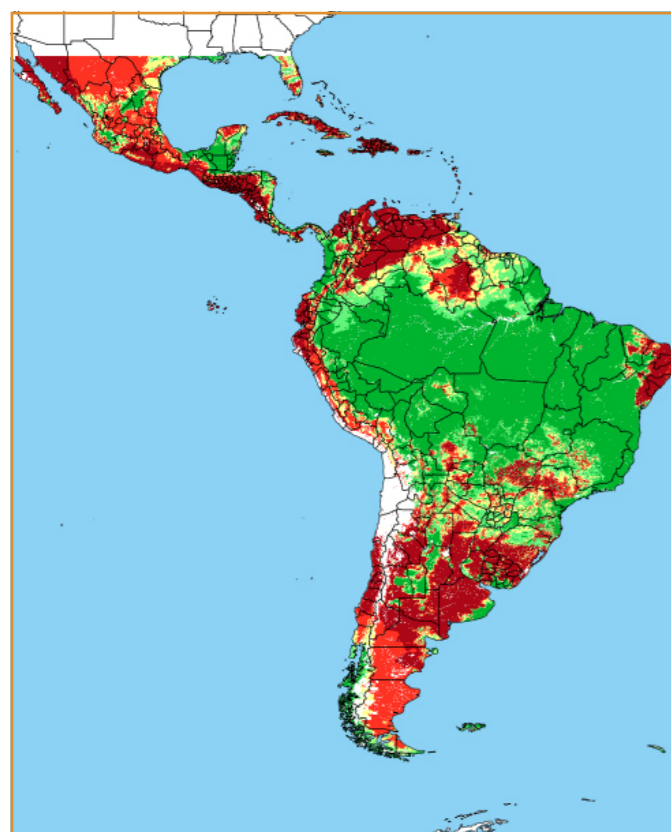
segunda-feira, 5 de fevereiro



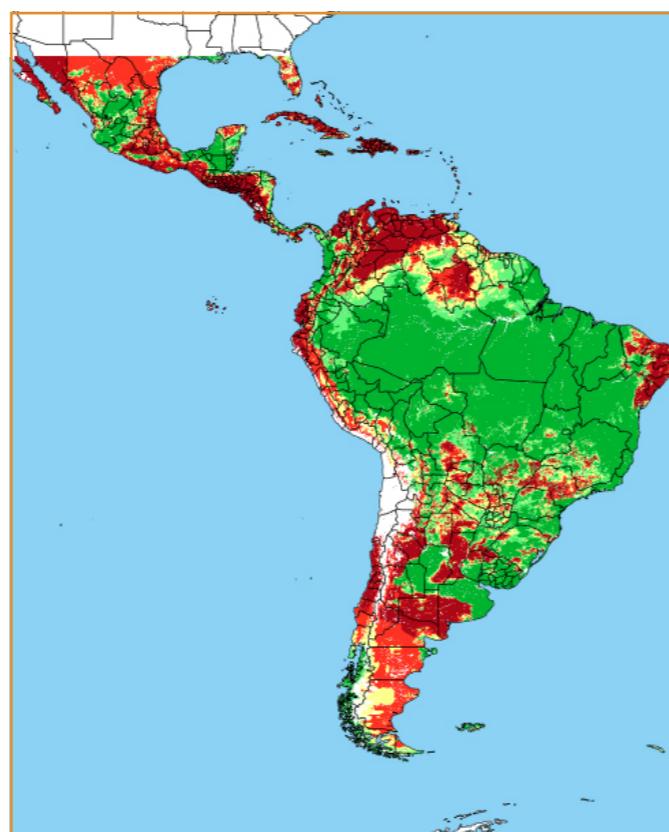
terça-feira, 6 de fevereiro



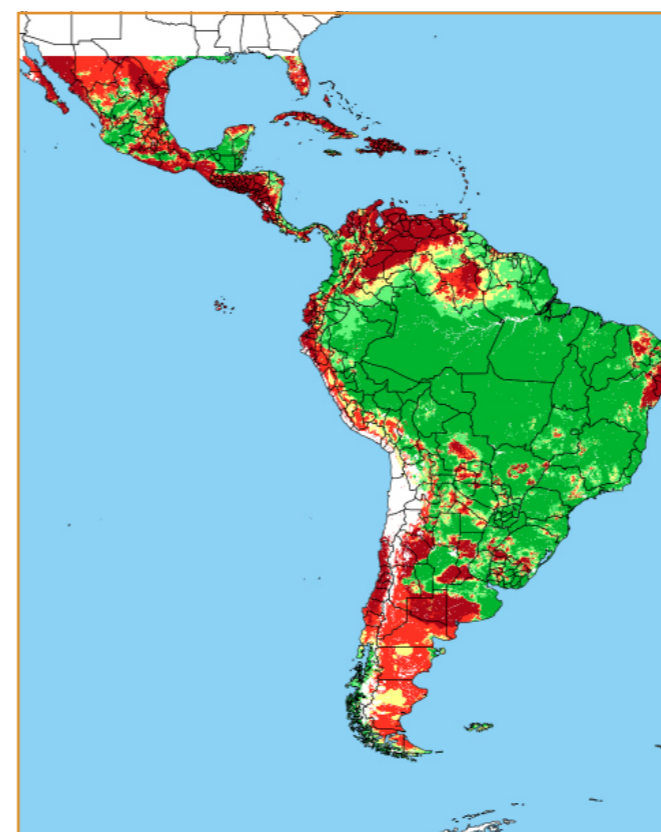
quarta-feira, 7 de fevereiro



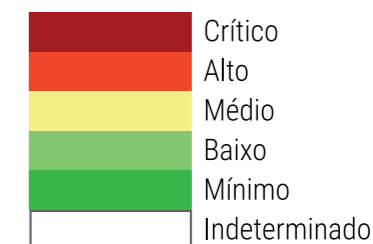
quinta-feira, 8 de fevereiro



sexta-feira, 9 de fevereiro

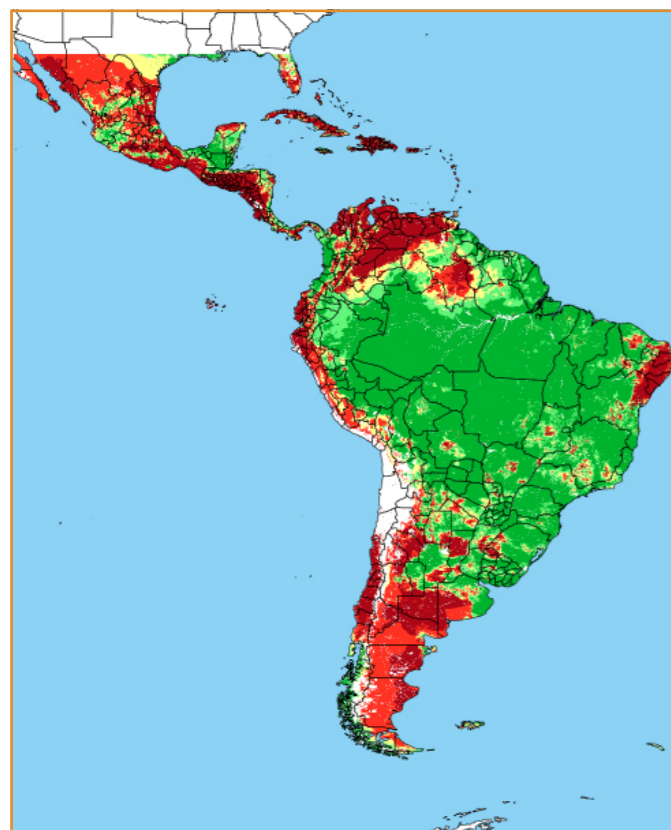


sábado, 10 de fevereiro

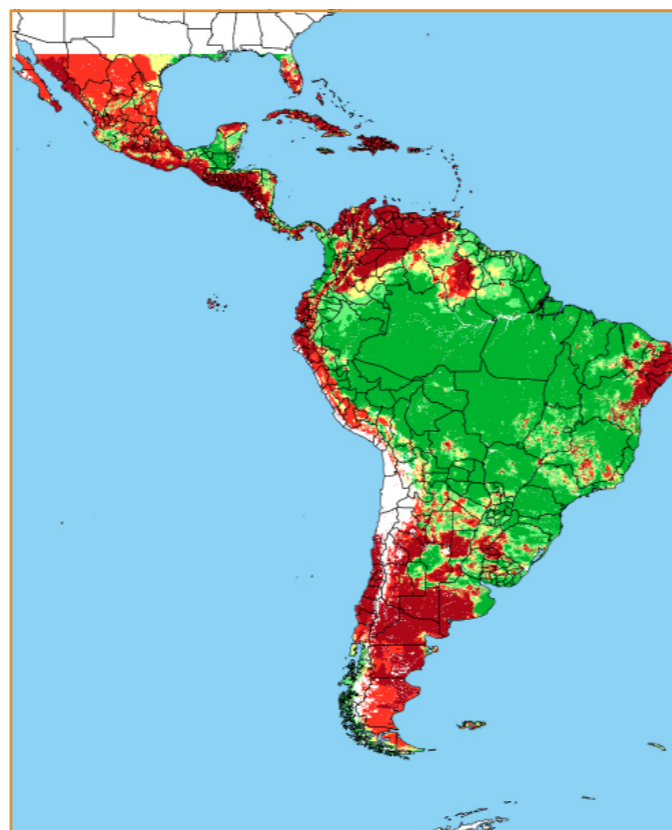


FEVEREIRO / 2018						
D	S	T	Q	Q	S	S
				32	33	34
35	36	37	38	39	40	41
42	43	44	45	46	47	48
49	50	51	52	53	54	55
56	57	58	59			

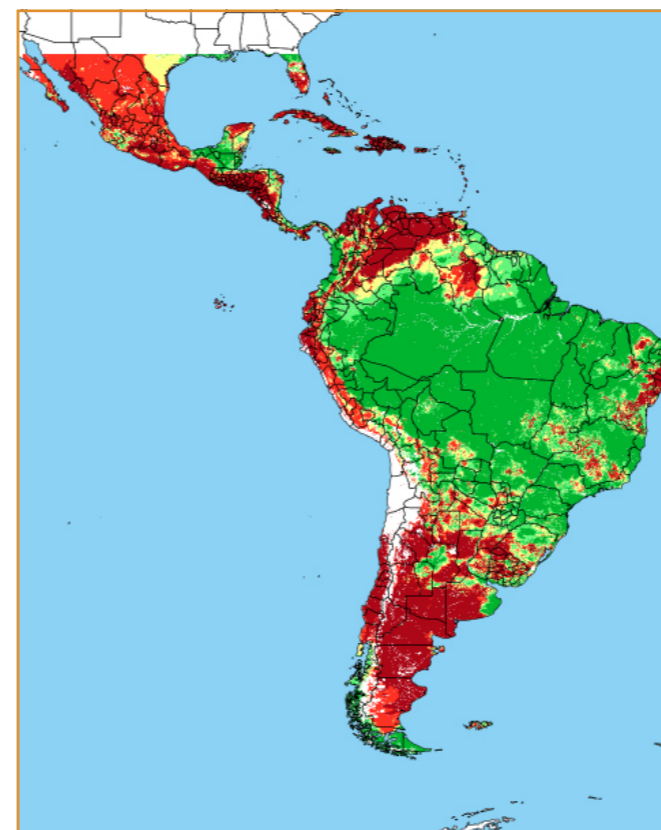
CALENDÁRIO JULIANO



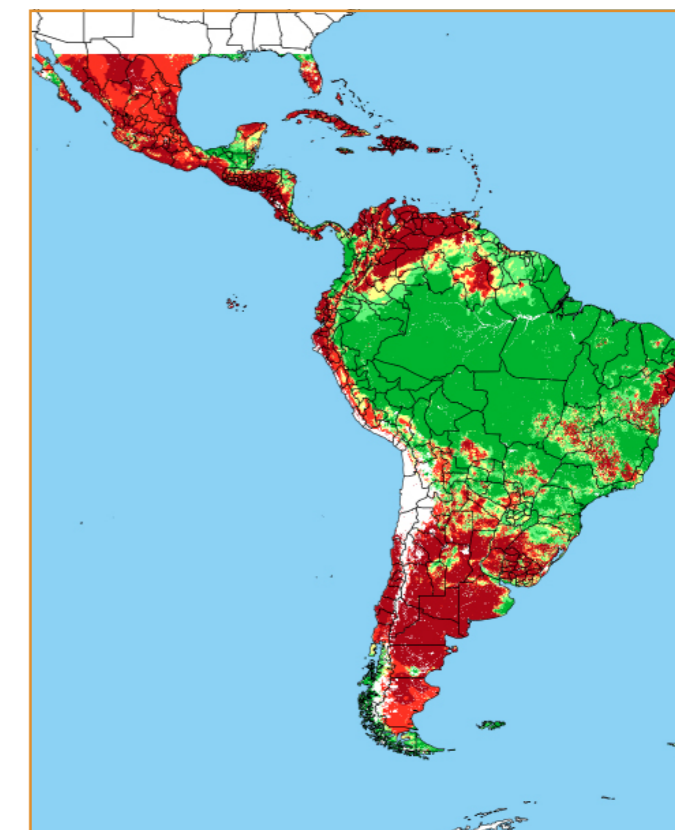
domingo, 11 de fevereiro



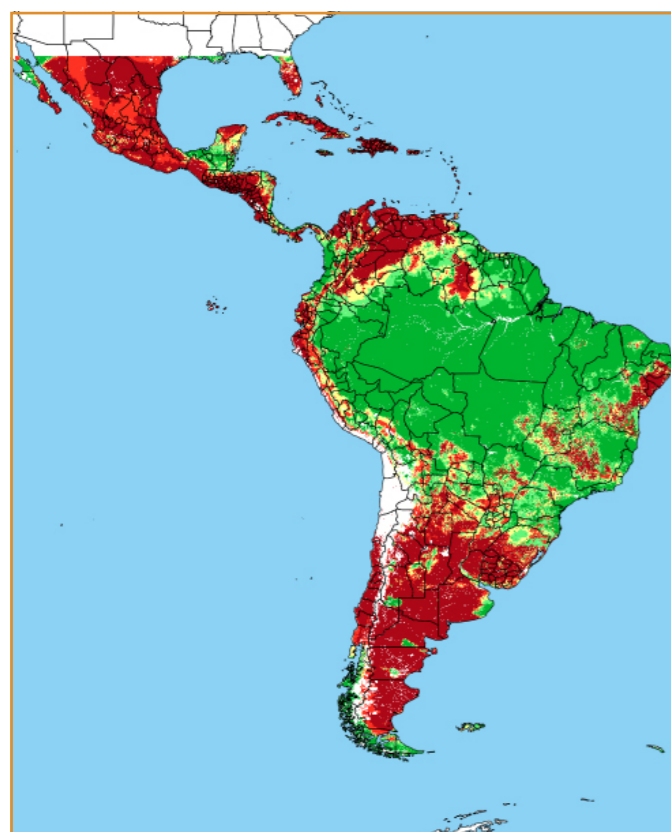
segunda-feira, 12 de fevereiro



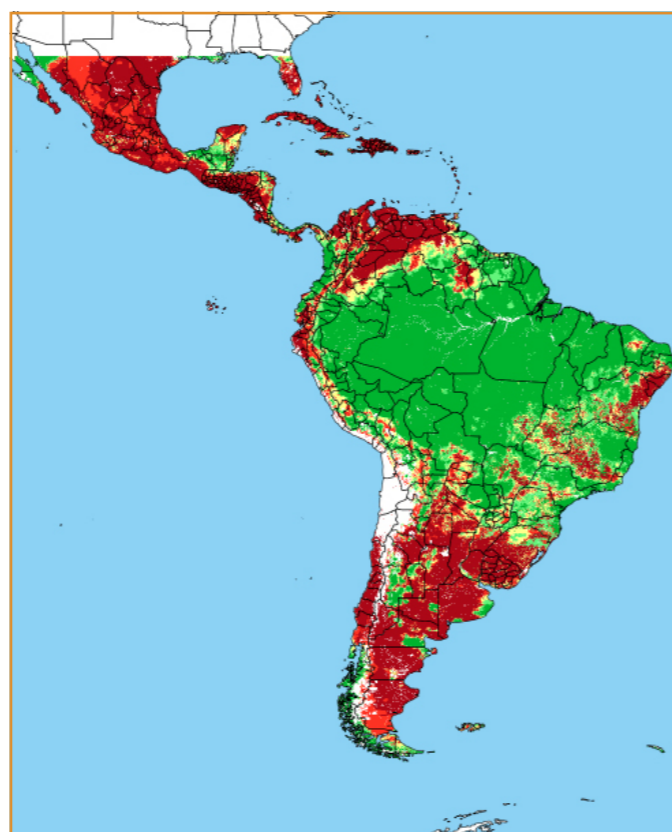
terça-feira, 13 de fevereiro



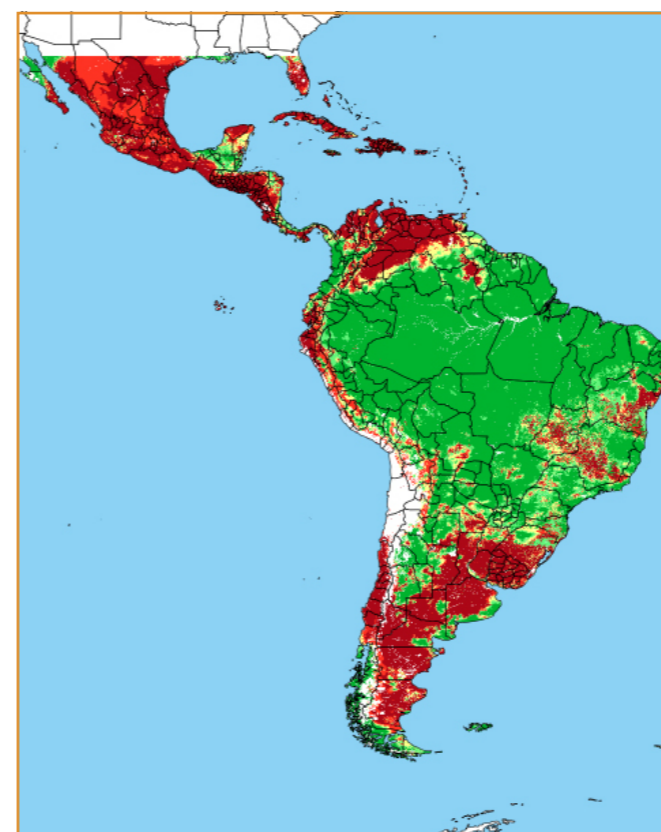
quarta-feira, 14 de fevereiro



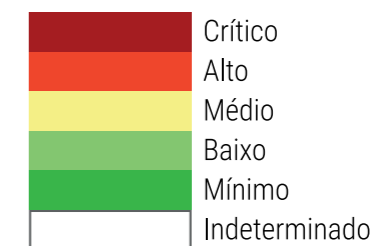
quinta-feira, 15 de fevereiro



sexta-feira, 16 de fevereiro

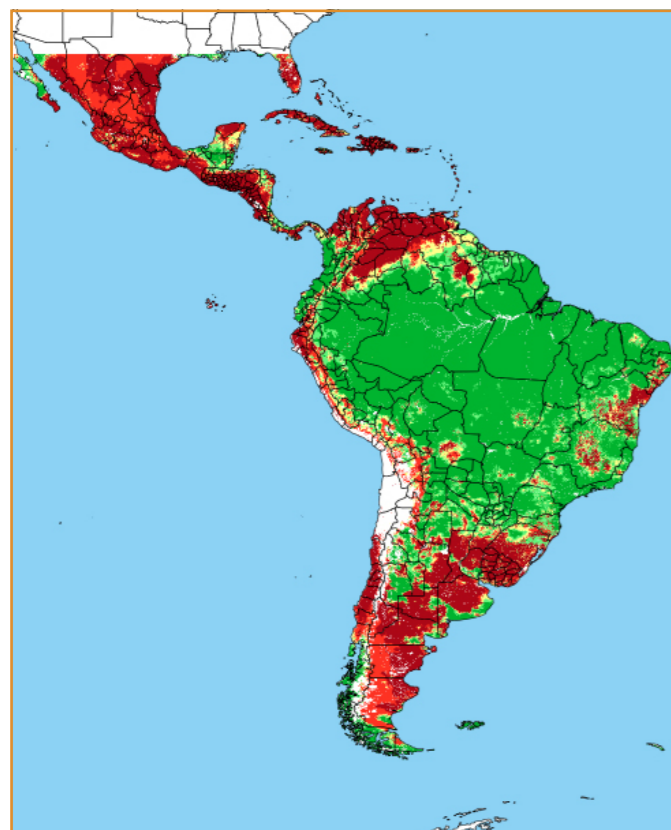


sábado, 17 de fevereiro

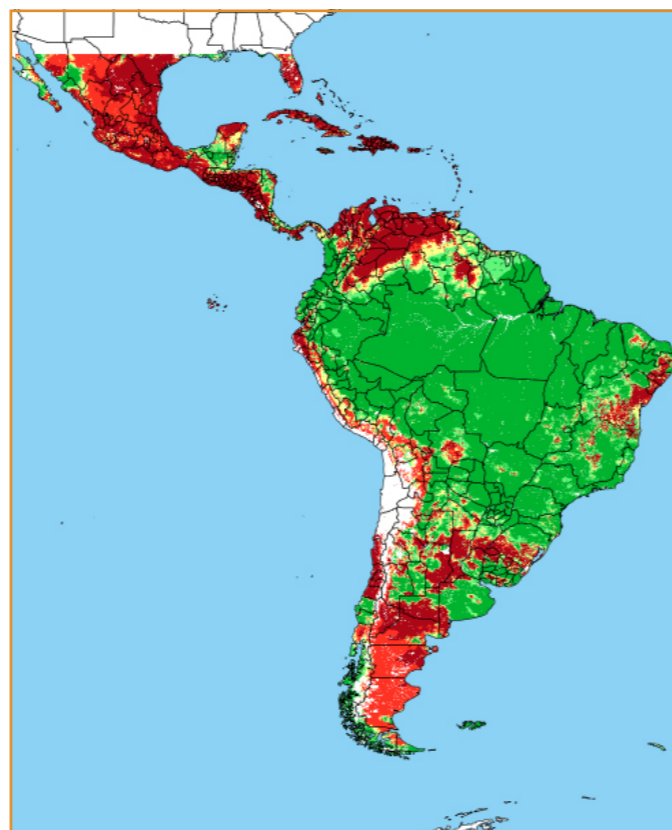


FEVEREIRO / 2018						
D	S	T	Q	Q	S	S
				32	33	34
35	36	37	38	39	40	41
42	43	44	45	46	47	48
49	50	51	52	53	54	55
56	57	58	59			

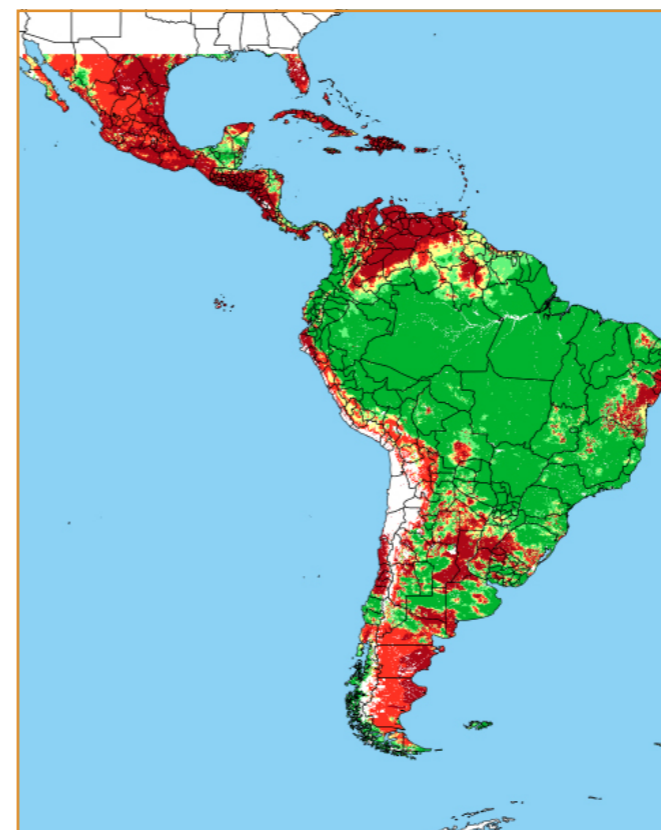
CALENDÁRIO JULIANO



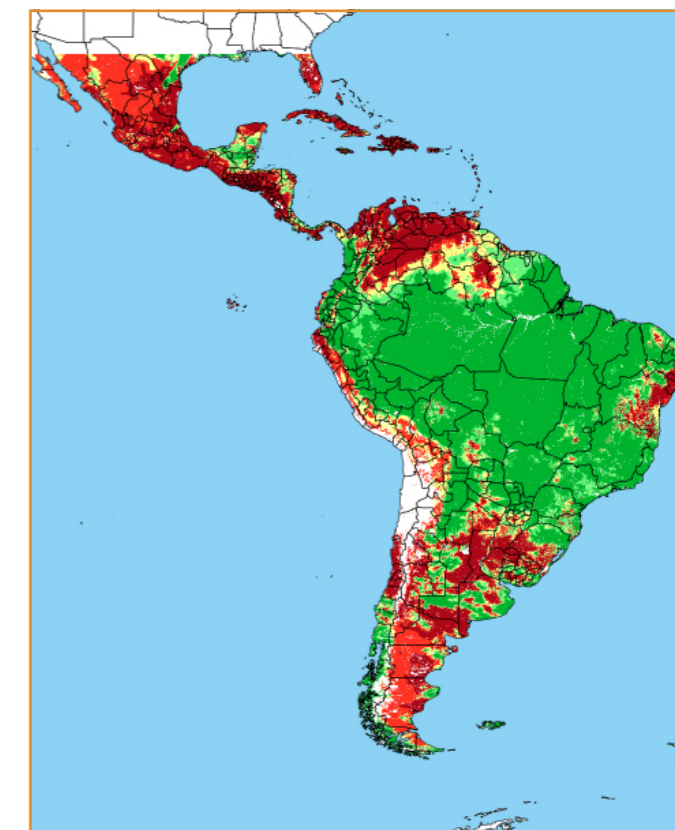
domingo, 18 de fevereiro



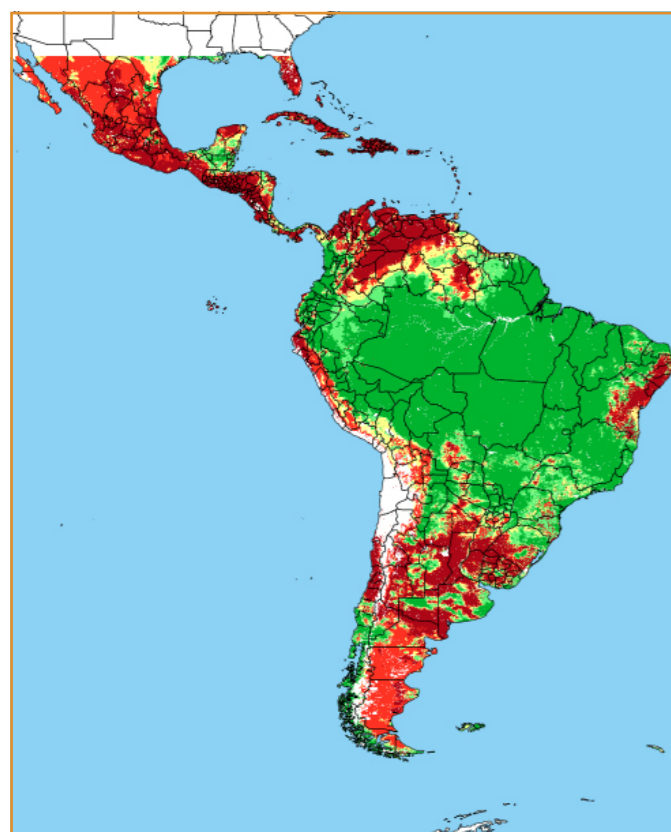
segunda-feira, 19 de fevereiro



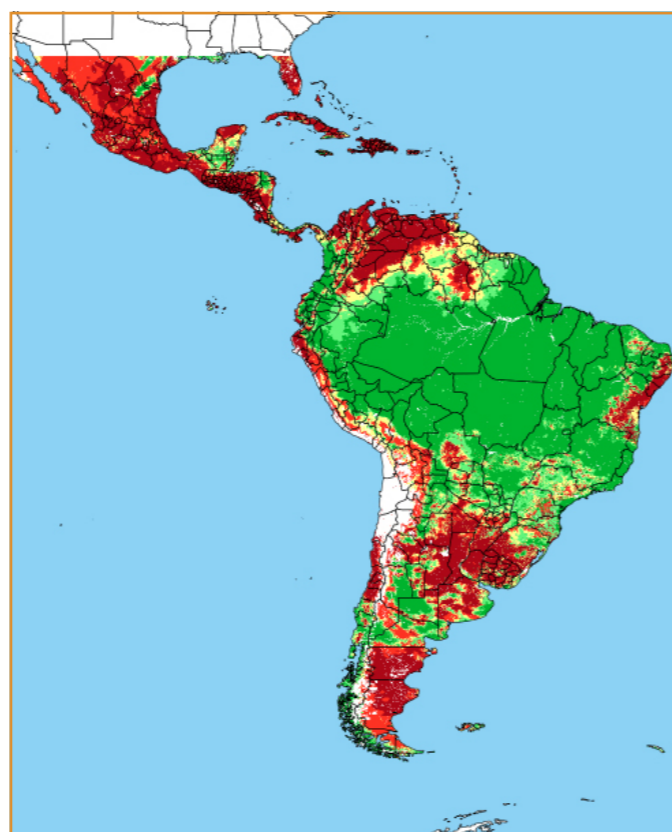
terça-feira, 20 de fevereiro



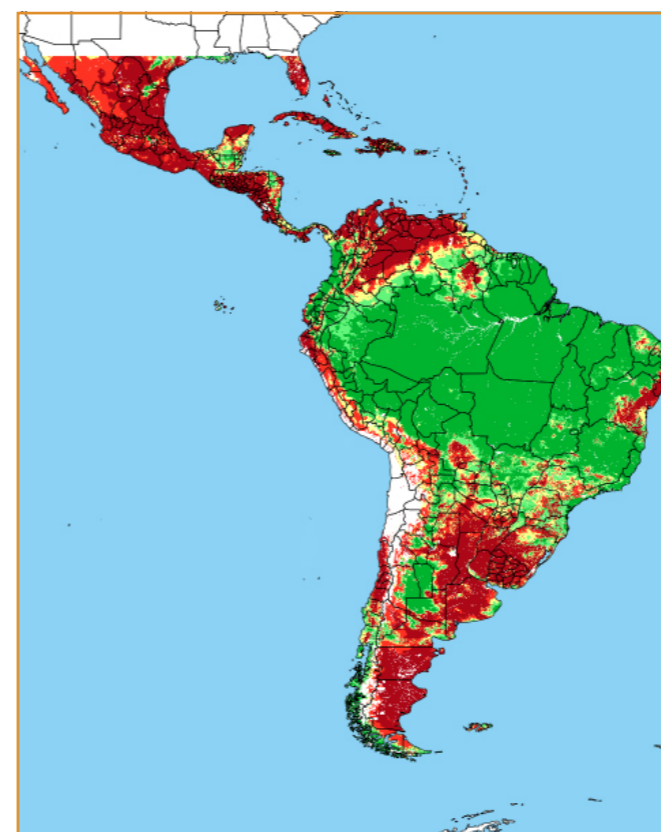
quarta-feira, 21 de fevereiro



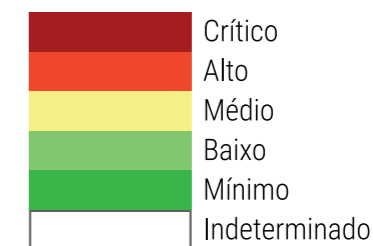
quinta-feira, 22 de fevereiro



sexta-feira, 23 de fevereiro

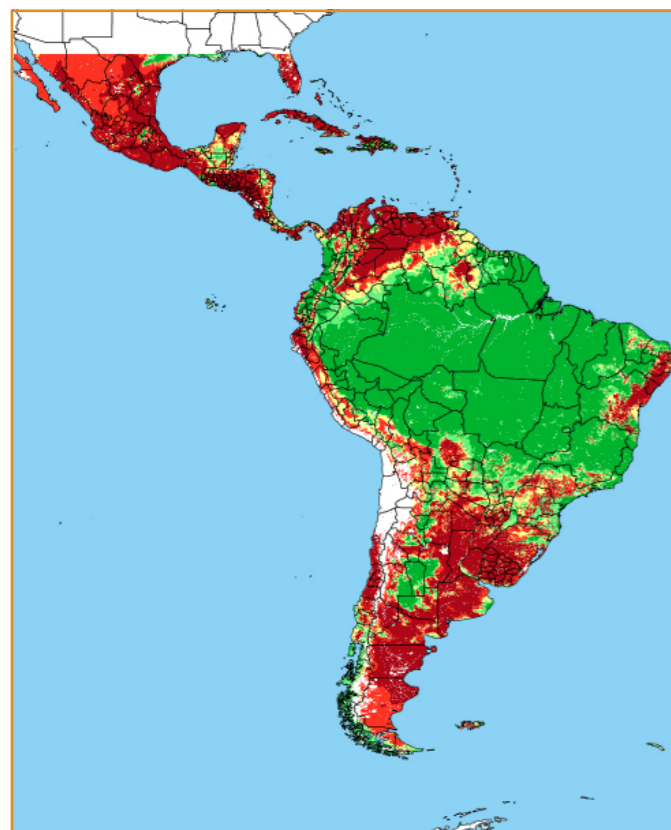


sábado, 24 de fevereiro

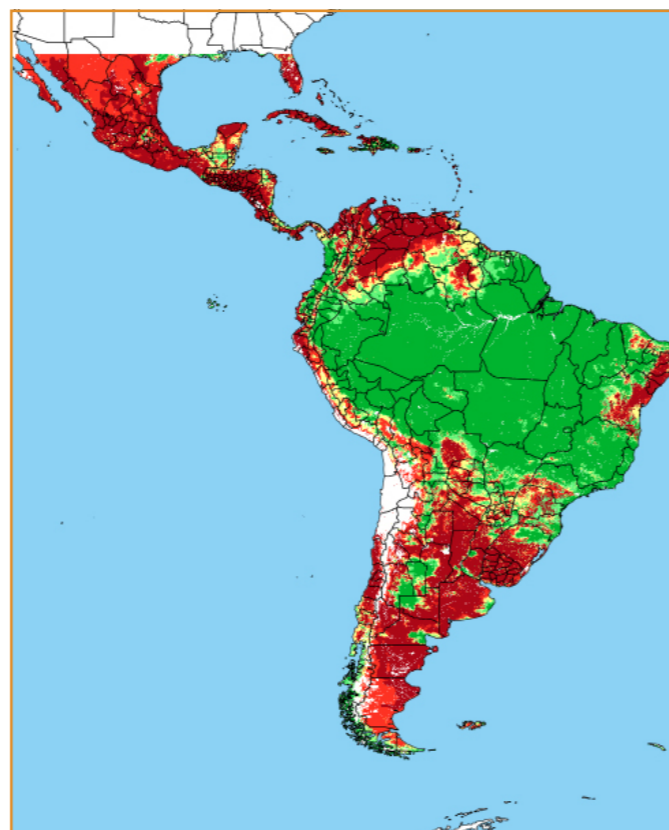


FEVEREIRO / 2018						
D	S	T	Q	Q	S	S
				32	33	34
35	36	37	38	39	40	41
42	43	44	45	46	47	48
49	50	51	52	53	54	55
56	57	58	59			

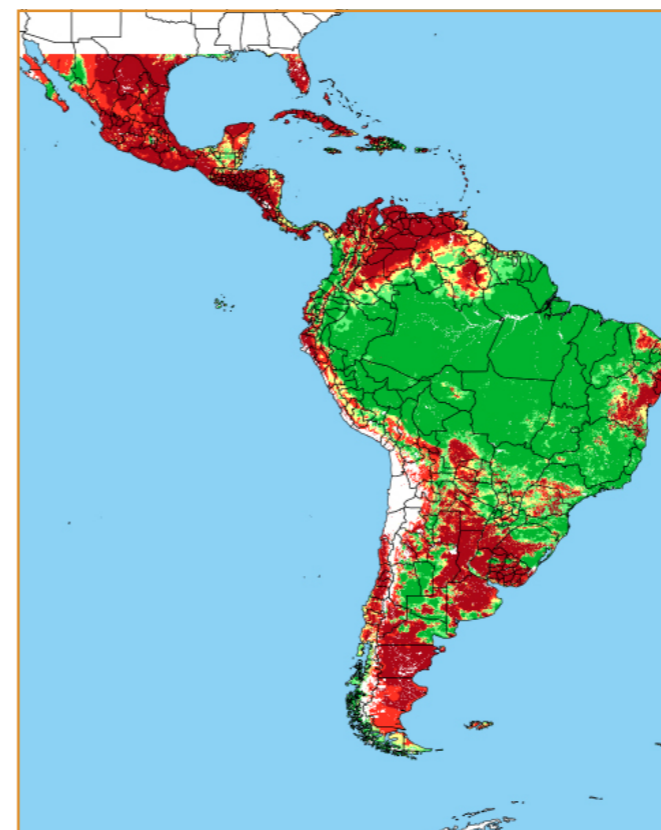
CALENDÁRIO JULIANO



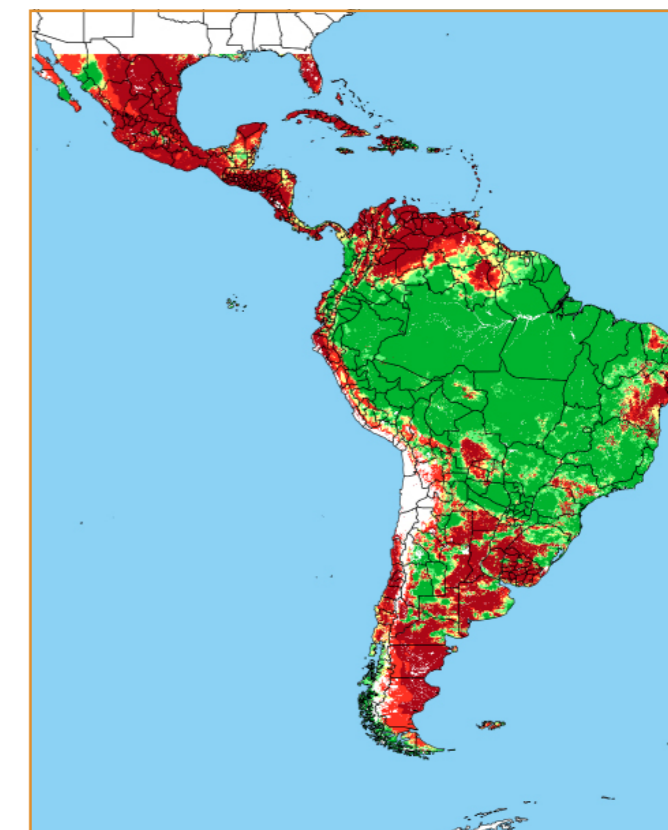
domingo, 25 de fevereiro



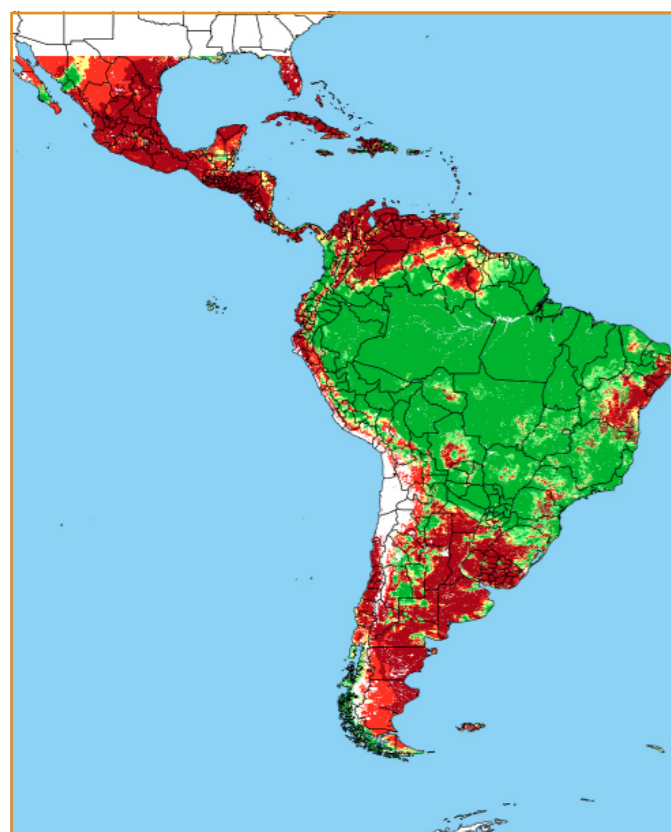
segunda-feira, 26 de fevereiro



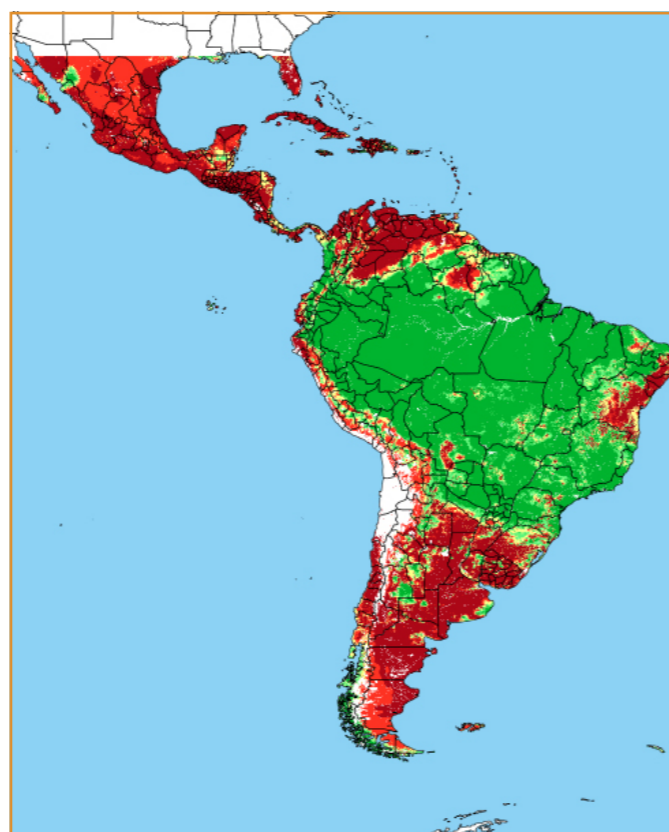
terça-feira, 27 de fevereiro



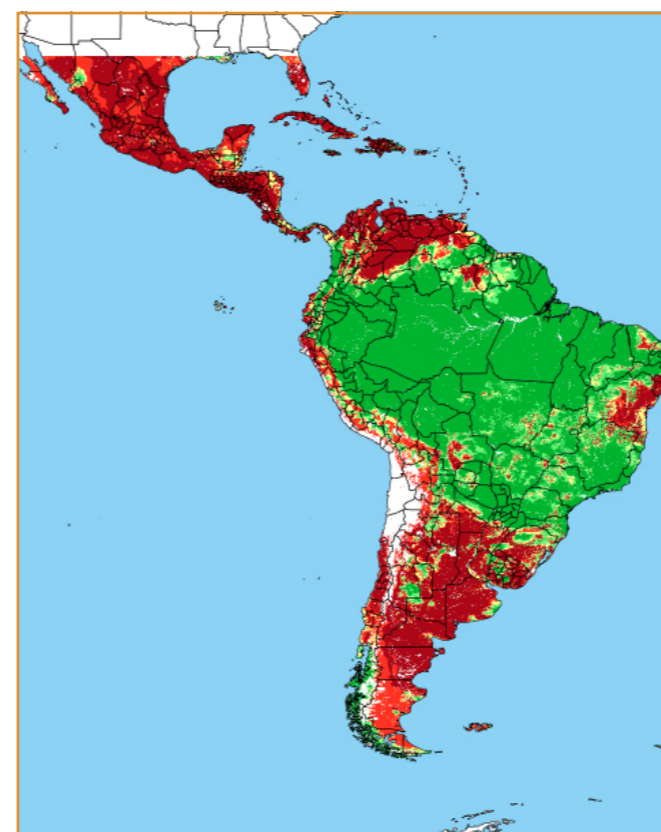
quarta-feira, 28 de fevereiro



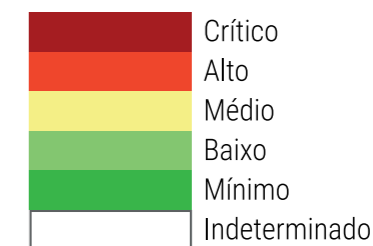
quinta-feira, 1 de março



sexta-feira, 2 de março

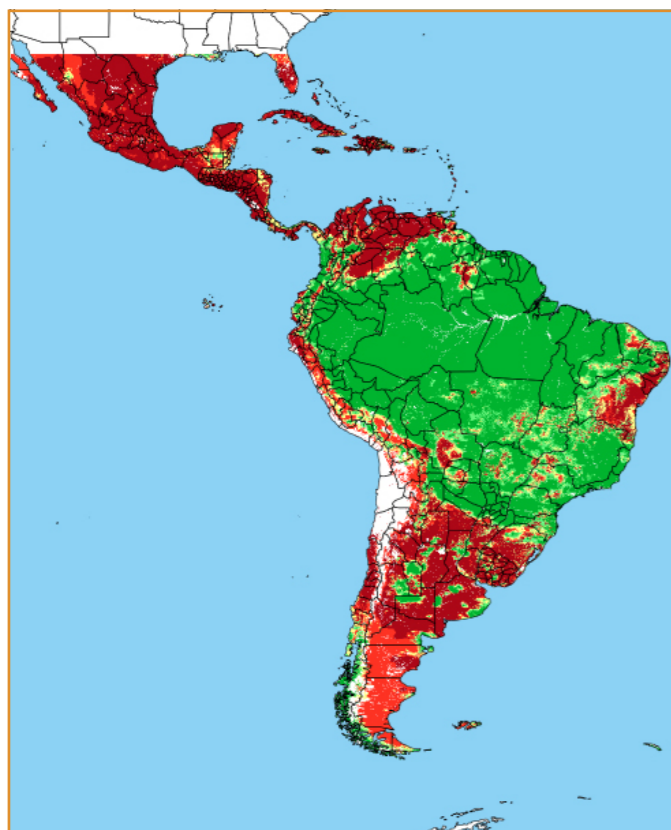


sábado, 3 de março

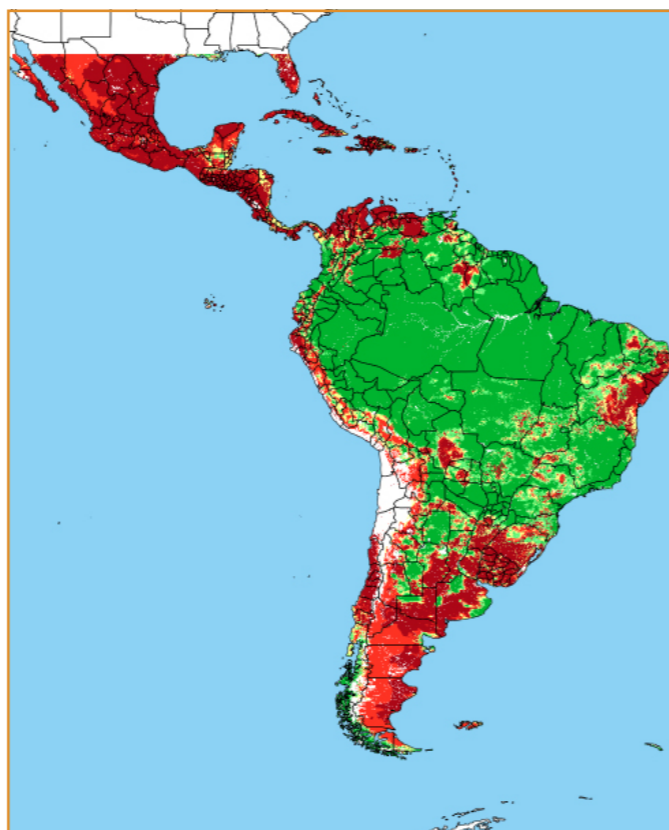


FEVEREIRO / 2018						
D	S	T	Q	Q	S	S
				32	33	34
35	36	37	38	39	40	41
42	43	44	45	46	47	48
49	50	51	52	53	54	55
56	57	58	59	60	61	62

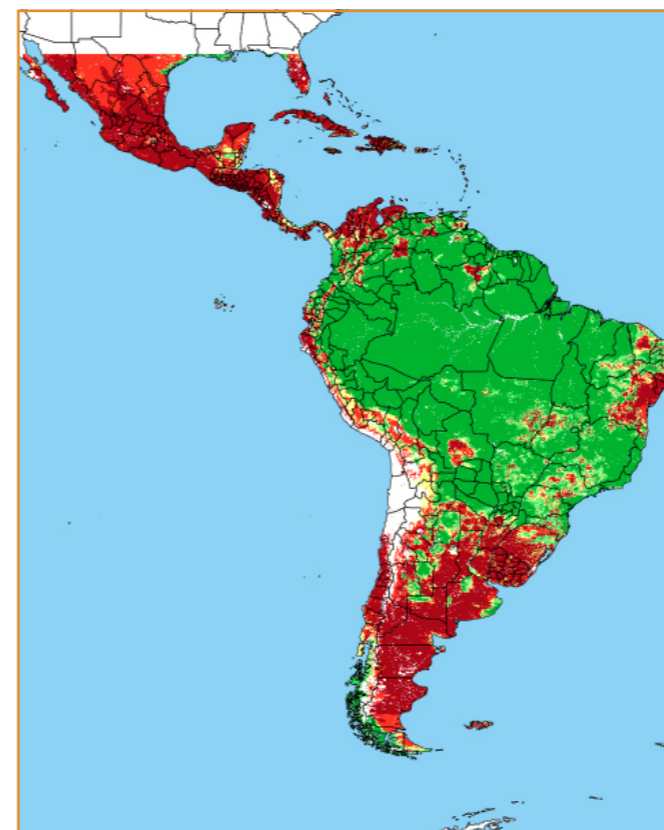
CALENDÁRIO JULIANO



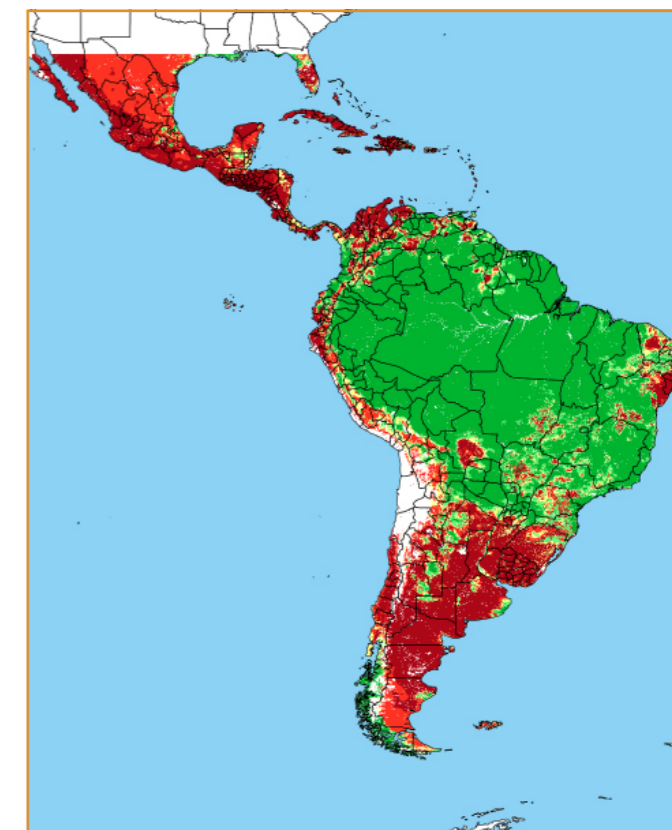
domingo, 4 de março



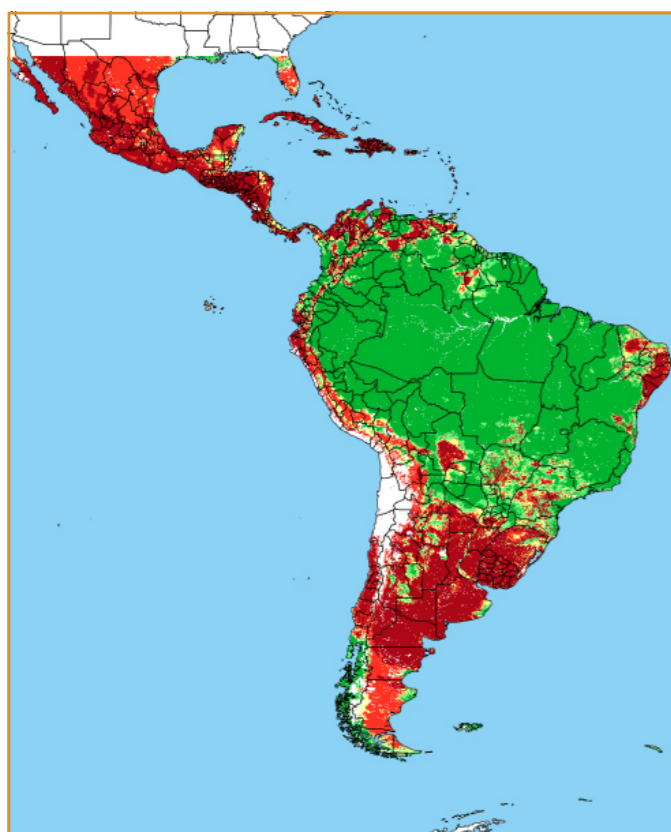
segunda-feira, 5 de março



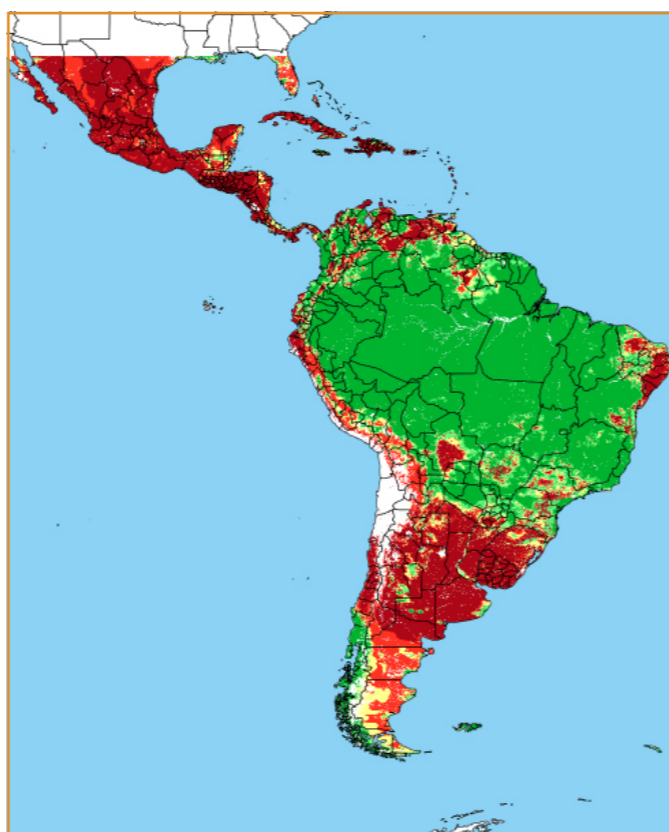
terça-feira, 6 de março



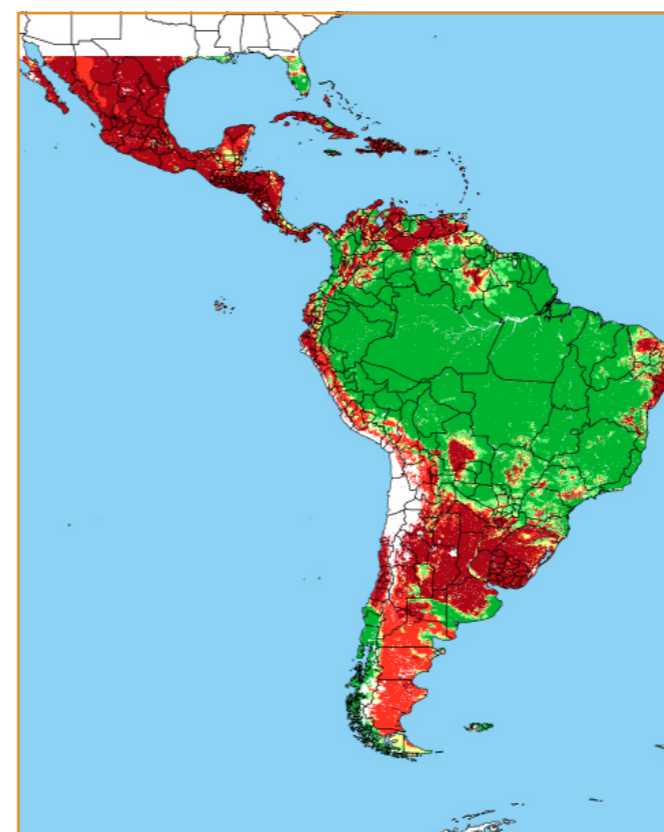
quarta-feira, 7 de março



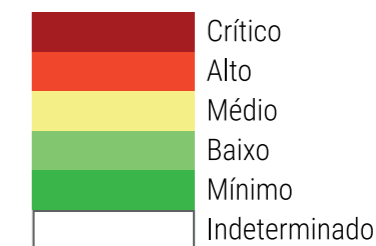
quinta-feira, 8 de março



sexta-feira, 9 de março



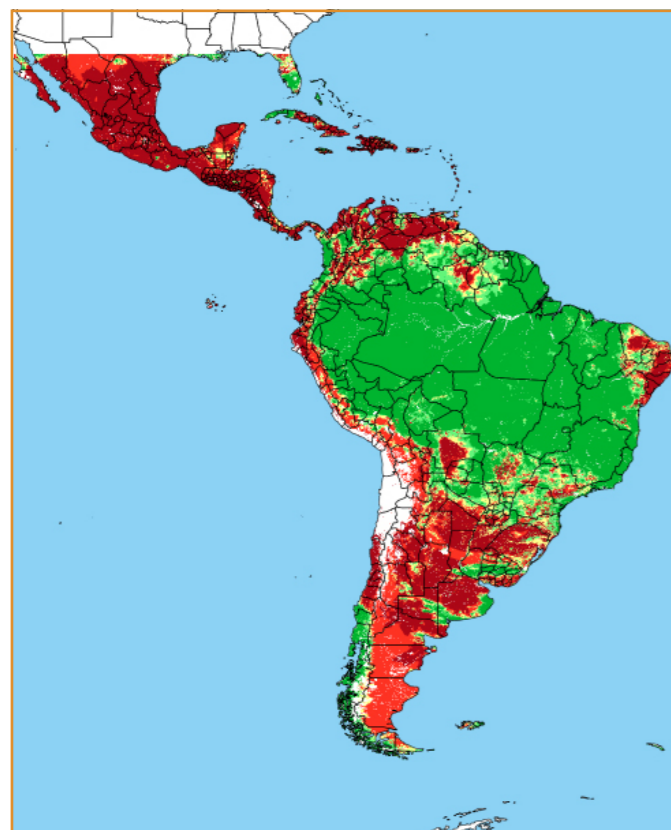
sábado, 10 de março



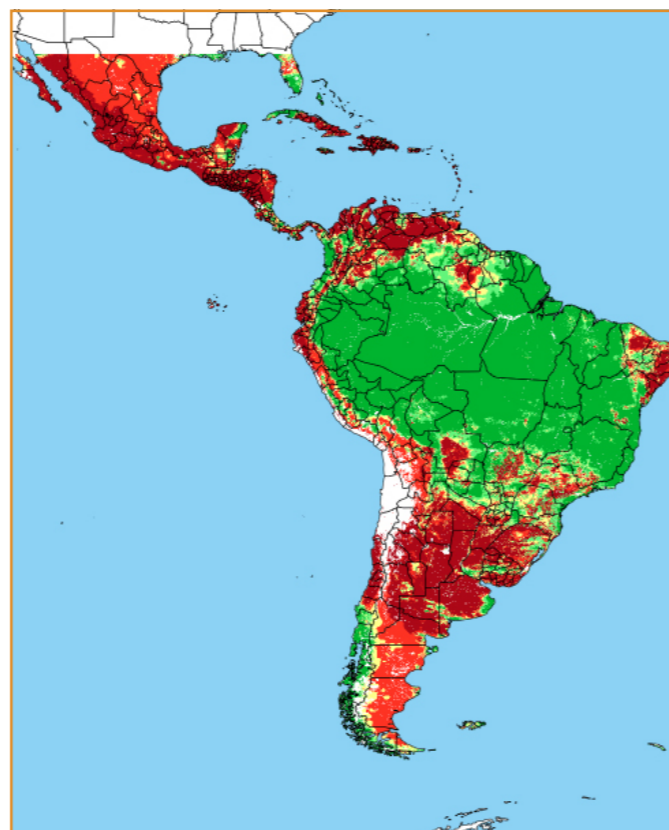
MARÇO / 2018						
D	S	T	Q	Q	S	S
				60	61	62
63	64	65	66	67	68	69
70	71	72	73	74	75	76
77	78	79	80	81	82	83
84	85	86	87	88	89	90

CALENDÁRIO JULIANO

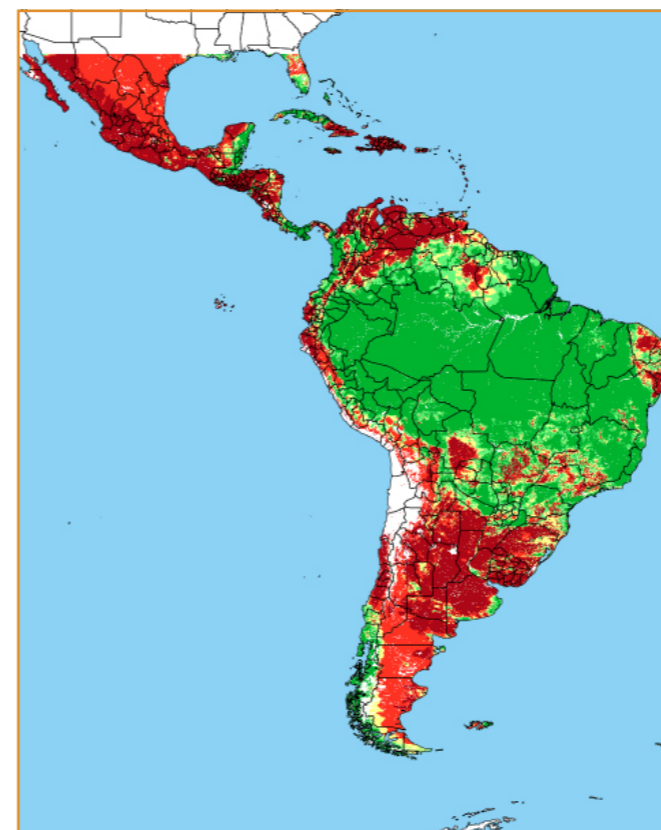




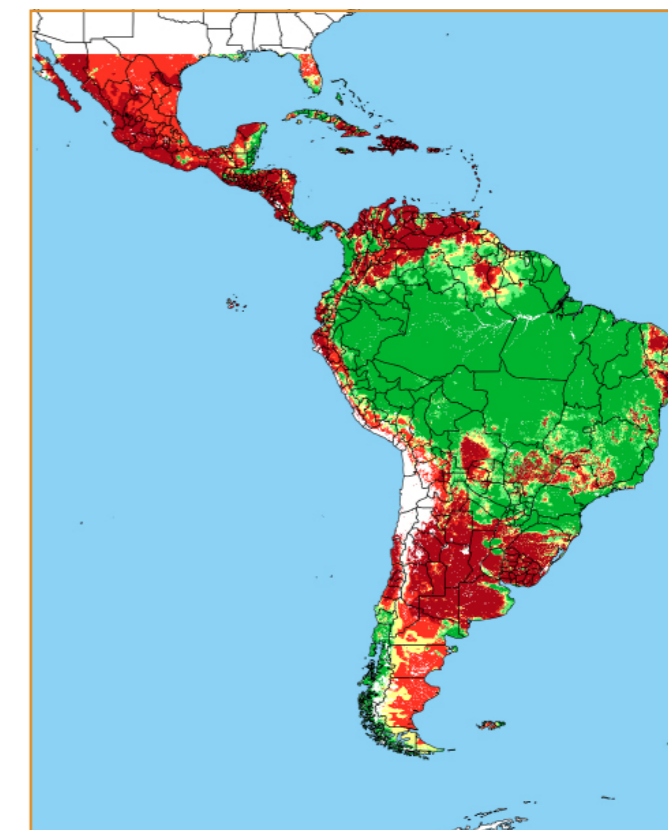
domingo, 11 de março



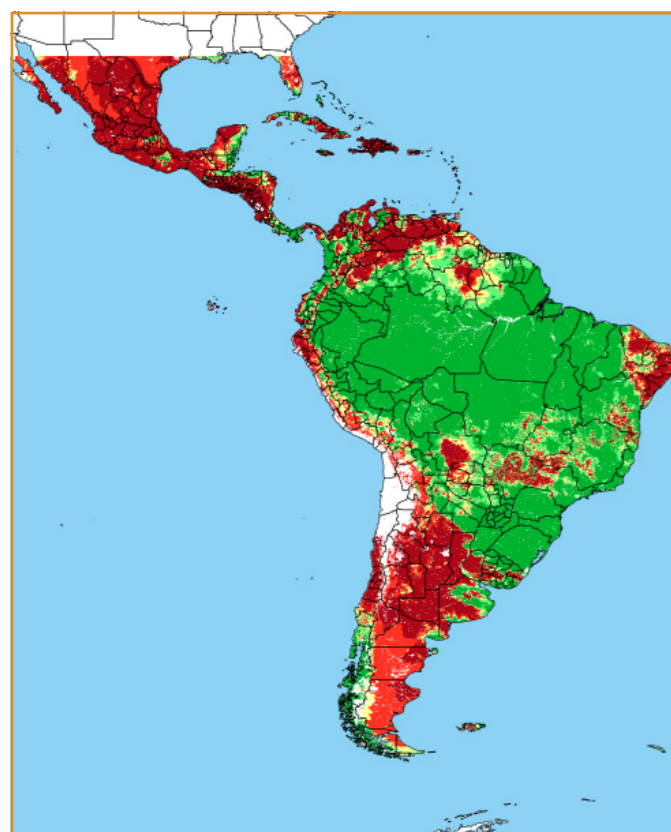
segunda-feira, 12 de março



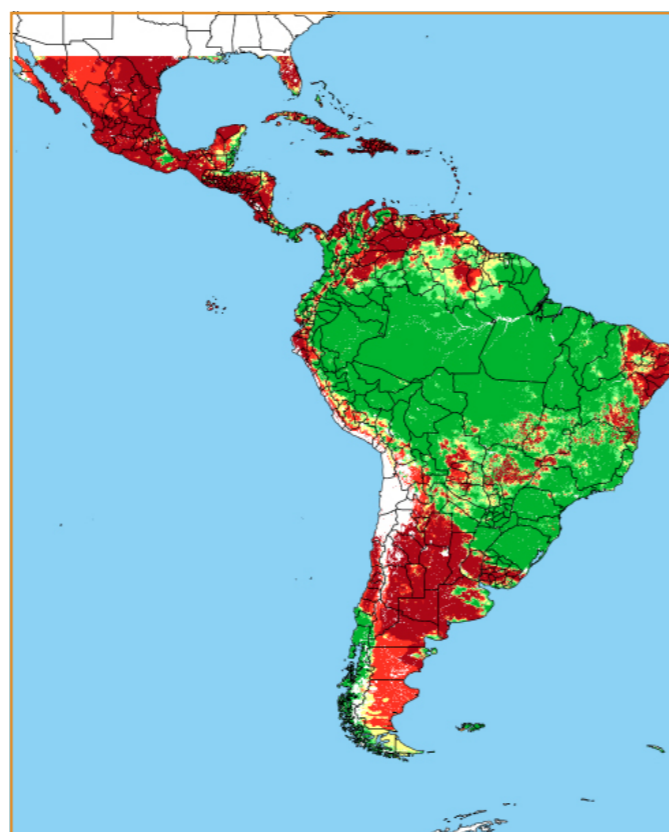
terça-feira, 13 de março



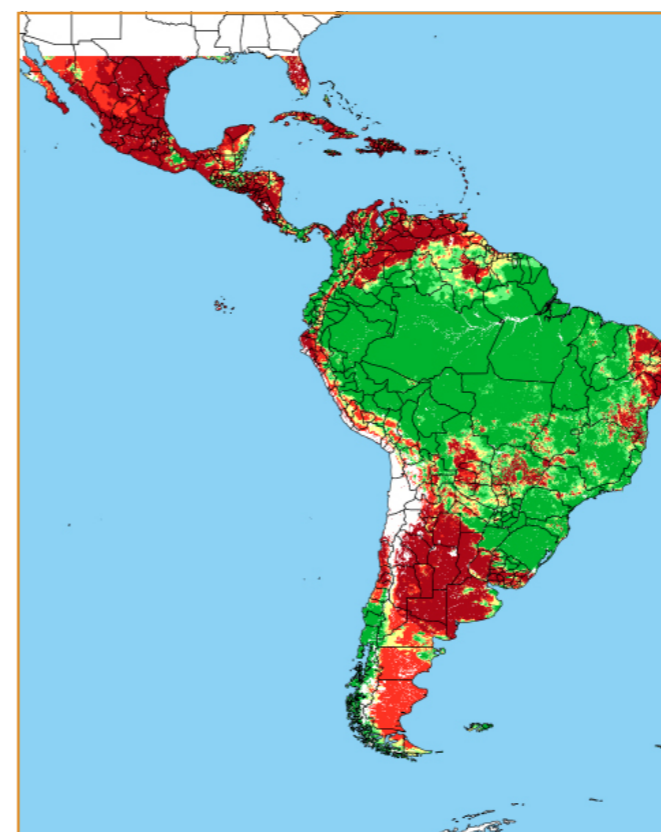
quarta-feira, 14 de março



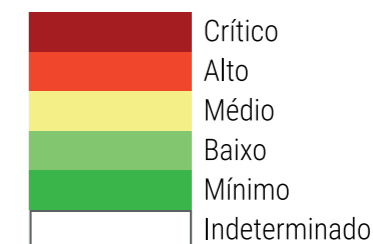
quinta-feira, 15 de março



sexta-feira, 16 de março



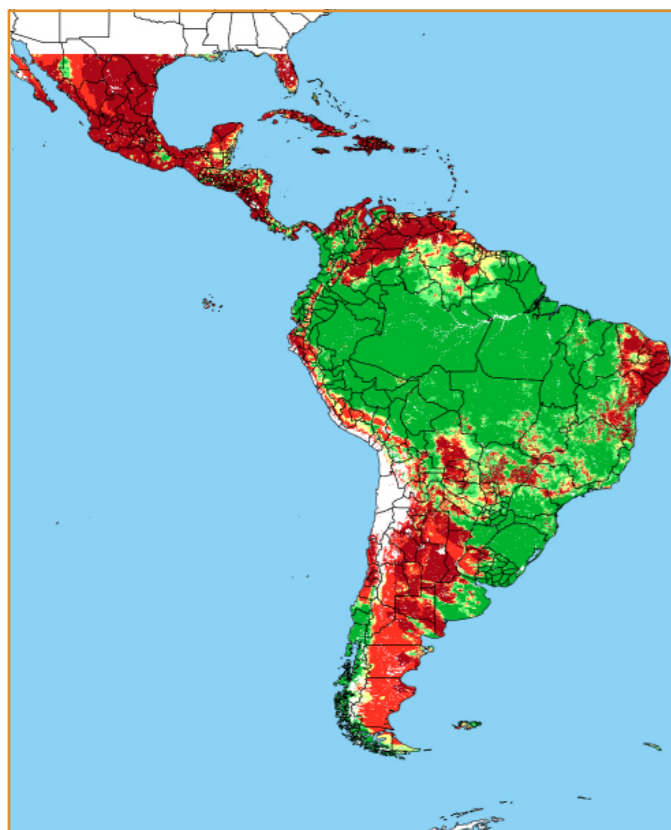
sábado, 17 de março



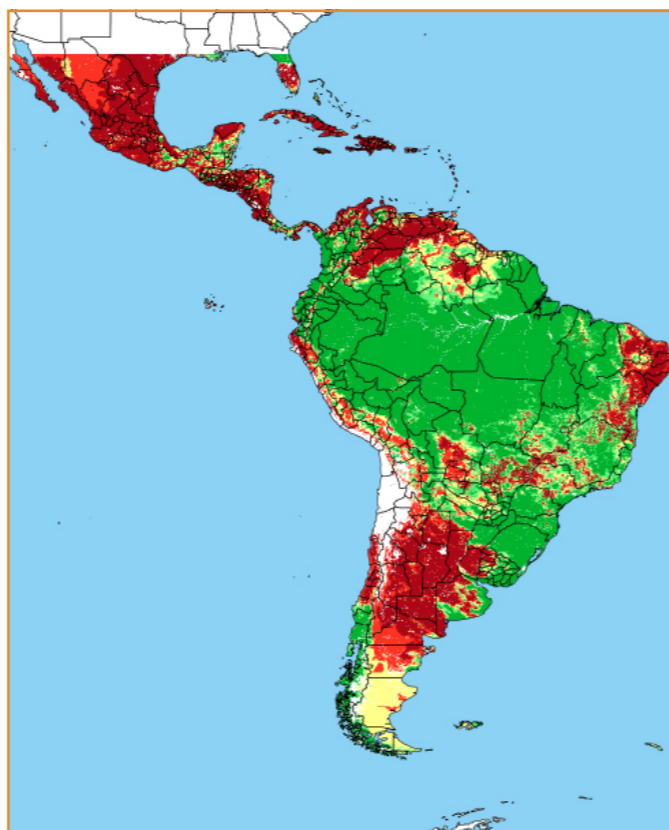
MARÇO / 2018

D	S	T	Q	Q	S	S
				60	61	62
63	64	65	66	67	68	69
70	71	72	73	74	75	76
77	78	79	80	81	82	83
84	85	86	87	88	89	90

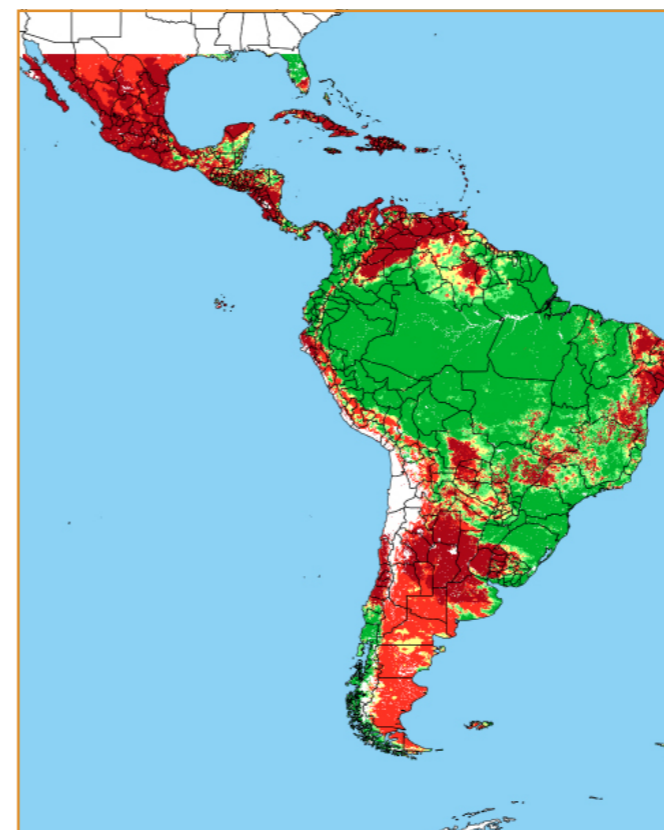
CALENDÁRIO JULIANO



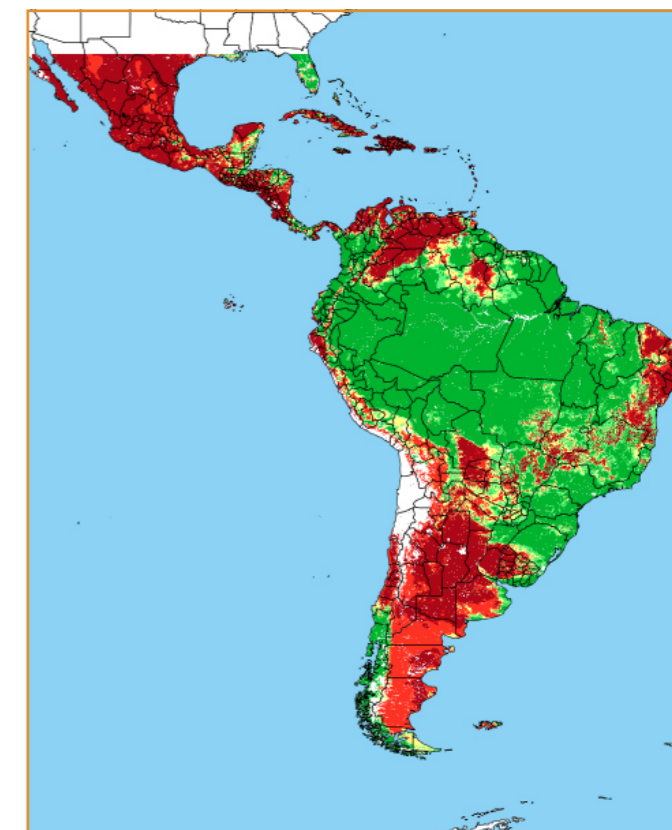
domingo, 18 de março



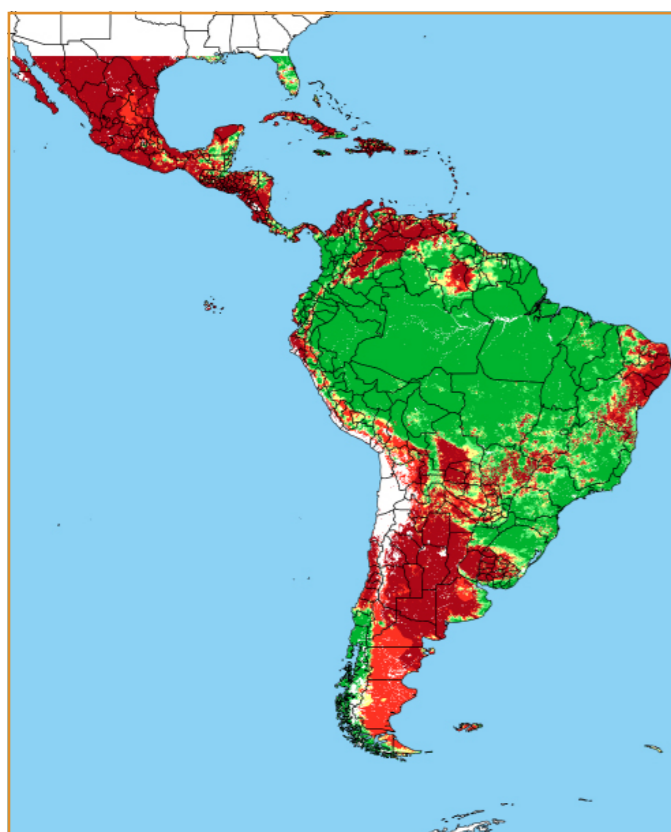
segunda-feira, 19 de março



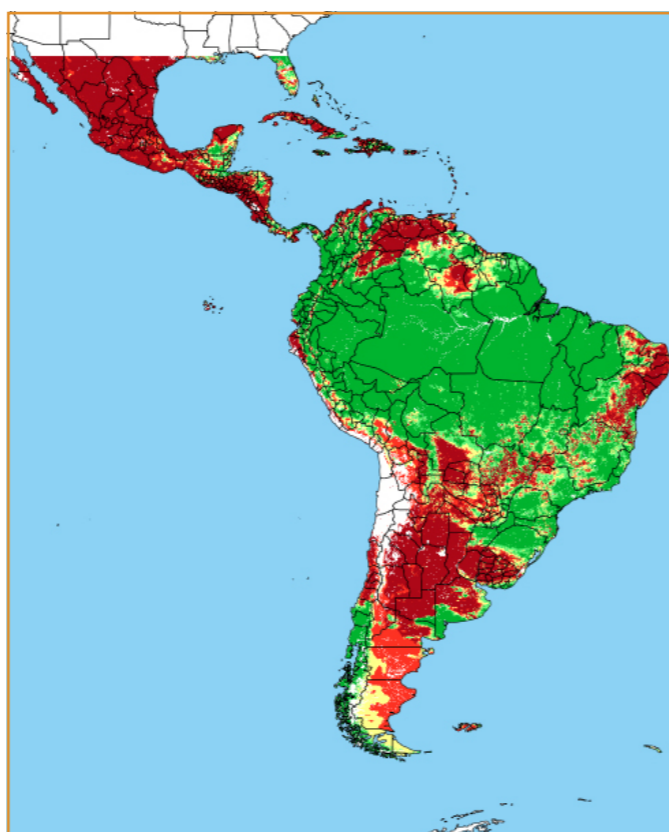
terça-feira, 20 de março



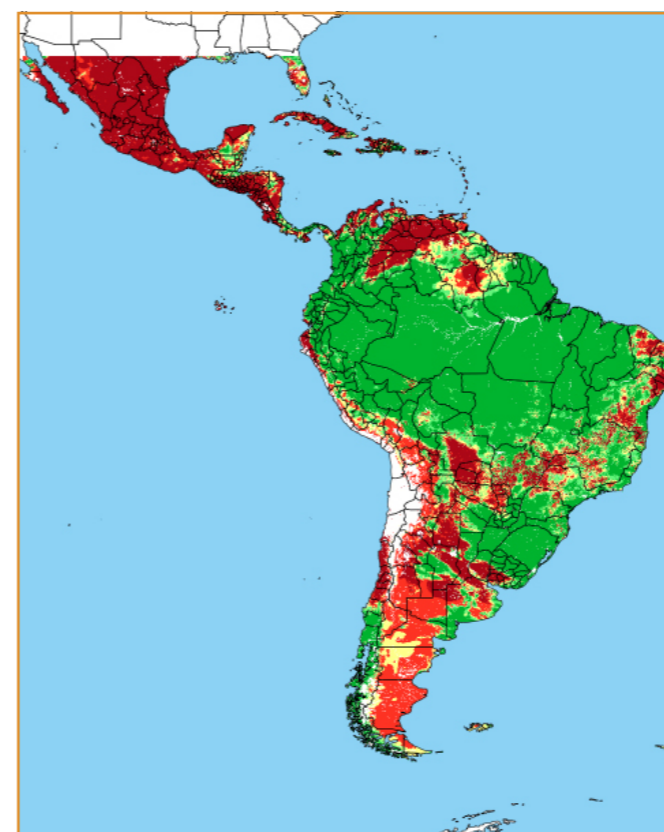
quarta-feira, 21 de março



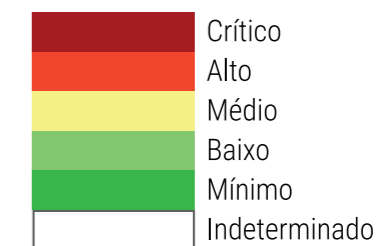
quinta-feira, 22 de março



sexta-feira, 23 de março

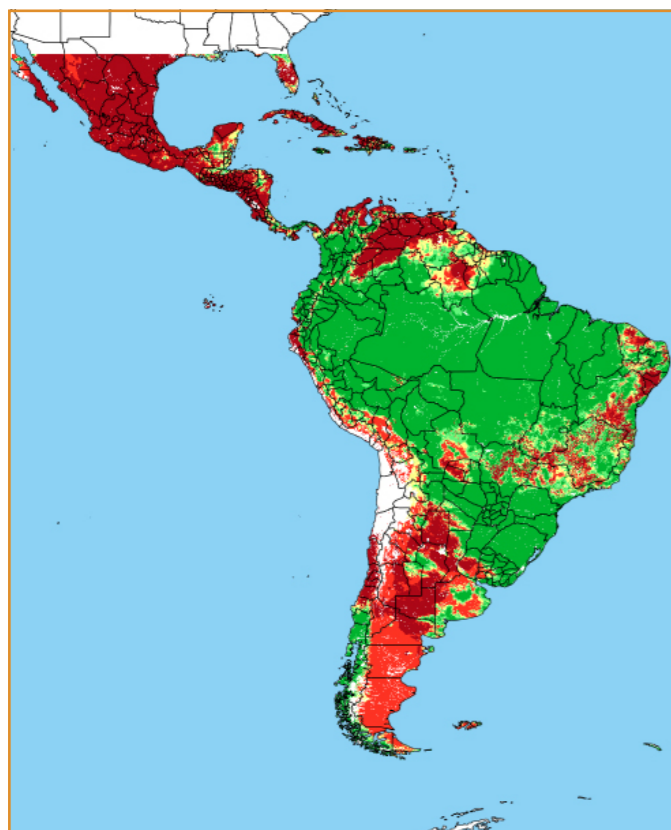


sábado, 24 de março

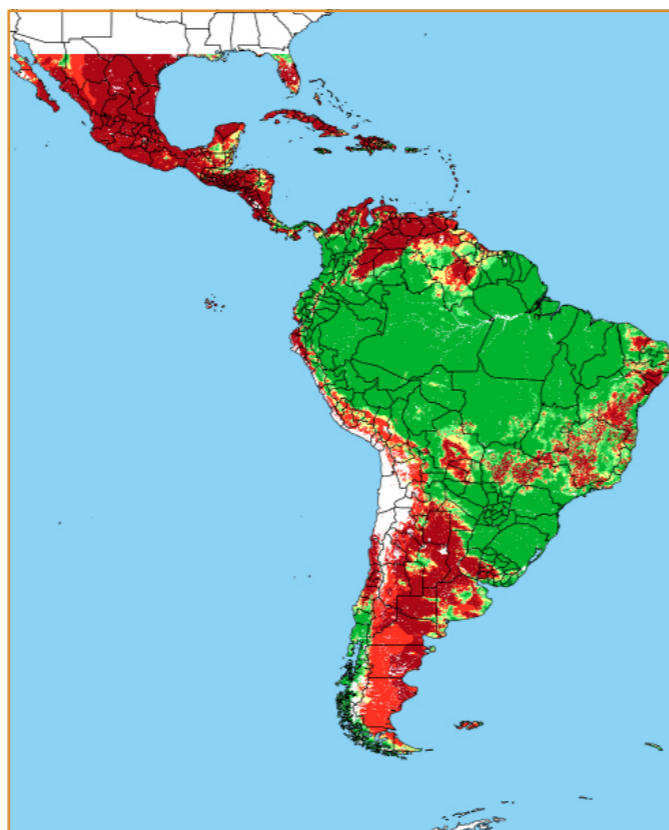


MARÇO / 2018						
D	S	T	Q	Q	S	S
				60	61	62
63	64	65	66	67	68	69
70	71	72	73	74	75	76
77	78	79	80	81	82	83
84	85	86	87	88	89	90

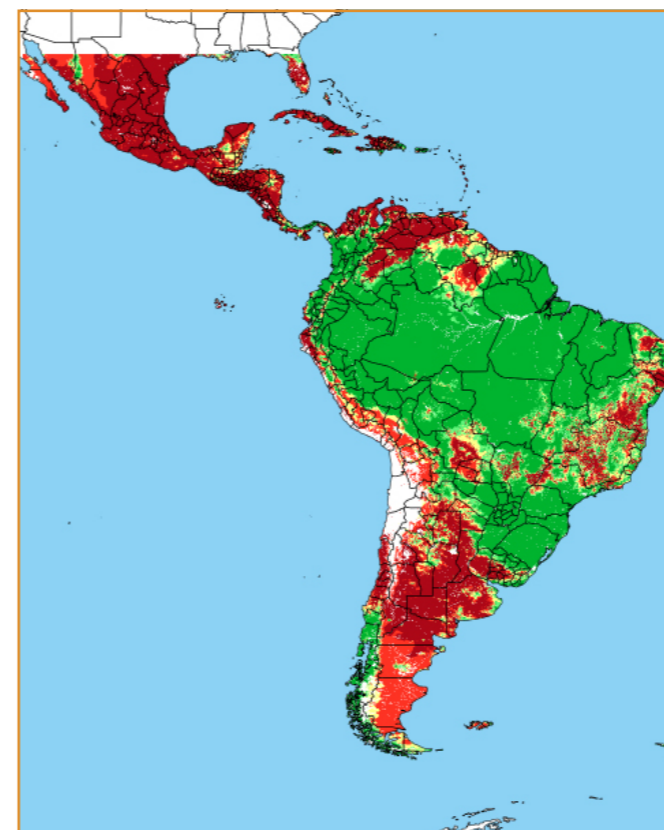
CALENDÁRIO JULIANO



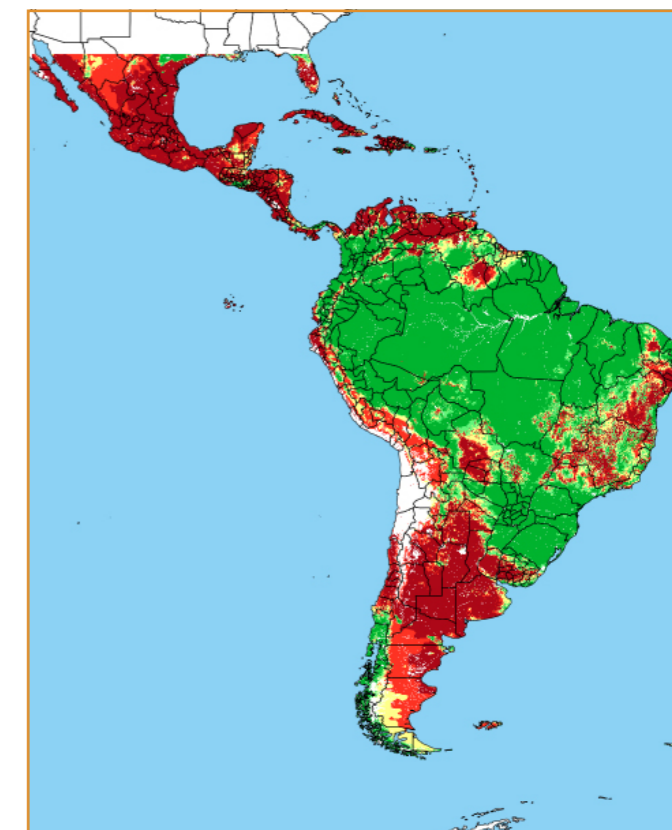
domingo, 25 de março



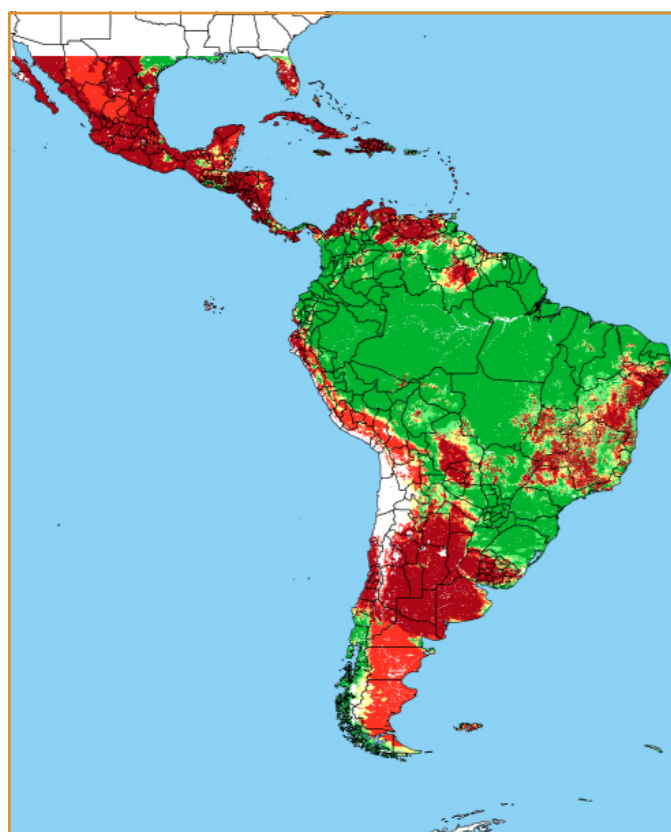
segunda-feira, 26 de março



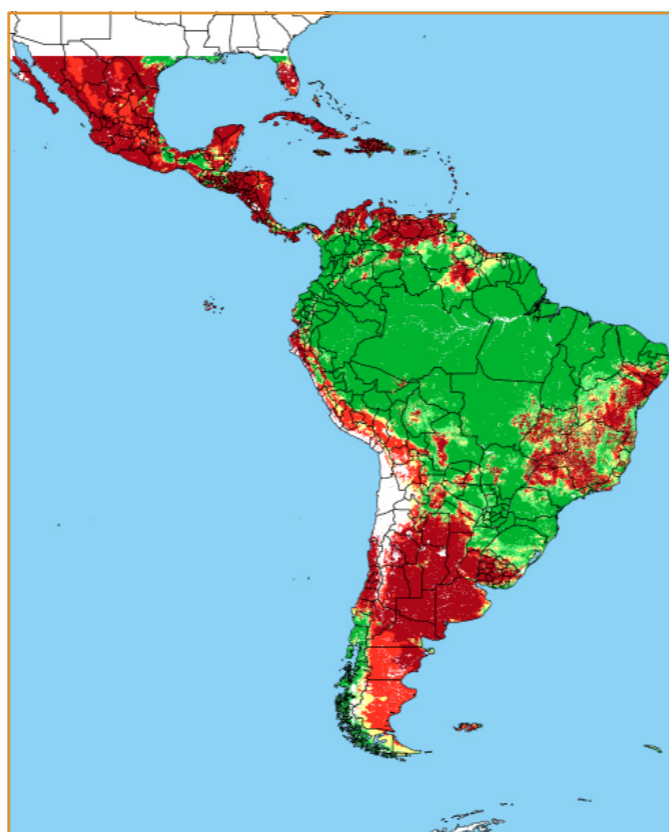
terça-feira, 27 de março



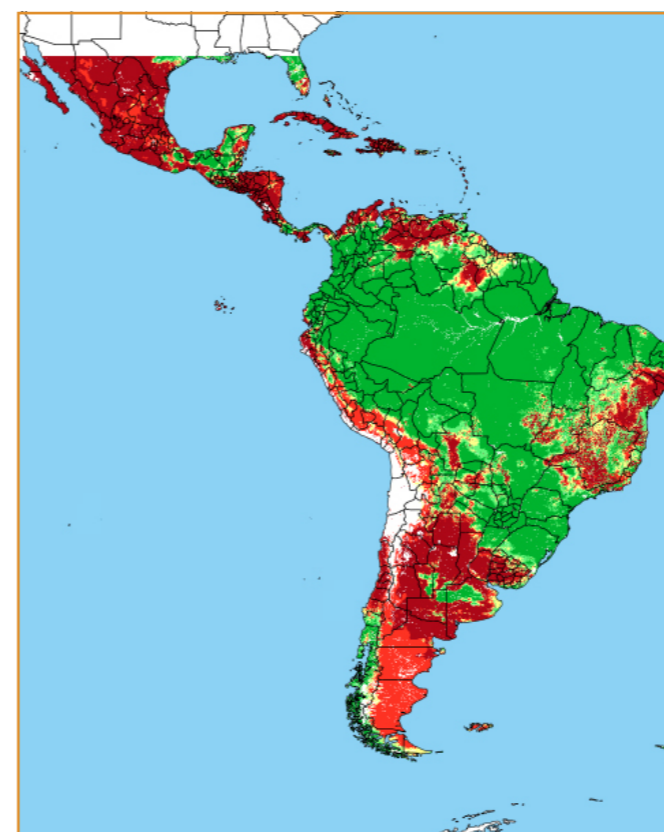
quarta-feira, 28 de março



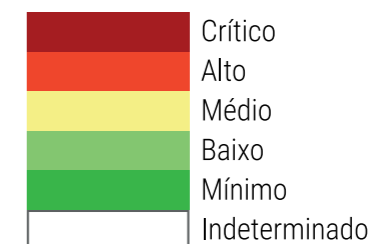
quinta-feira, 29 de março



sexta-feira, 30 de março



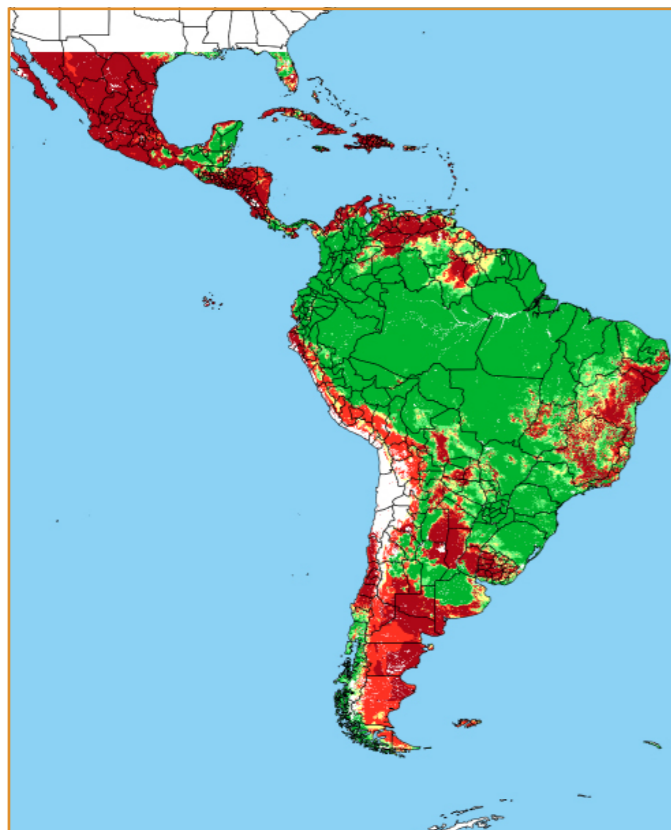
sábado, 31 de março



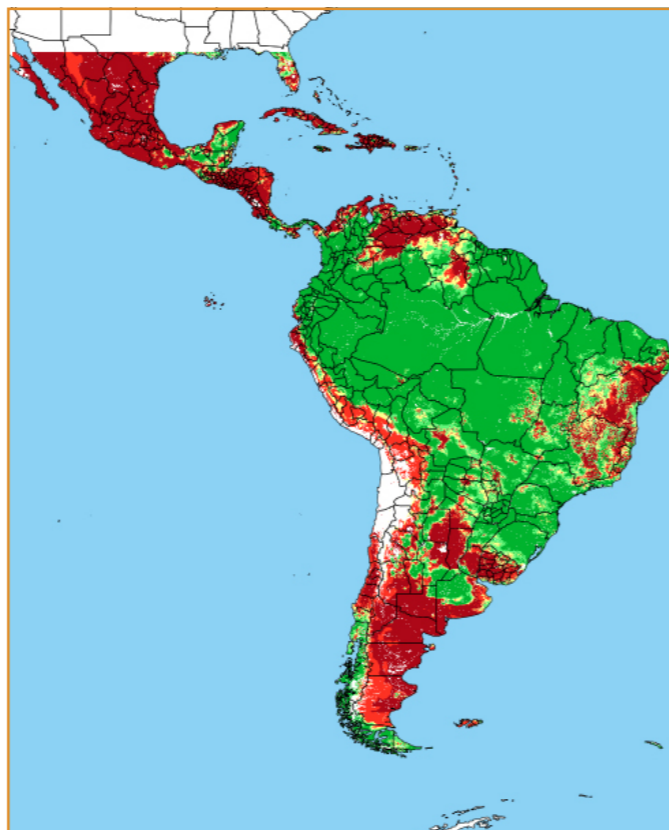
MARÇO / 2018

D	S	T	Q	Q	S	S
				60	61	62
63	64	65	66	67	68	69
70	71	72	73	74	75	76
77	78	79	80	81	82	83
84	85	86	87	88	89	90

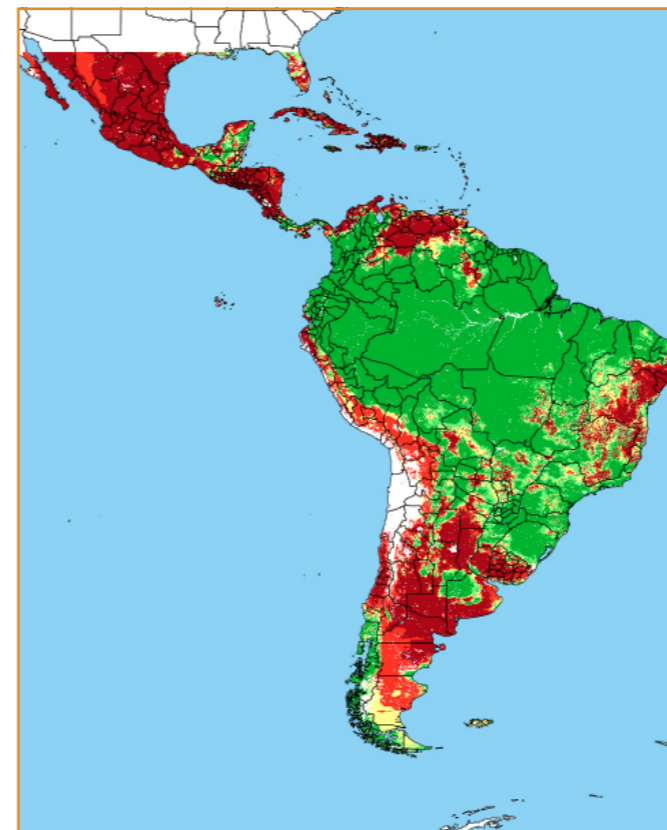
CALENDÁRIO JULIANO



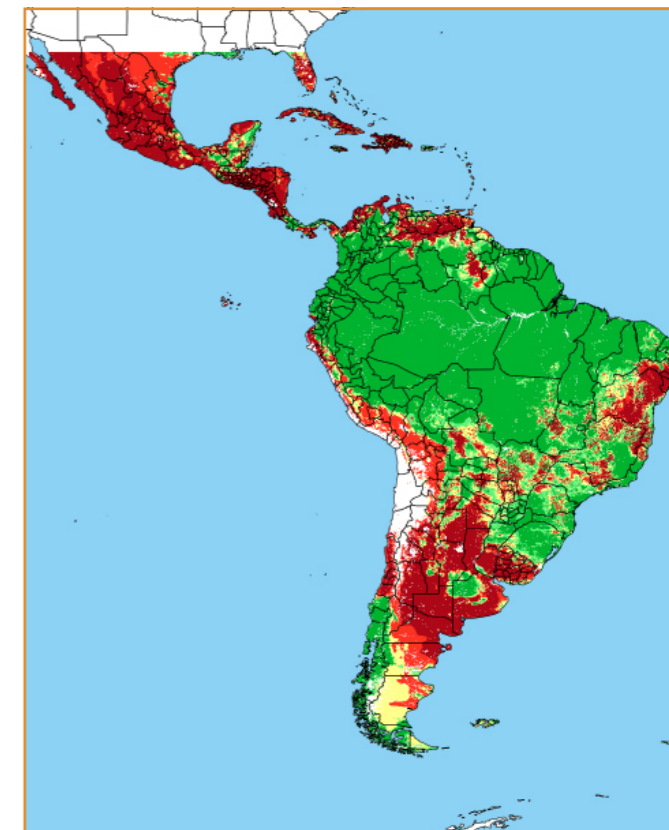
domingo, 1 de abril



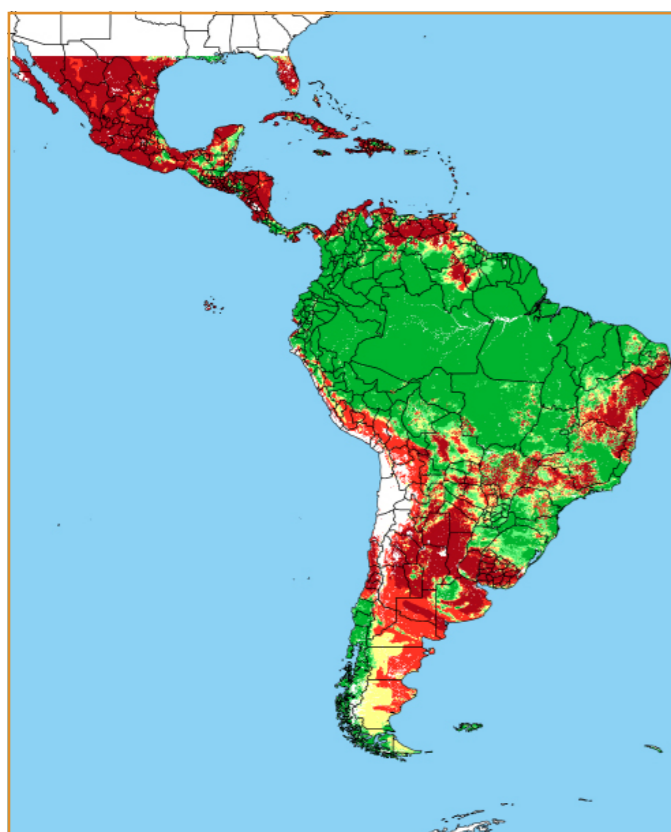
segunda-feira, 2 de abril



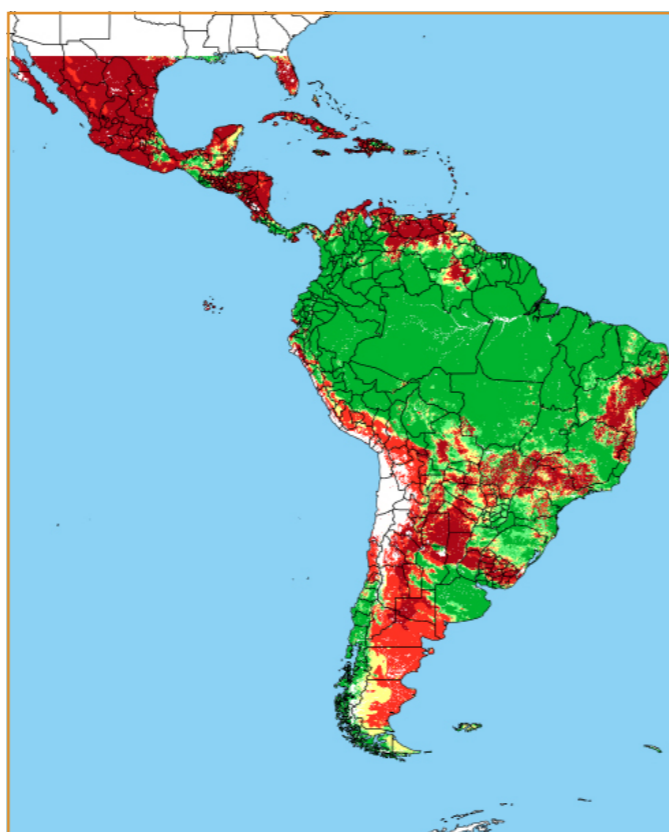
terça-feira, 3 de abril



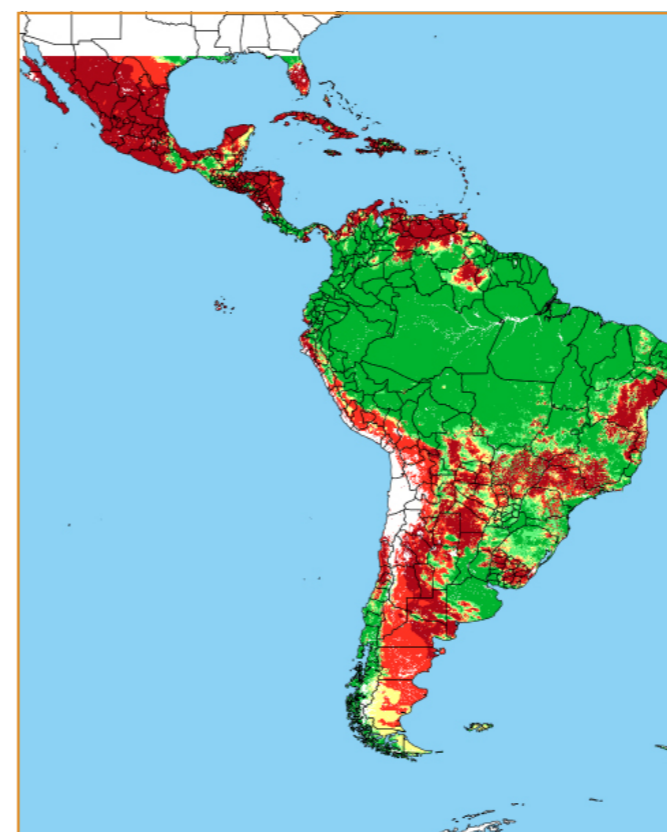
quarta-feira, 4 de abril



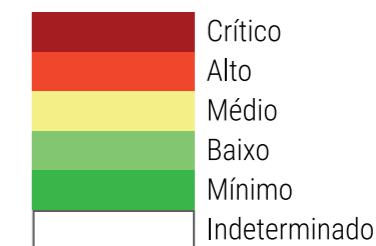
quinta-feira, 5 de abril



sexta-feira, 6 de abril



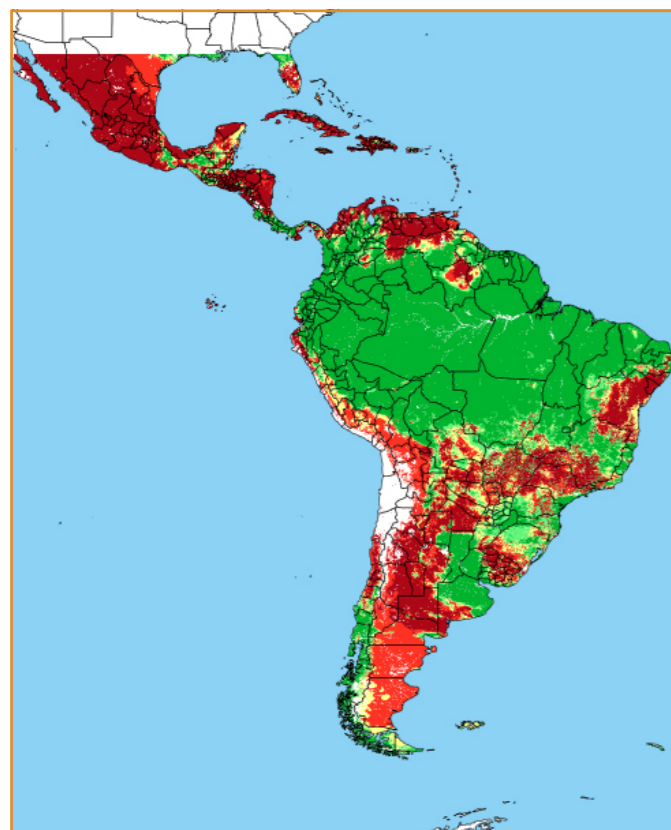
sábado, 7 de abril



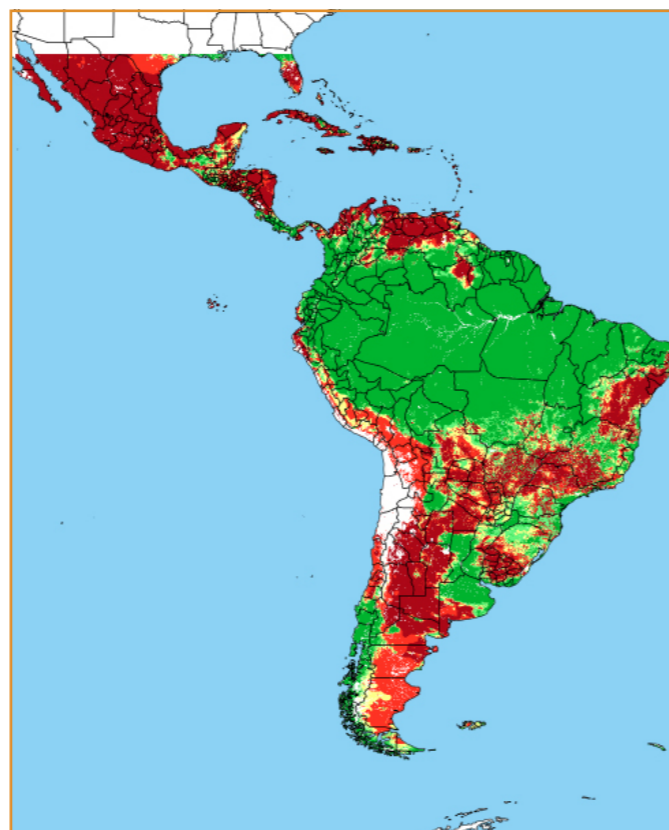
ABRIL / 2018

D	S	T	Q	Q	S	S
91	92	93	94	95	96	97
98	99	100	101	102	103	104
105	106	107	108	109	110	111
112	113	114	115	116	117	118
119	120					

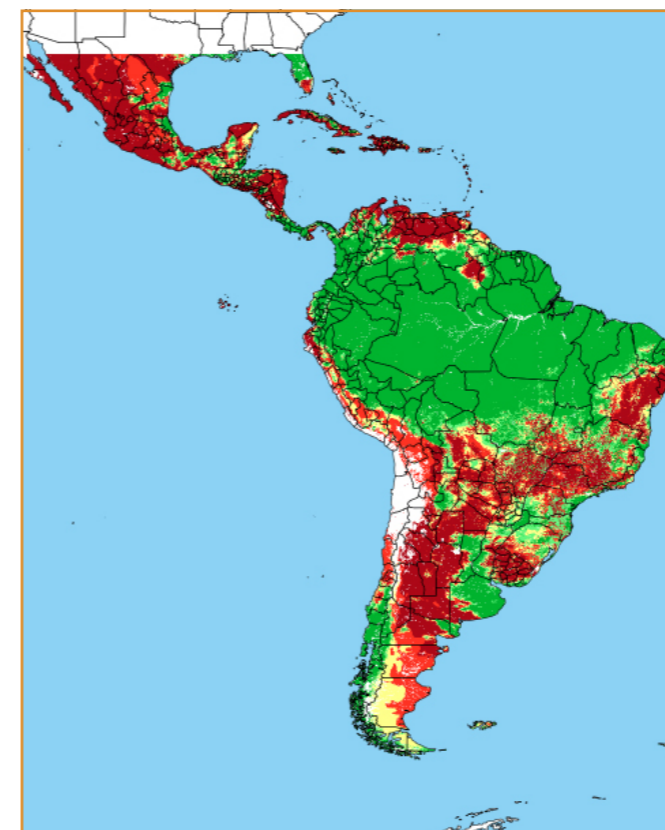
CALENDÁRIO JULIANO



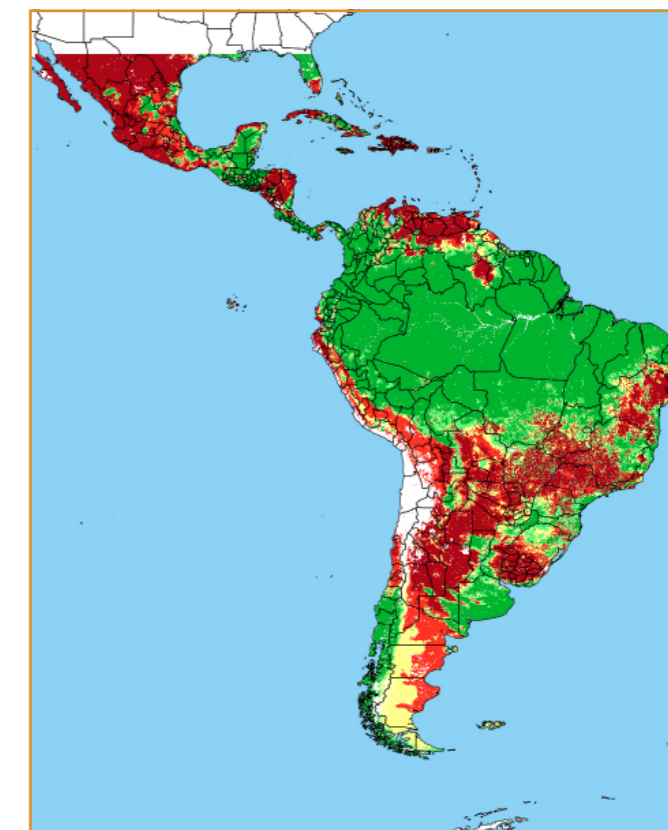
domingo, 8 de abril



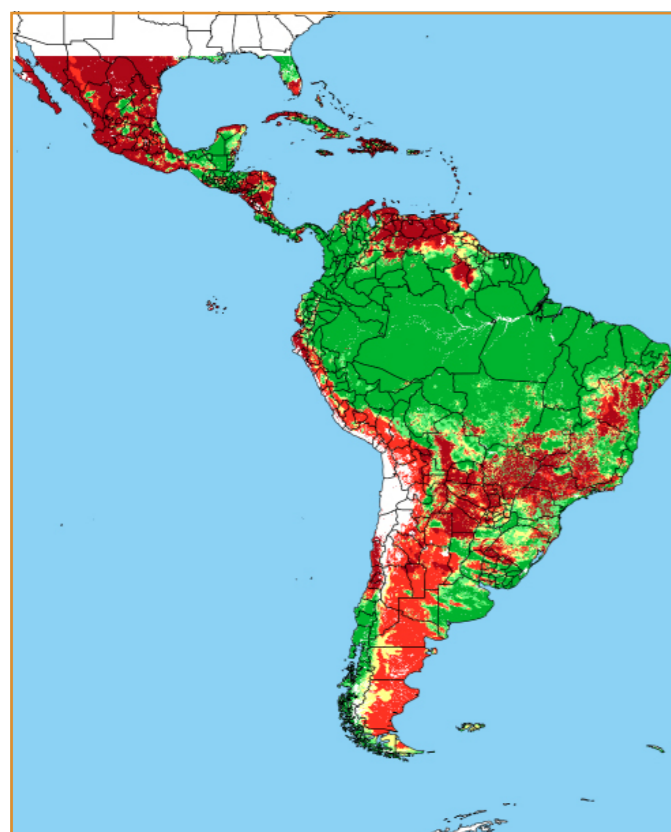
segunda-feira, 9 de abril



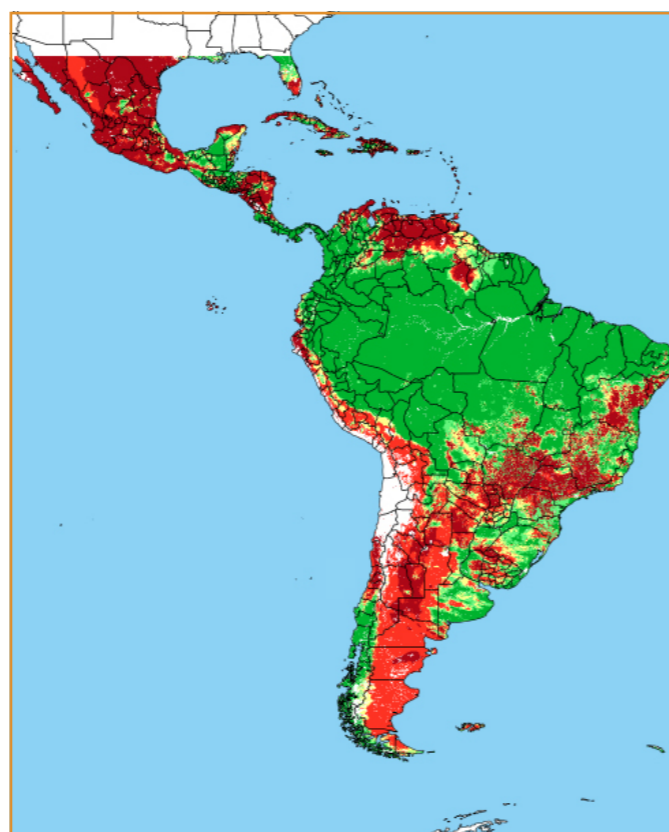
terça-feira, 10 de abril



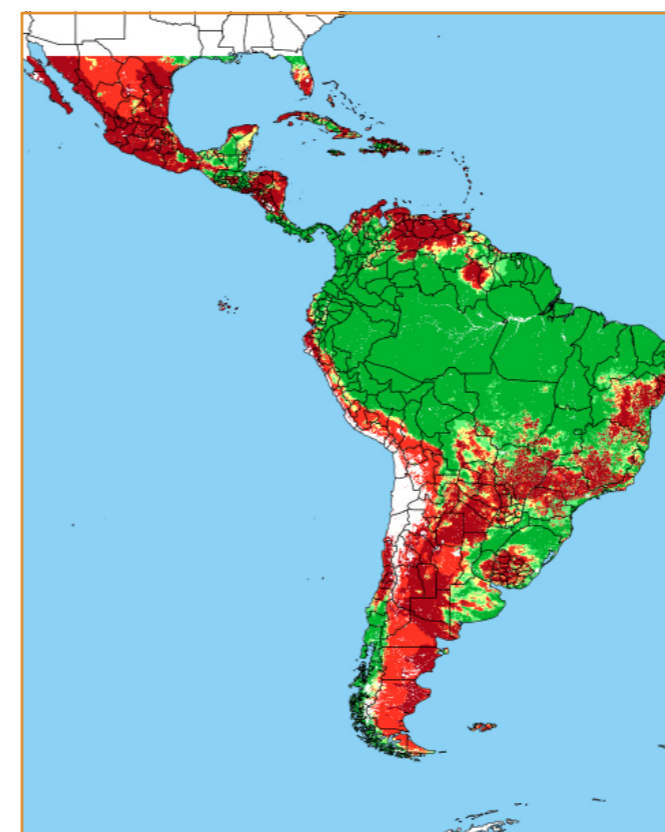
quarta-feira, 11 de abril



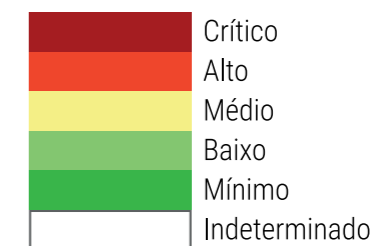
quinta-feira, 12 de abril



sexta-feira, 13 de abril

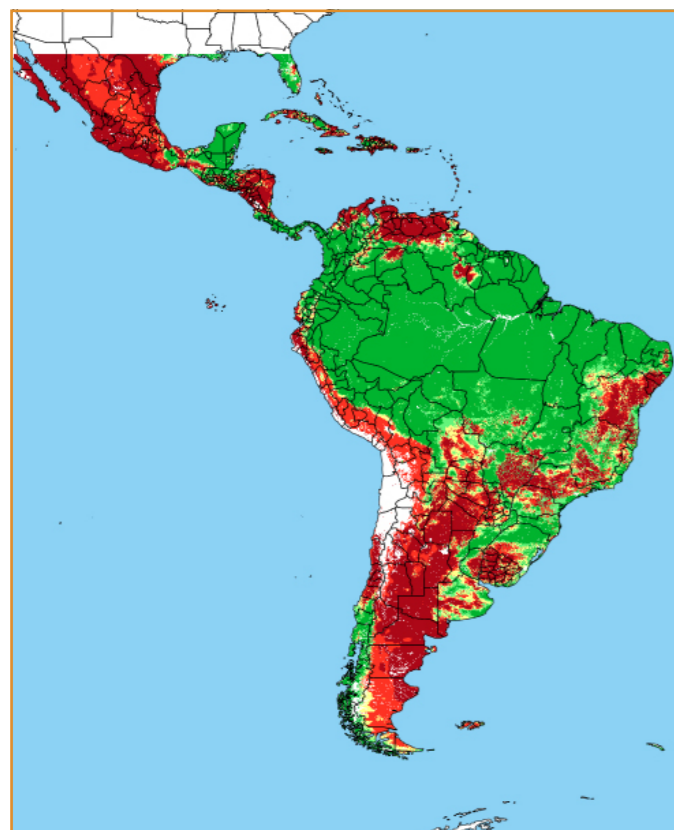


sábado, 14 de abril

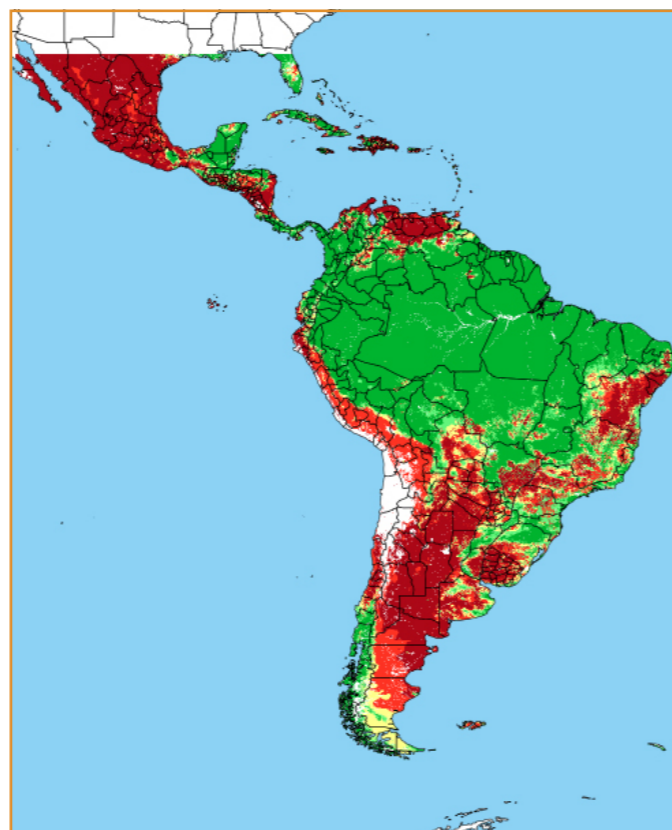


ABRIL / 2018						
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119	120					

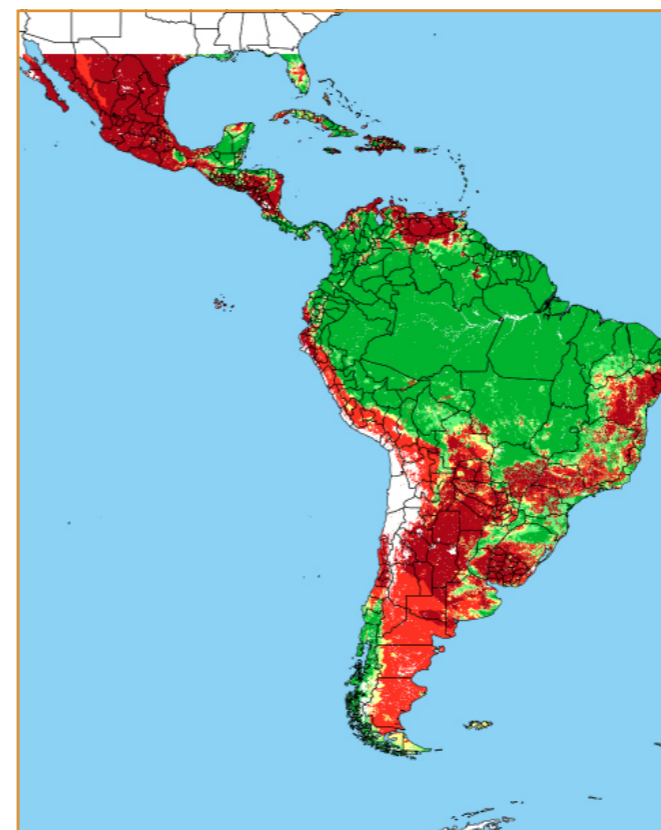
CALENDÁRIO JULIANO



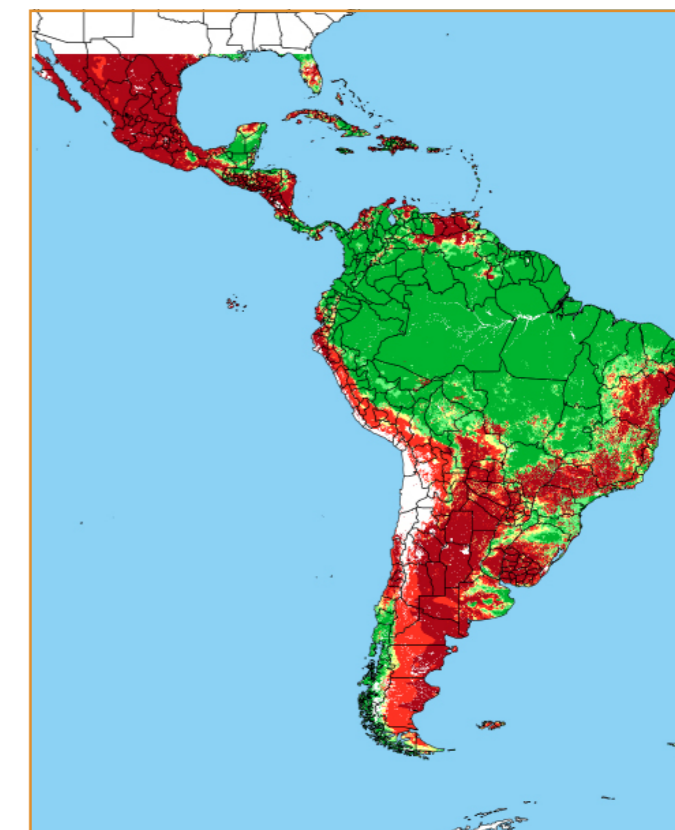
domingo, 15 de abril



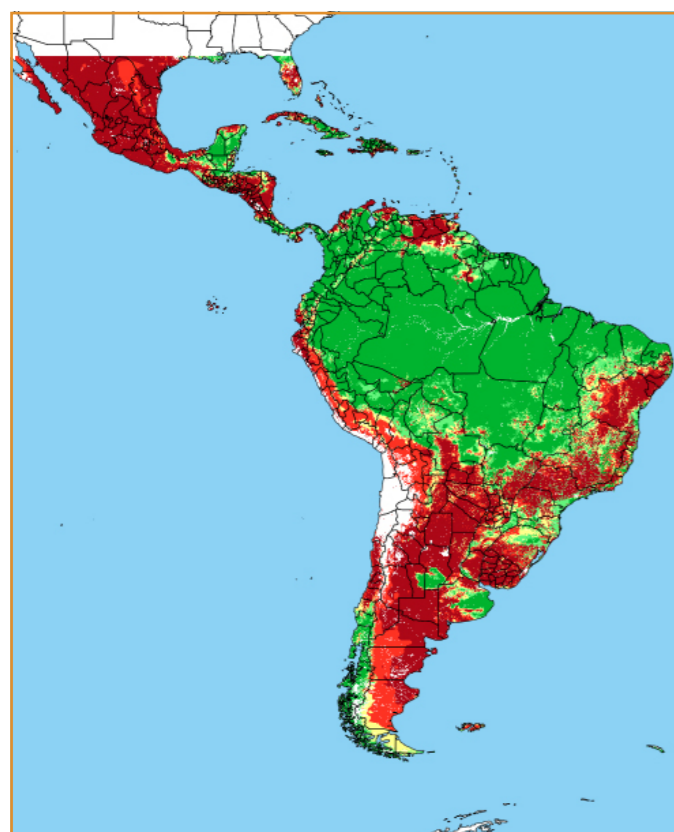
segunda-feira, 16 de abril



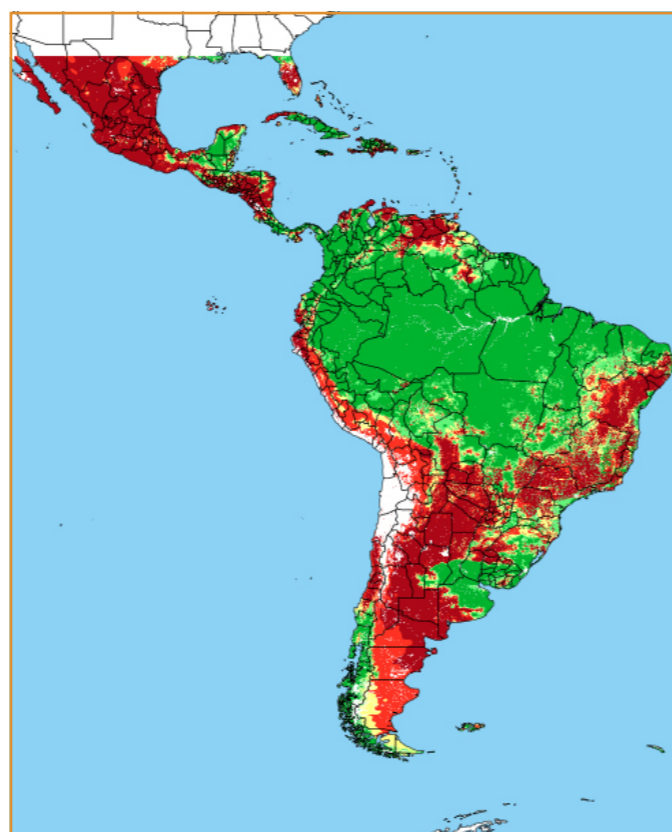
terça-feira, 17 de abril



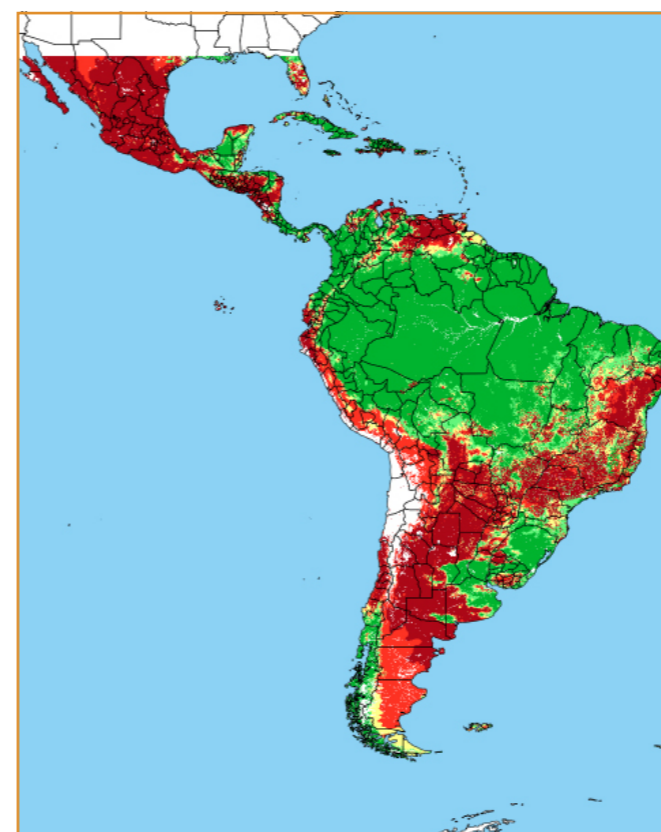
quarta-feira, 18 de abril



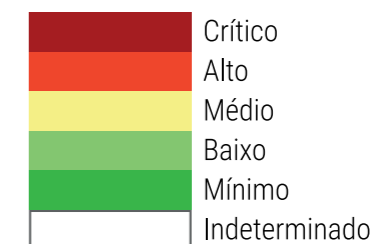
quinta-feira, 19 de abril



sexta-feira, 20 de abril



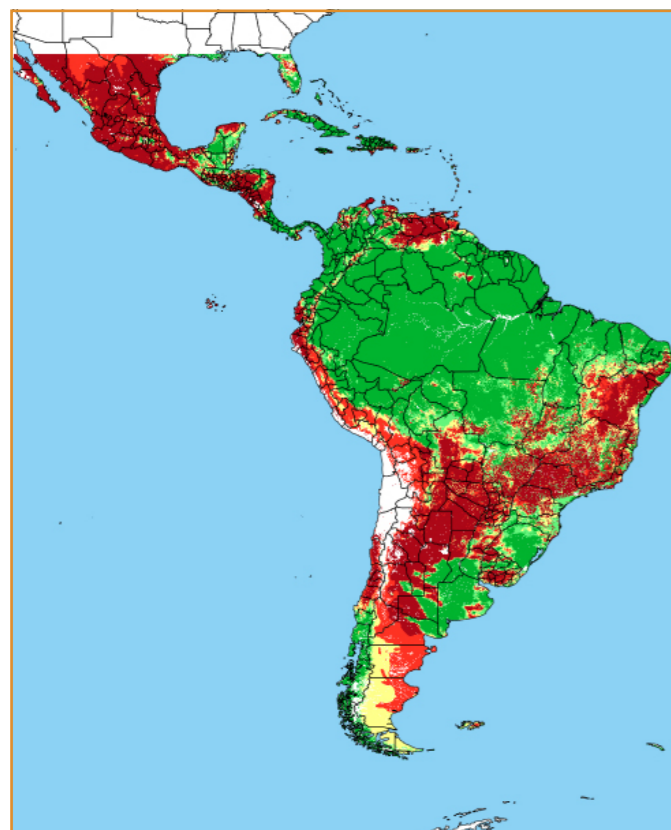
sábado, 21 de abril



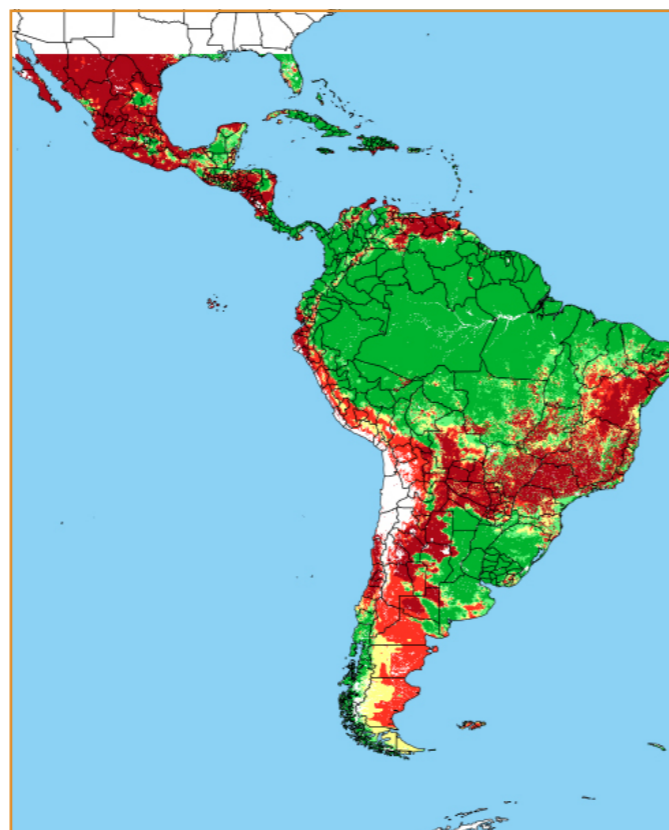
ABRIL / 2018

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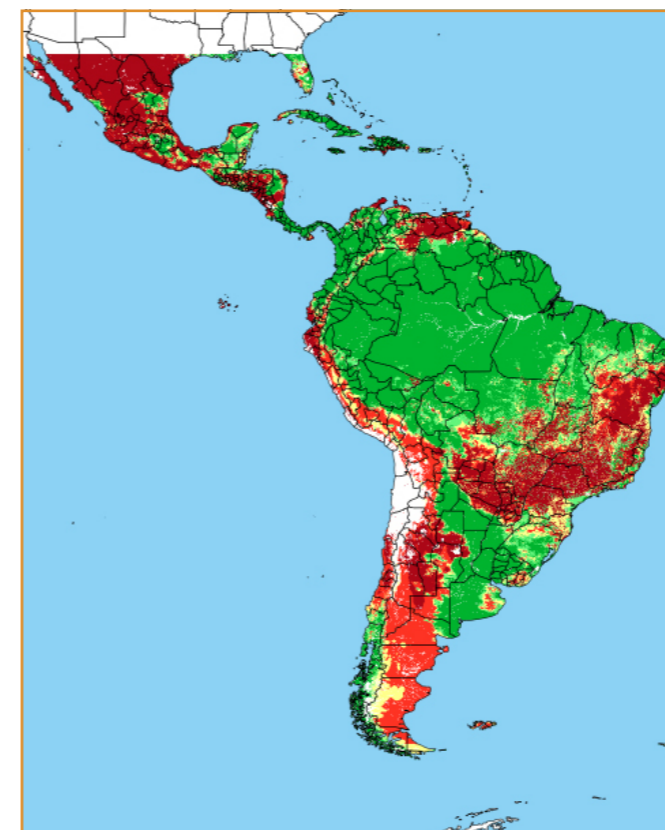
CALENDÁRIO JULIANO



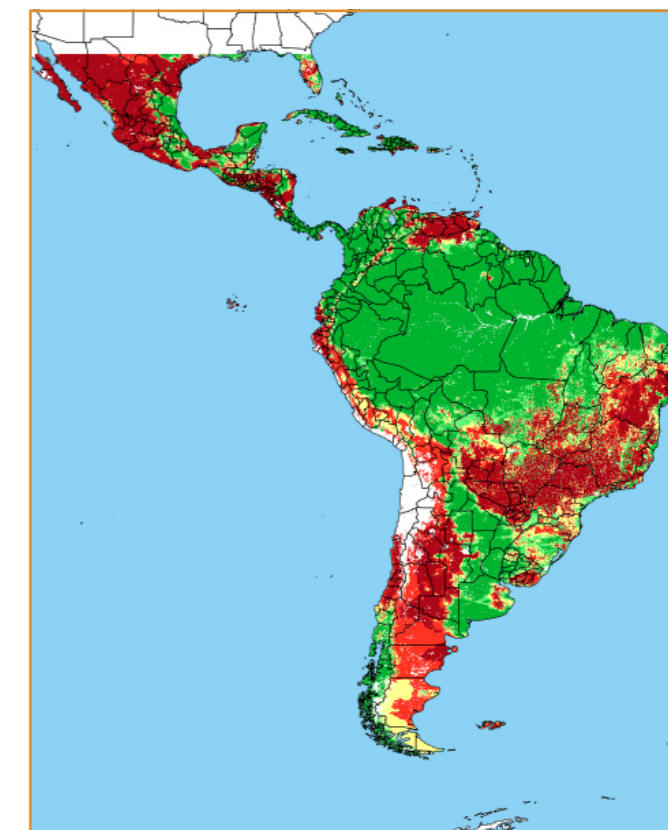
domingo, 22 de abril



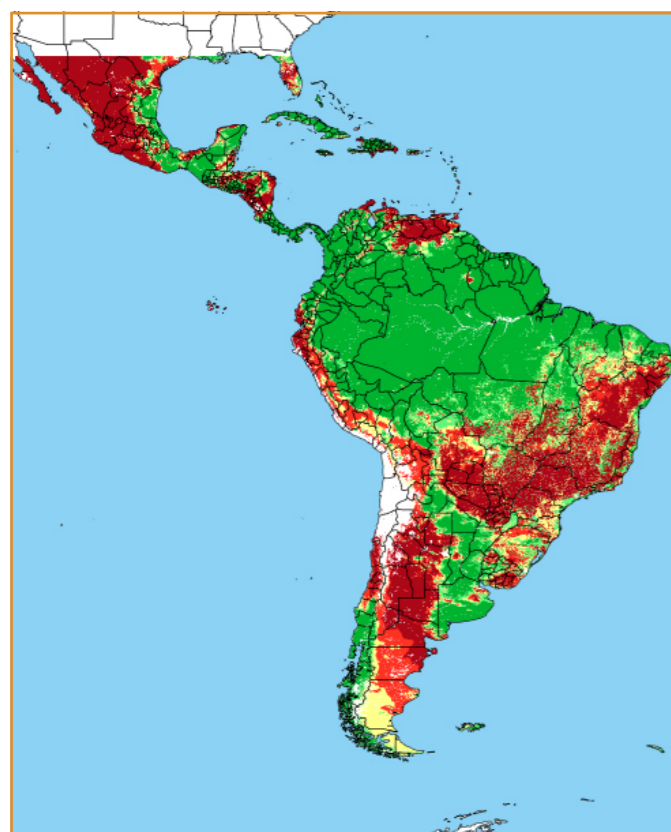
segunda-feira, 23 de abril



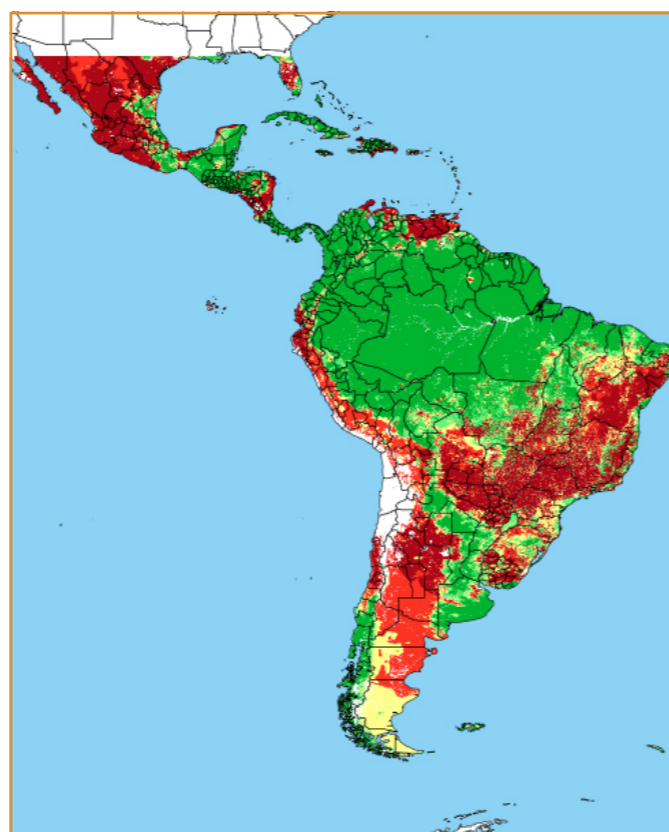
terça-feira, 24 de abril



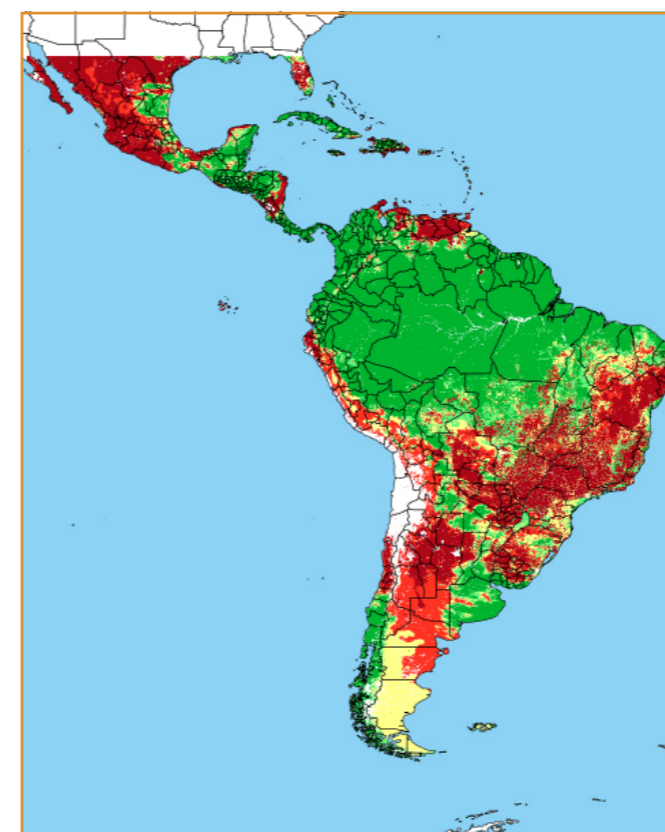
quarta-feira, 25 de abril



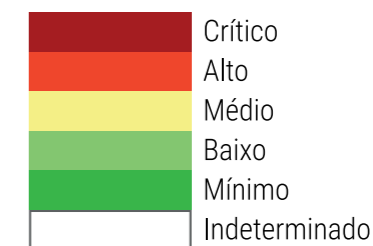
quinta-feira, 26 de abril



sexta-feira, 27 de abril

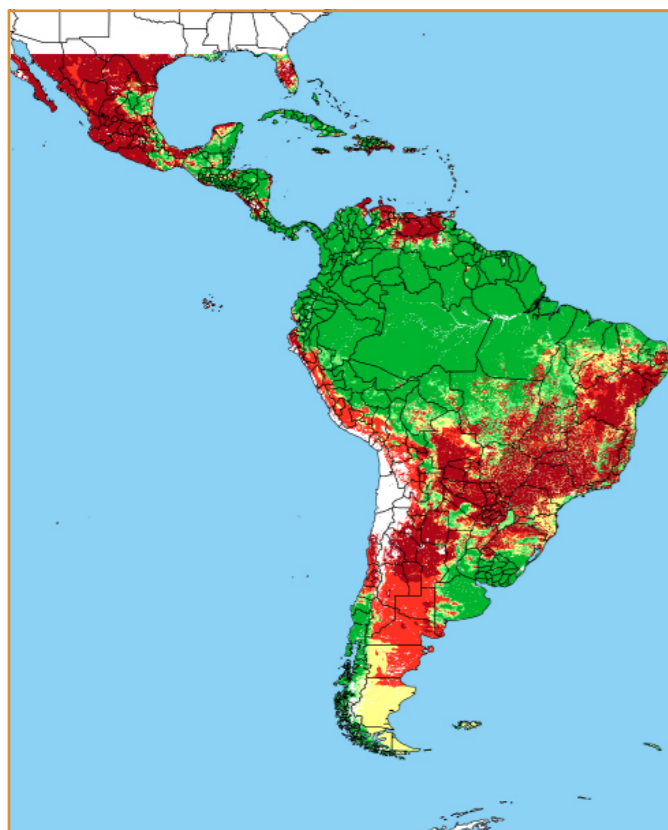


sábado, 28 de abril

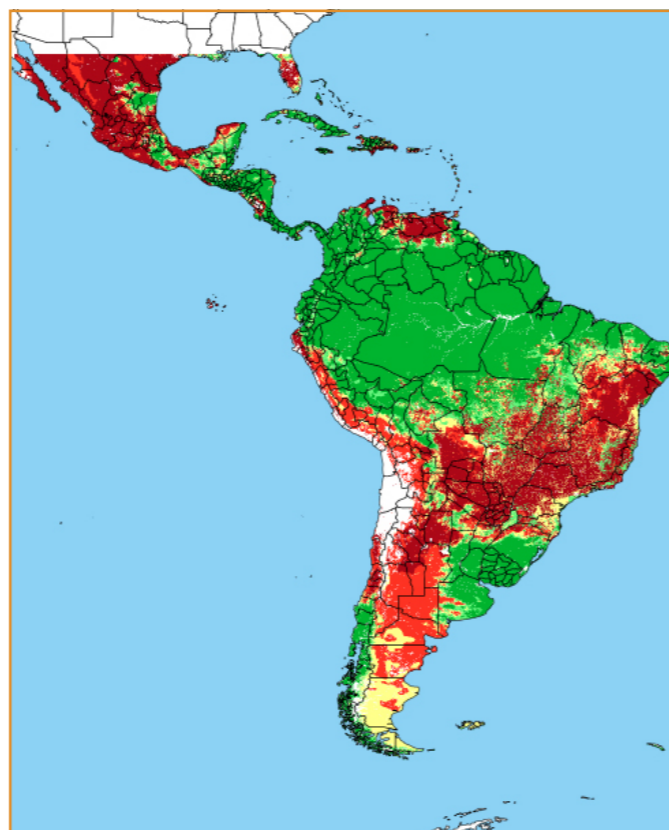


ABRIL / 2018						
D	S	T	Q	Q	S	S
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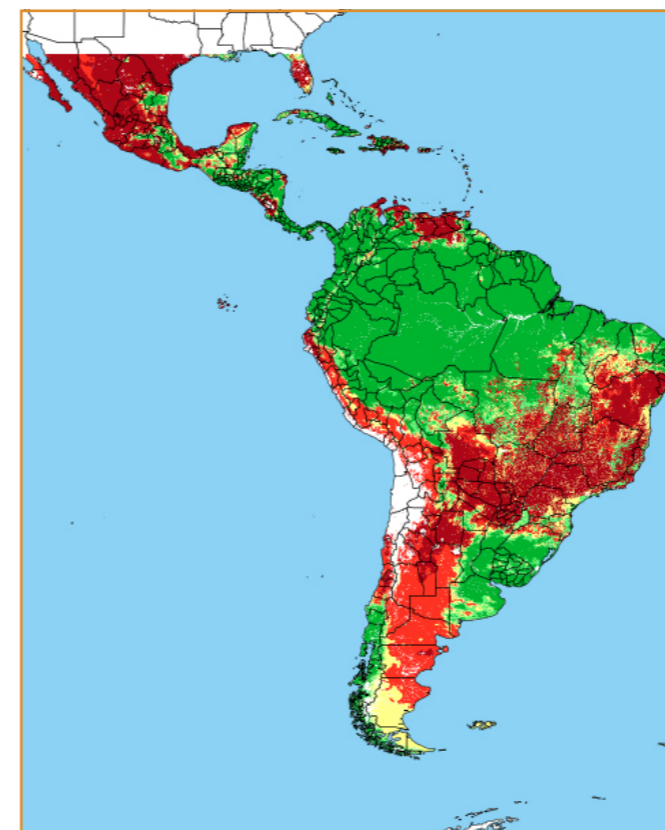
CALENDÁRIO JULIANO



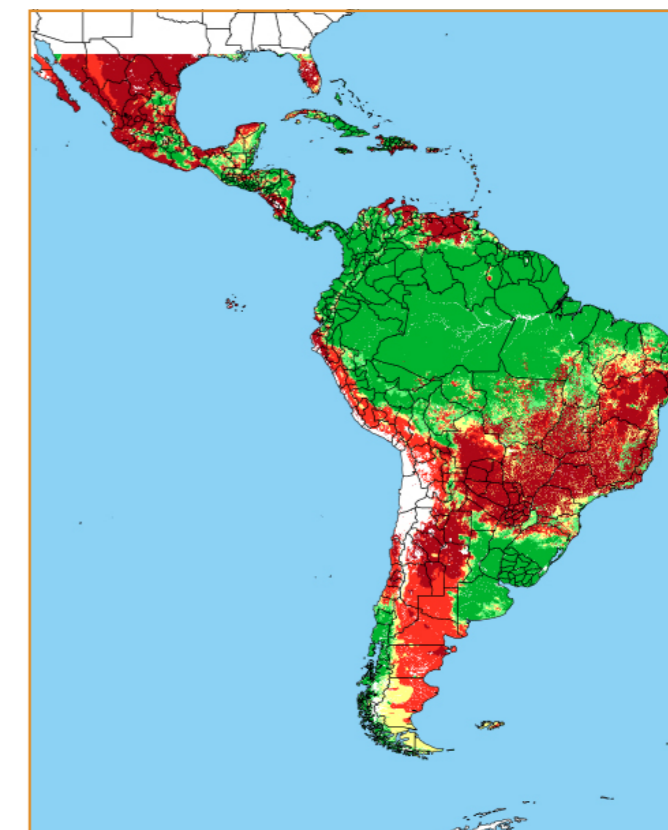
domingo, 29 de abril



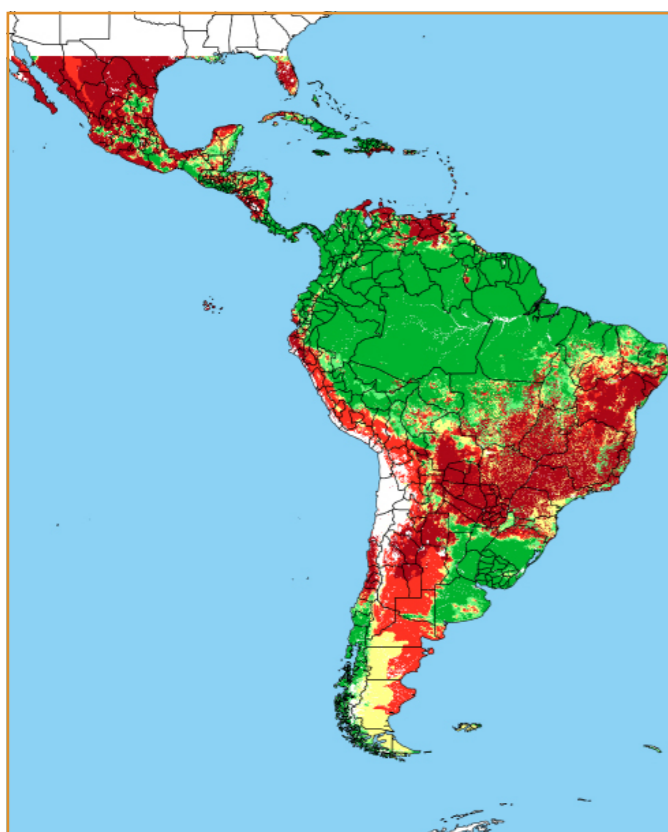
segunda-feira, 30 de abril



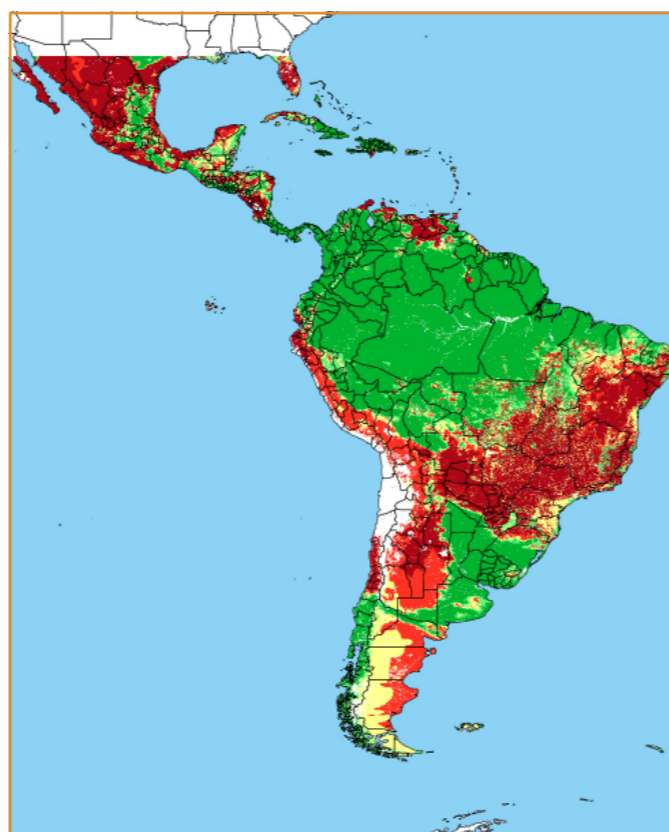
terça-feira, 1 de maio



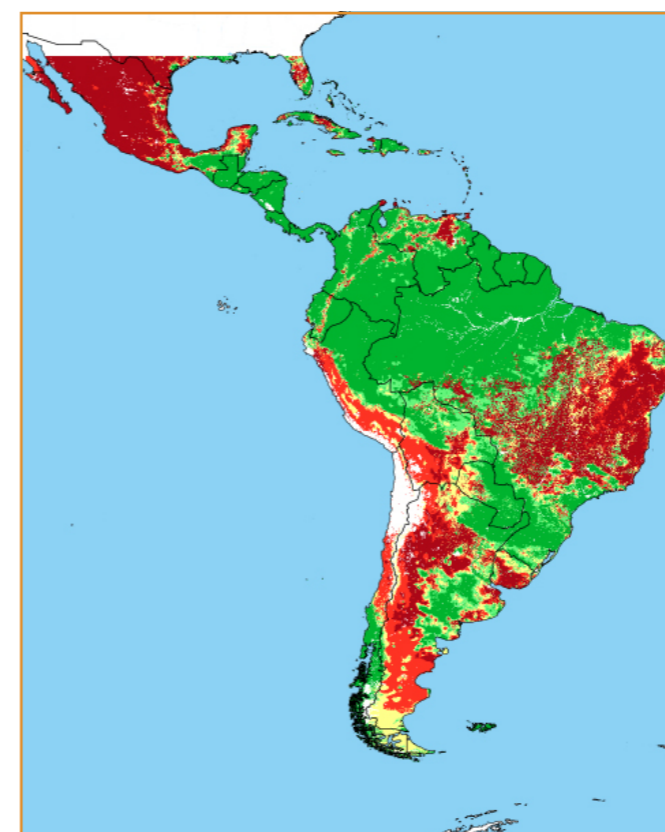
quarta-feira, 2 de maio



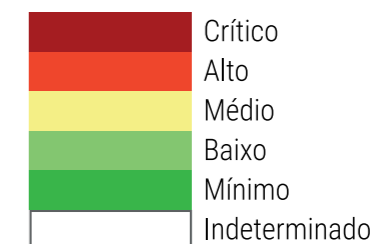
quinta-feira, 3 de maio



sexta-feira, 4 de maio



sábado, 5 de maio

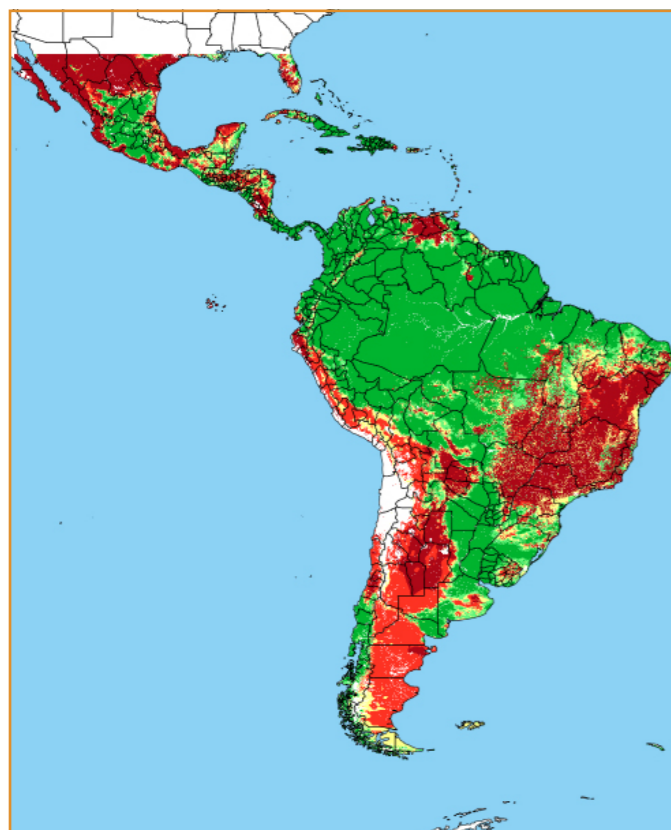


MAIO / 2018

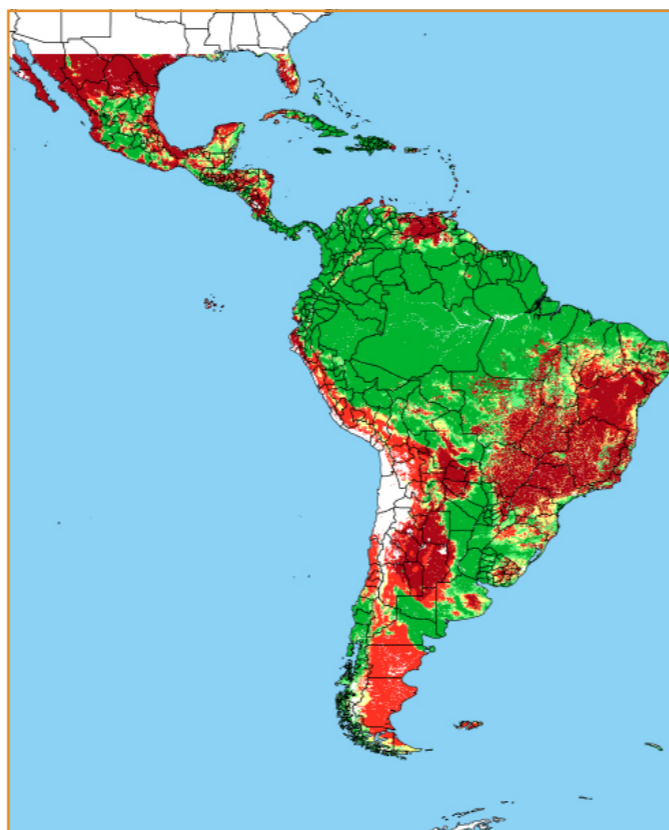
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CALENDÁRIO JULIANO

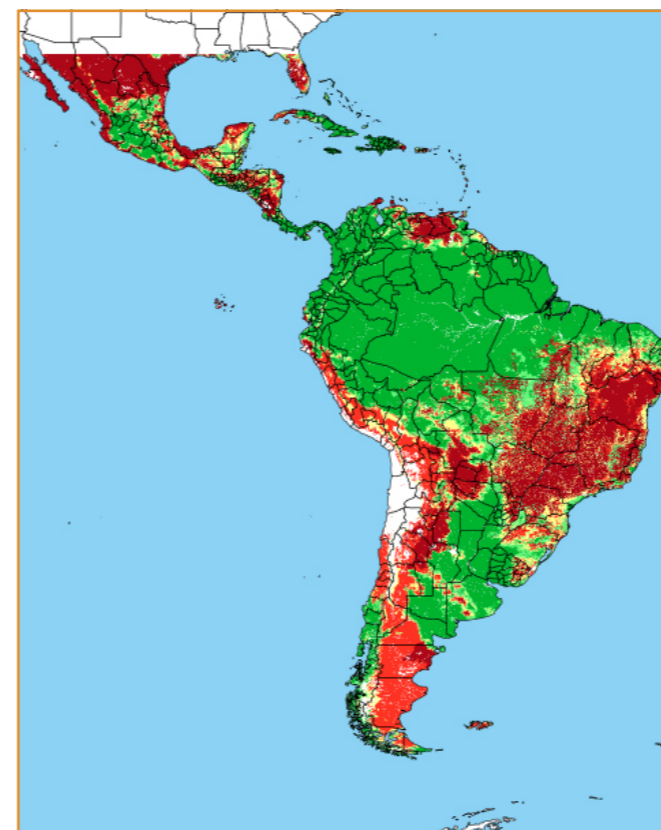




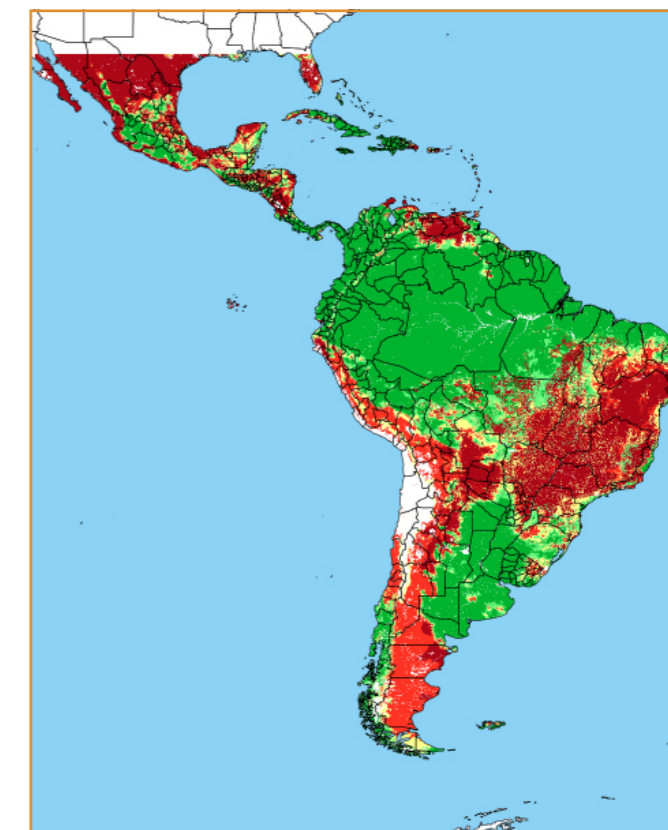
domingo, 6 de maio



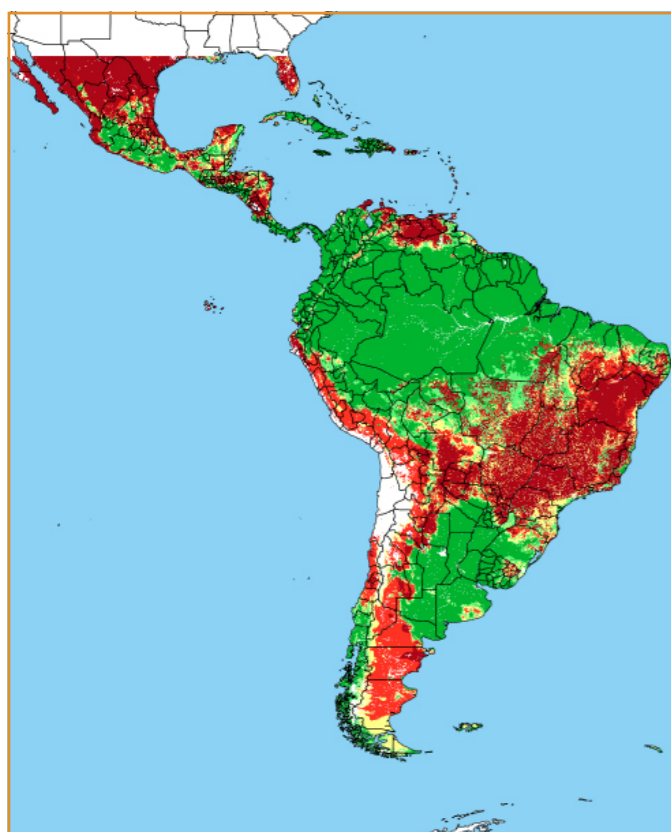
segunda-feira, 7 de maio



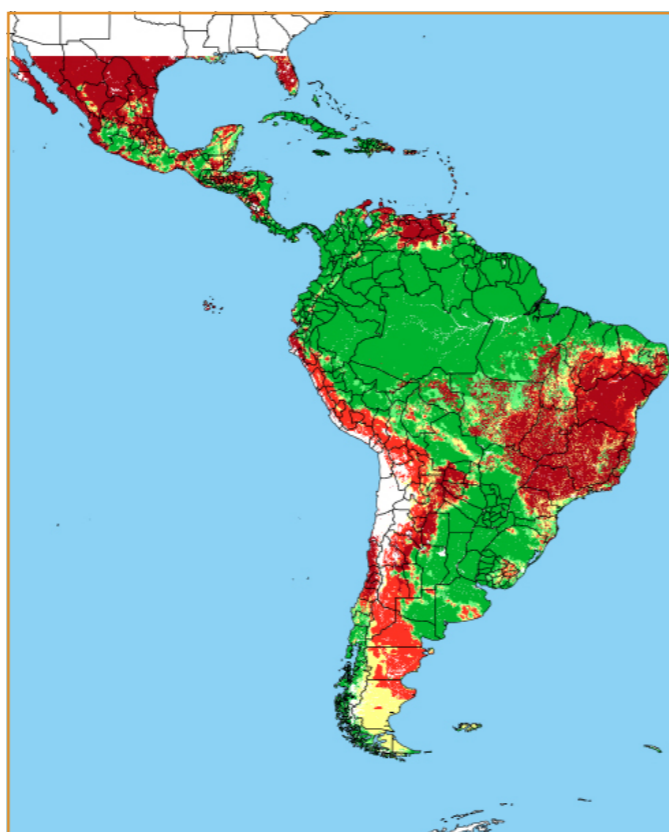
terça-feira, 8 de maio



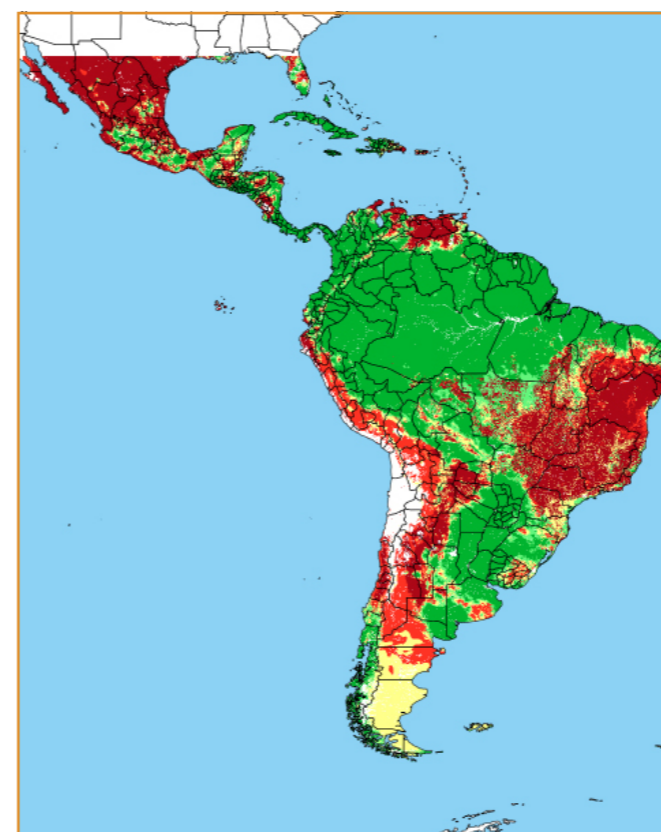
quarta-feira, 9 de maio



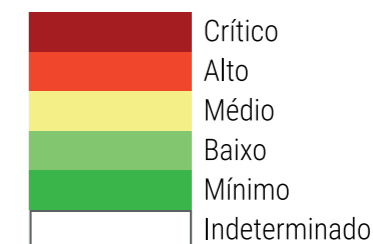
quinta-feira, 10 de maio



sexta-feira, 11 de maio



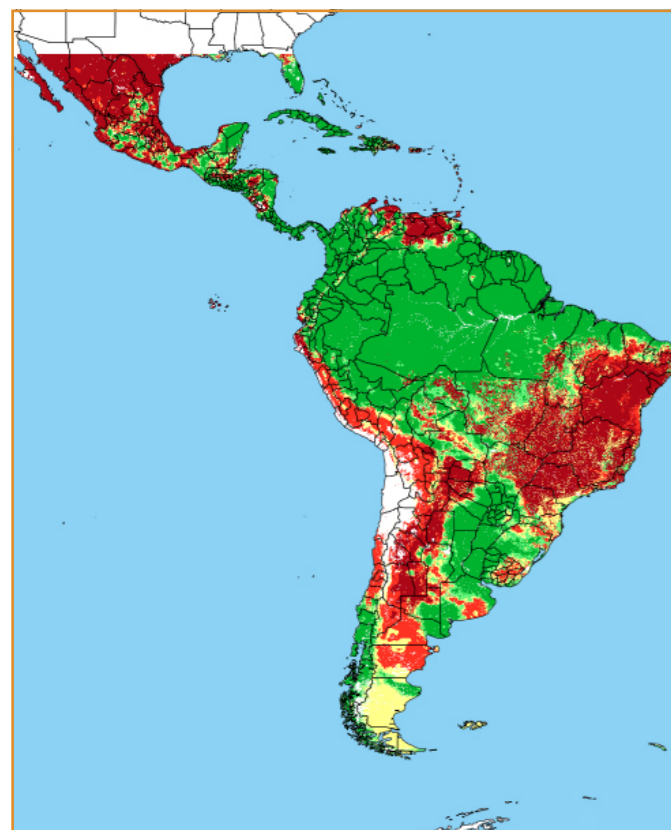
sábado, 12 de maio



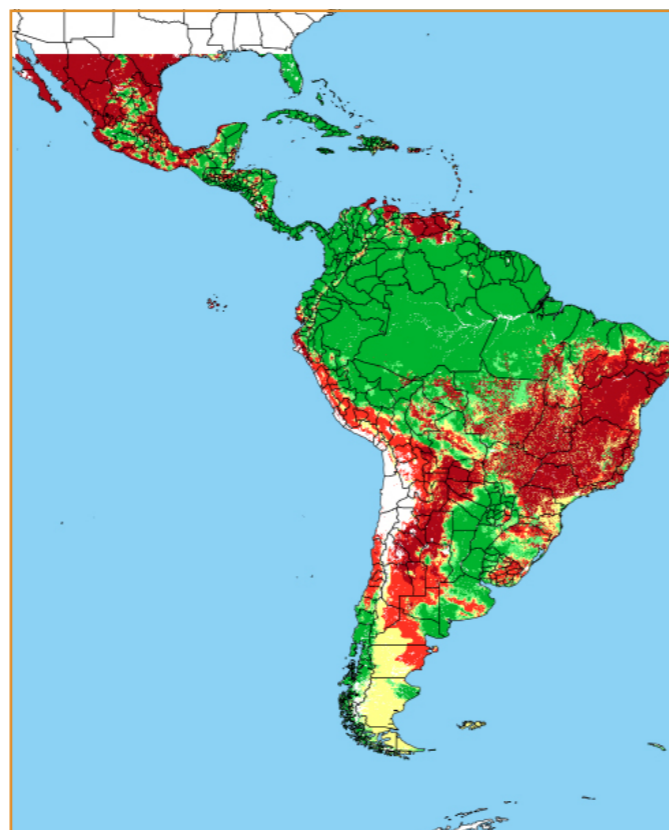
MAIO / 2018

<b>D</b>	<b>S</b>	<b>T</b>	<b>Q</b>	<b>Q</b>	<b>S</b>	<b>S</b>
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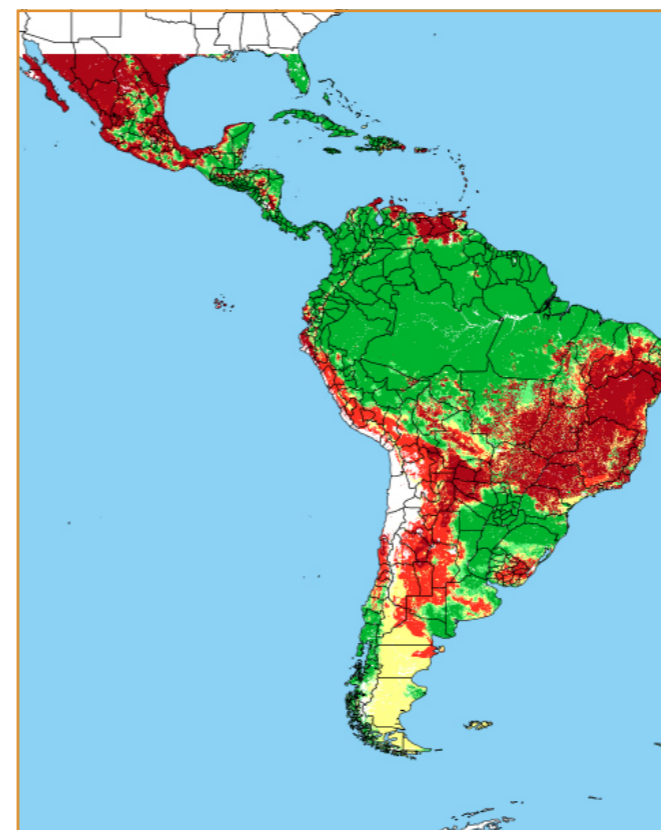
CALENDÁRIO JULIANO



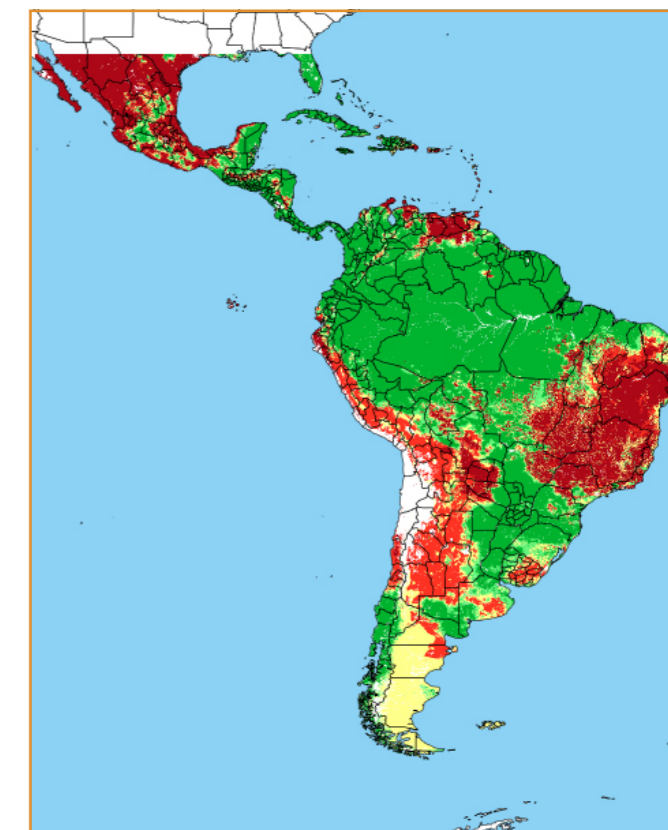
domingo, 13 de maio



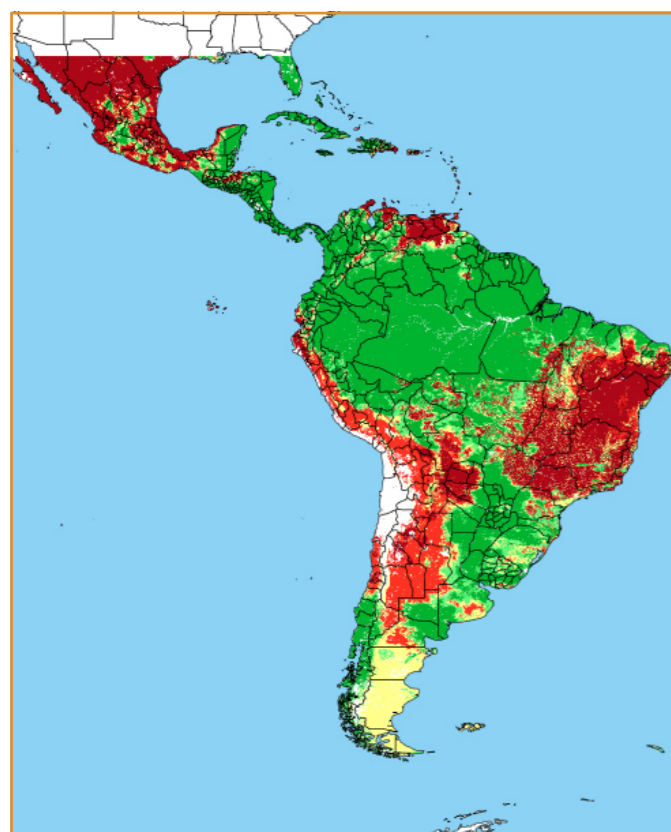
segunda-feira, 14 de maio



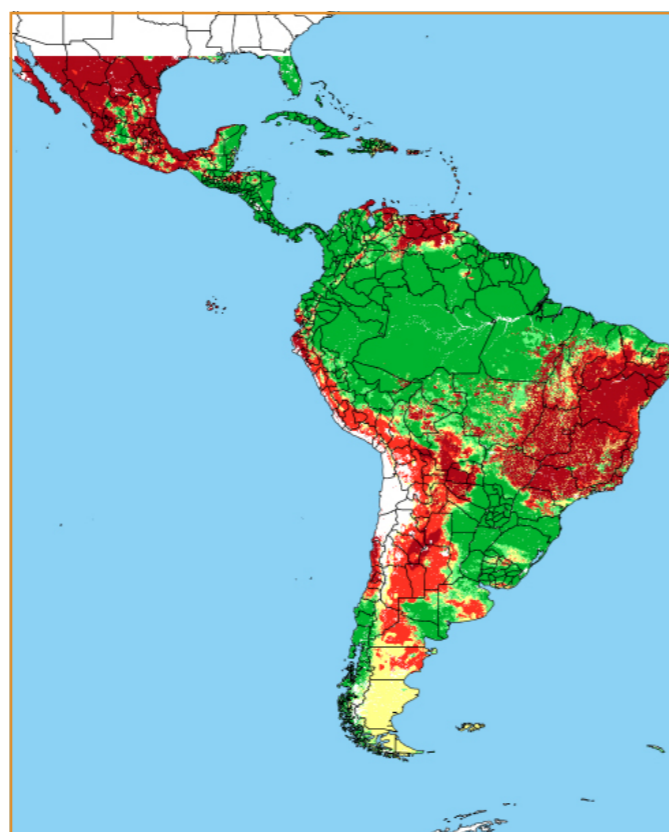
terça-feira, 15 de maio



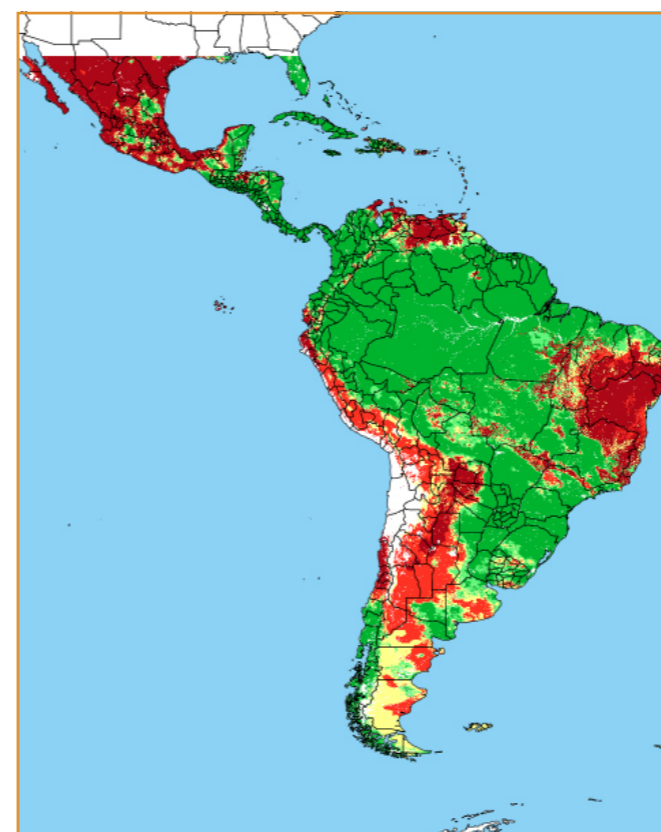
quarta-feira, 16 de maio



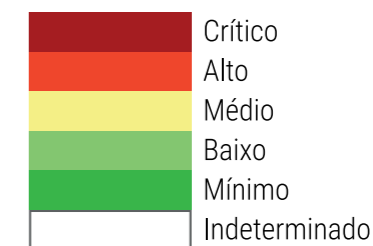
quinta-feira, 17 de maio



sexta-feira, 18 de maio

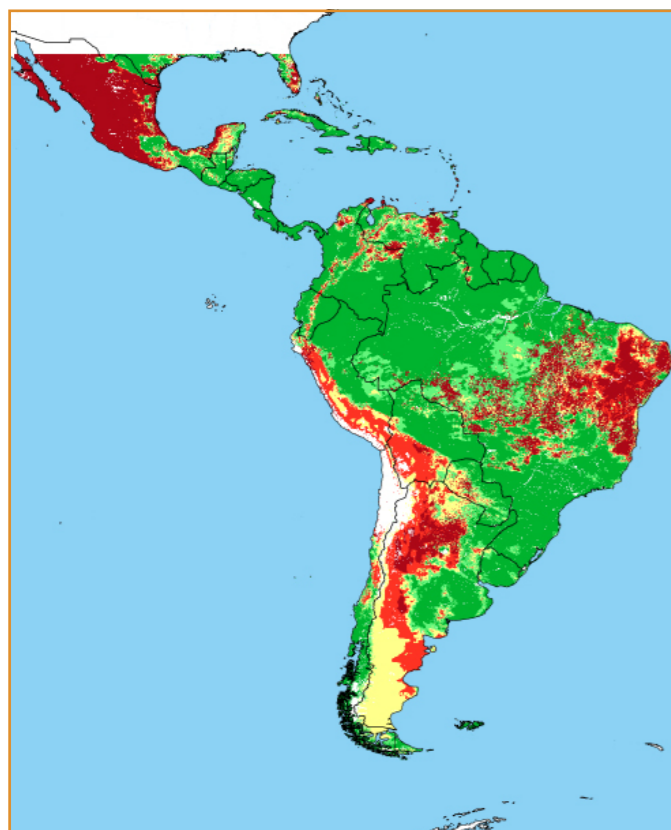


sábado, 19 de maio

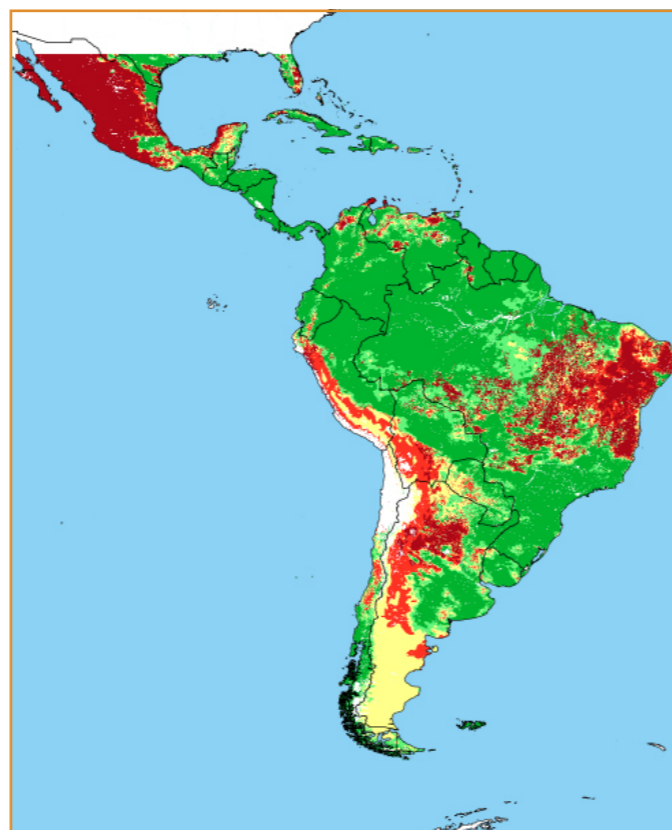


MAIO / 2018						
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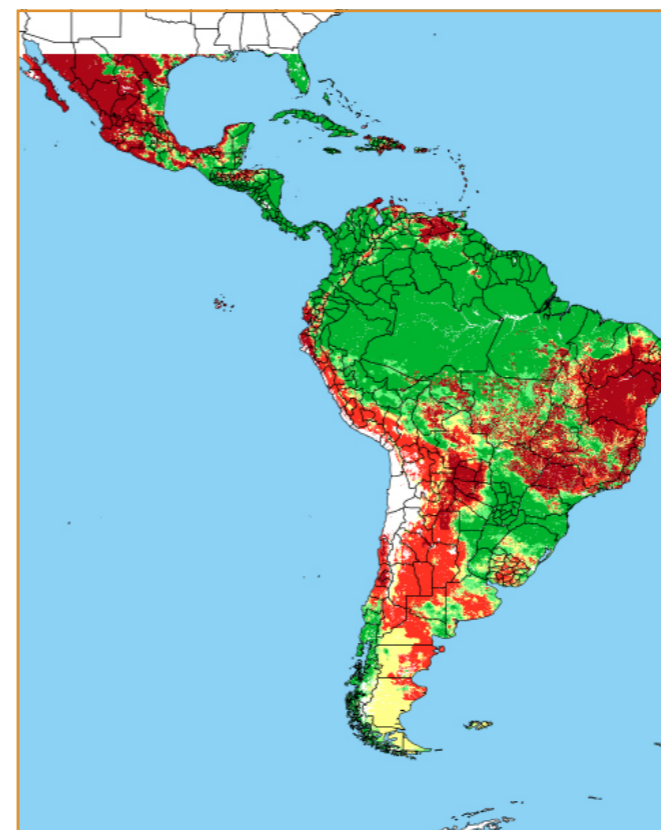
CALENDÁRIO JULIANO



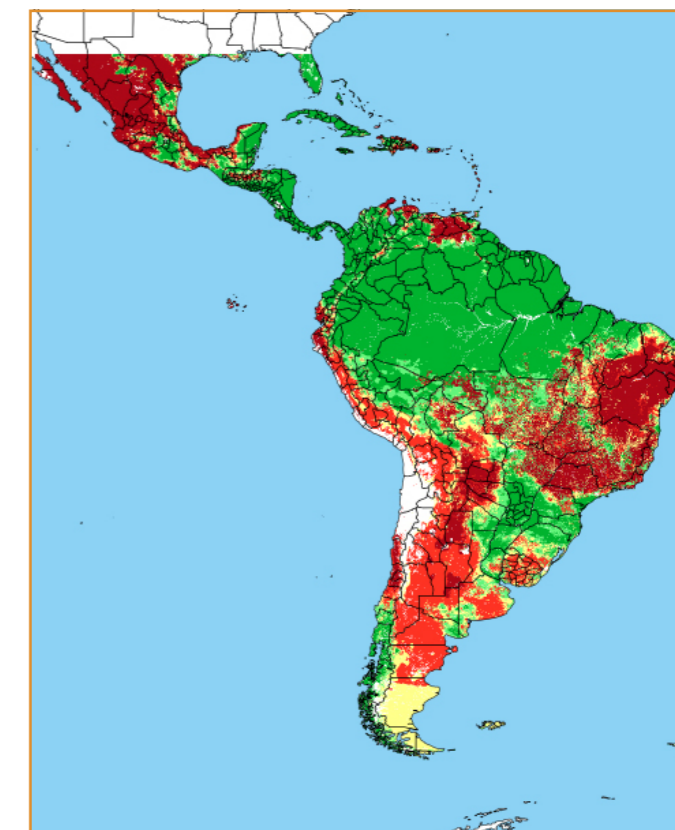
domingo, 20 de maio



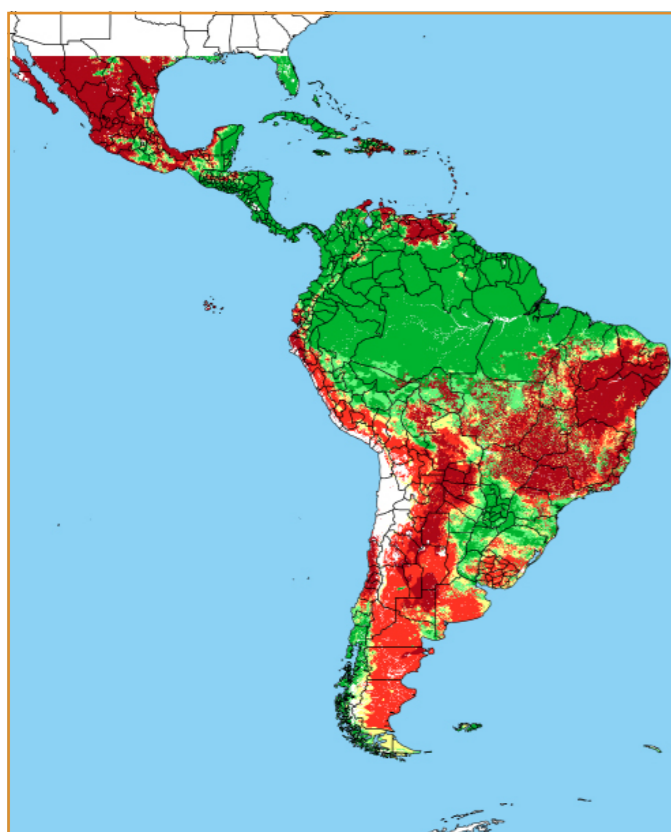
segunda-feira, 21 de maio



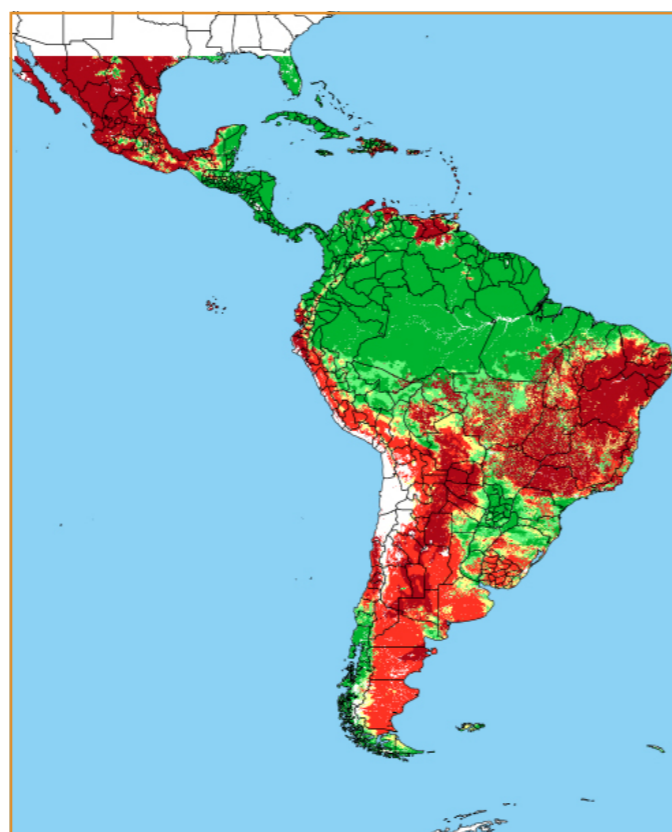
terça-feira, 22 de maio



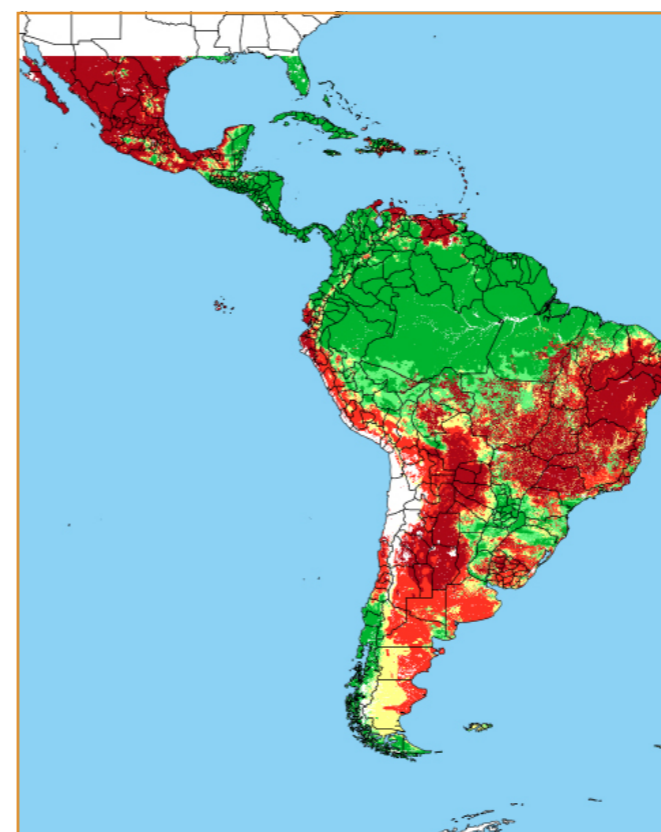
quarta-feira, 23 de maio



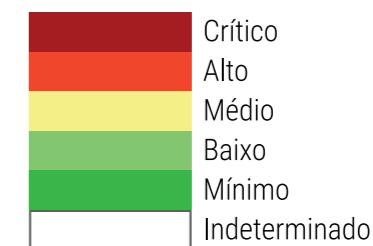
quinta-feira, 24 de maio



sexta-feira, 25 de maio



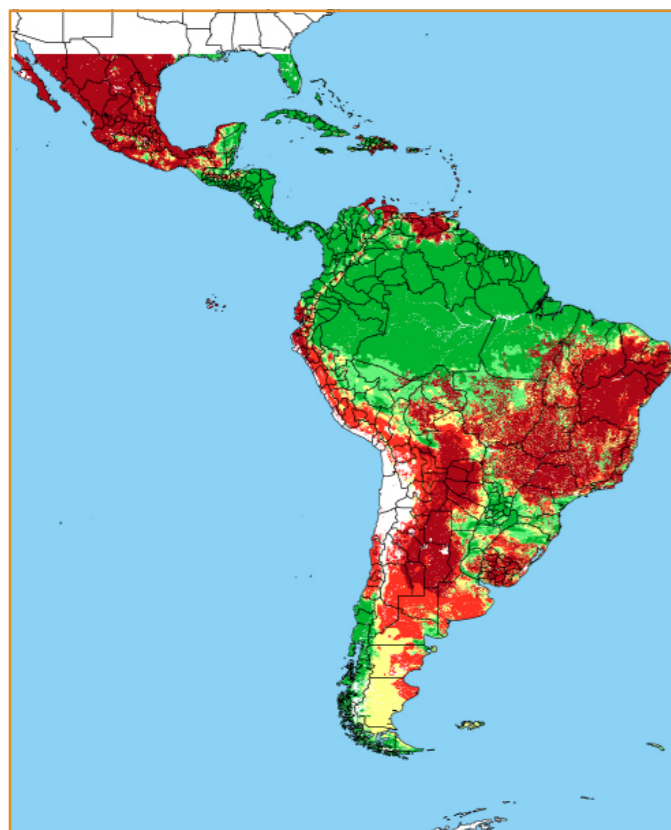
sábado, 26 de maio



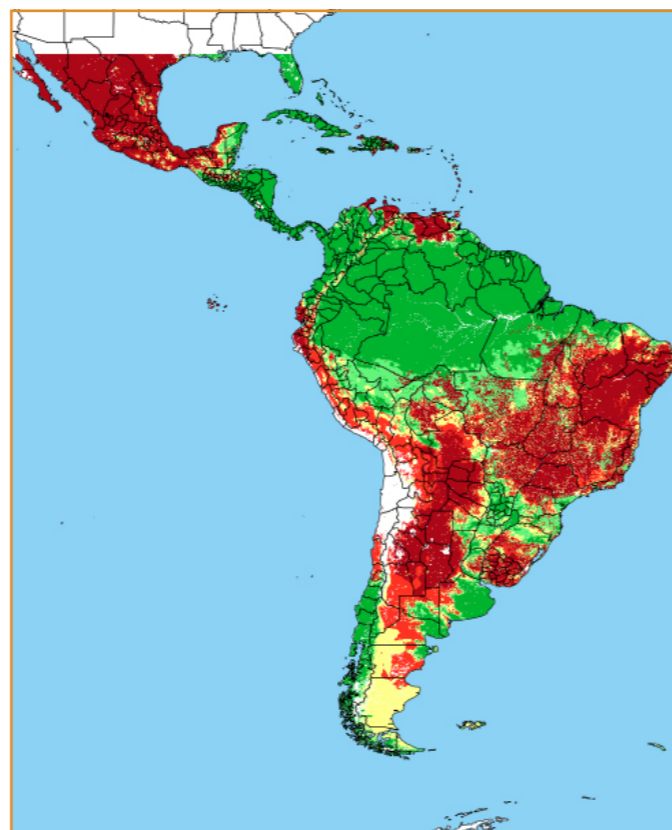
MAIO / 2018

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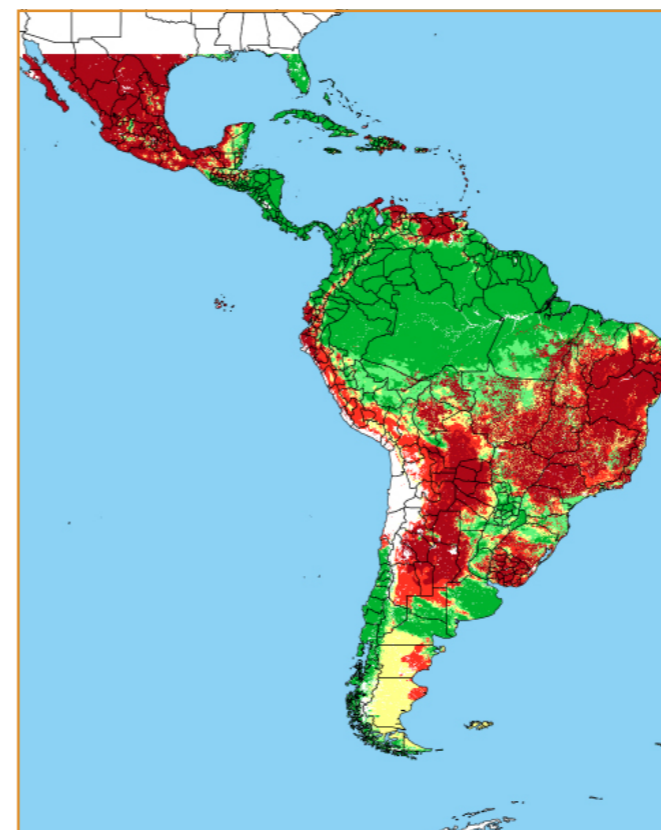
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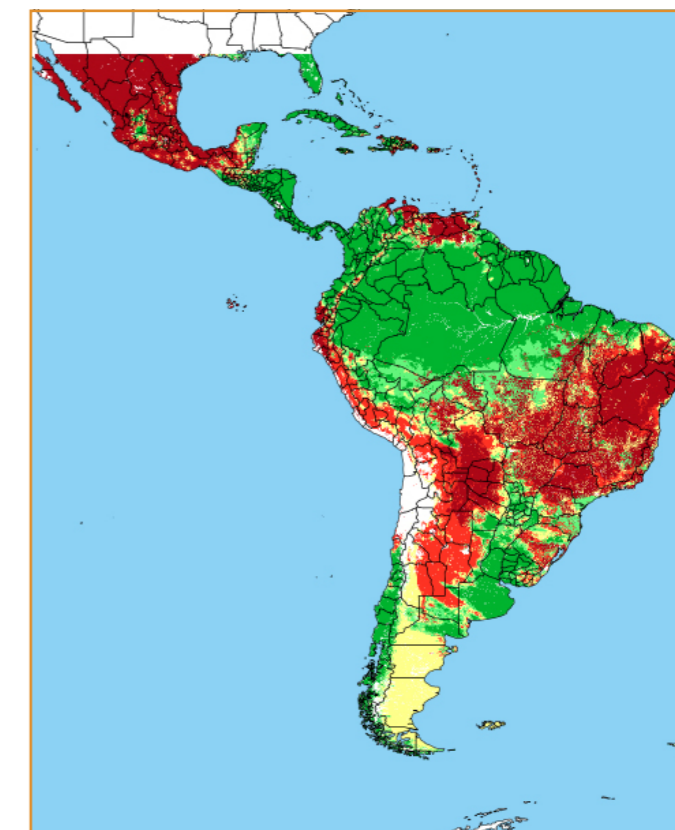
domingo, 27 de maio



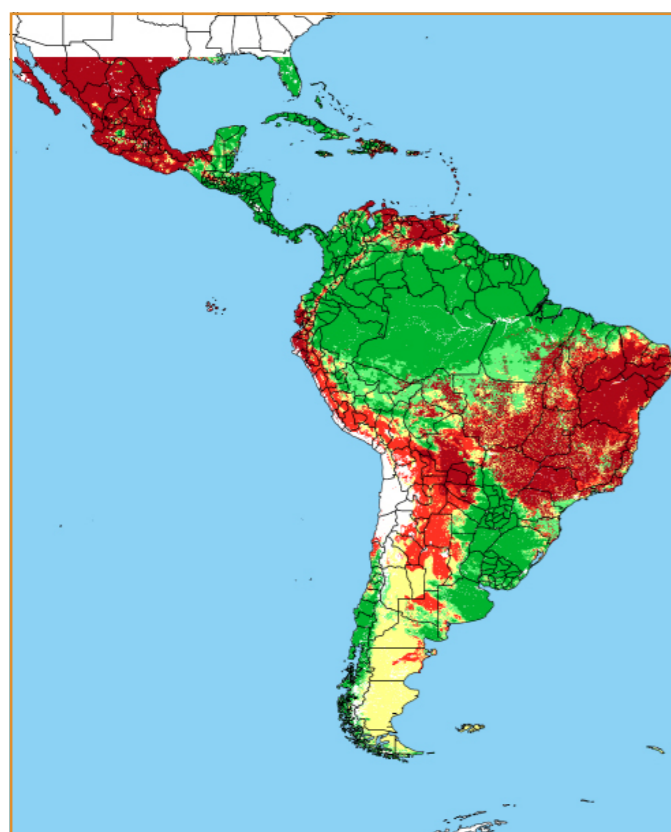
segunda-feira, 28 de maio



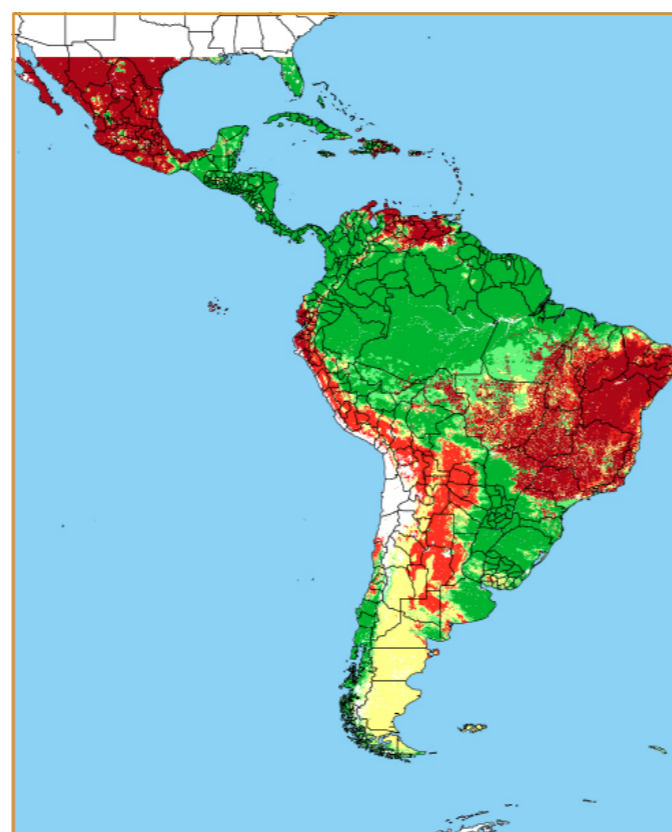
terça-feira, 29 de maio



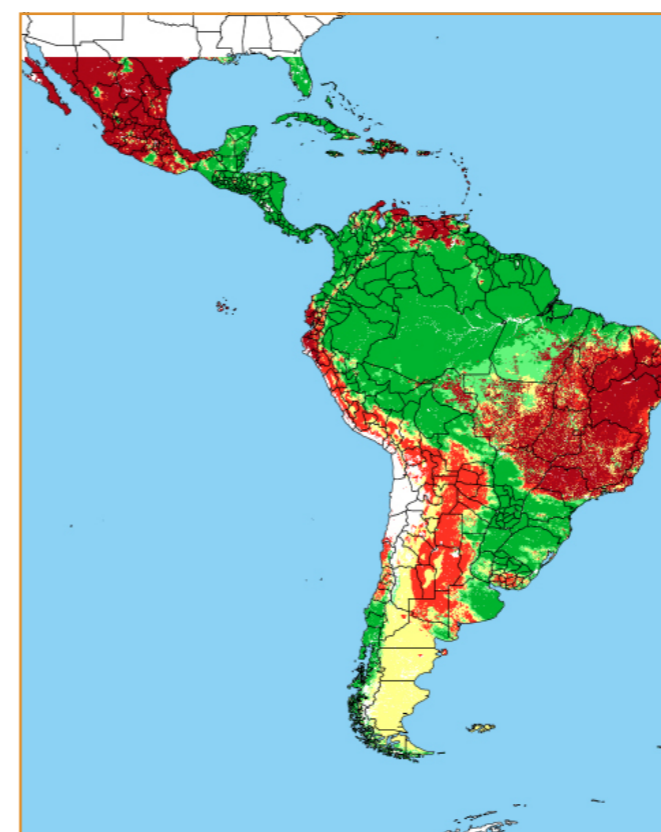
quarta-feira, 30 de maio



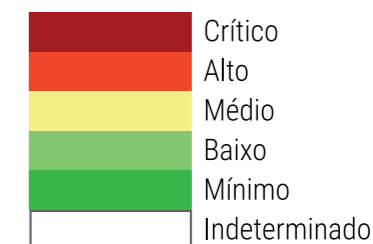
quinta-feira, 31 de maio



sexta-feira, 1 de junho



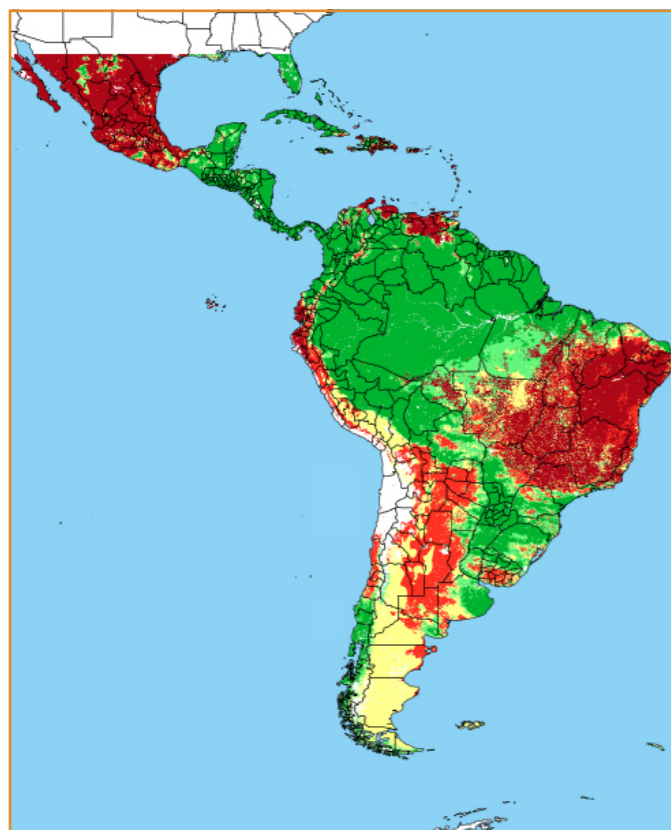
sábado, 2 de junho



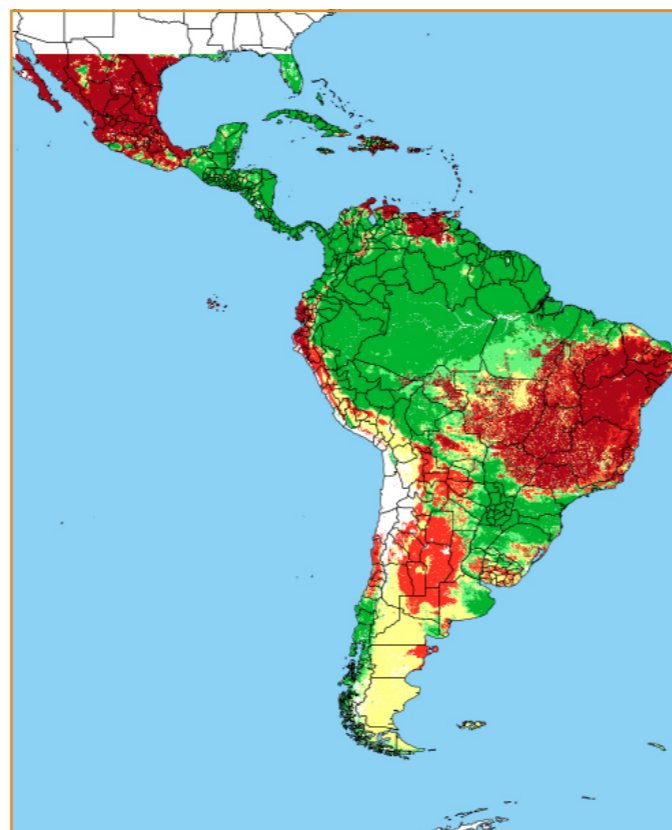
MAIO / 2018

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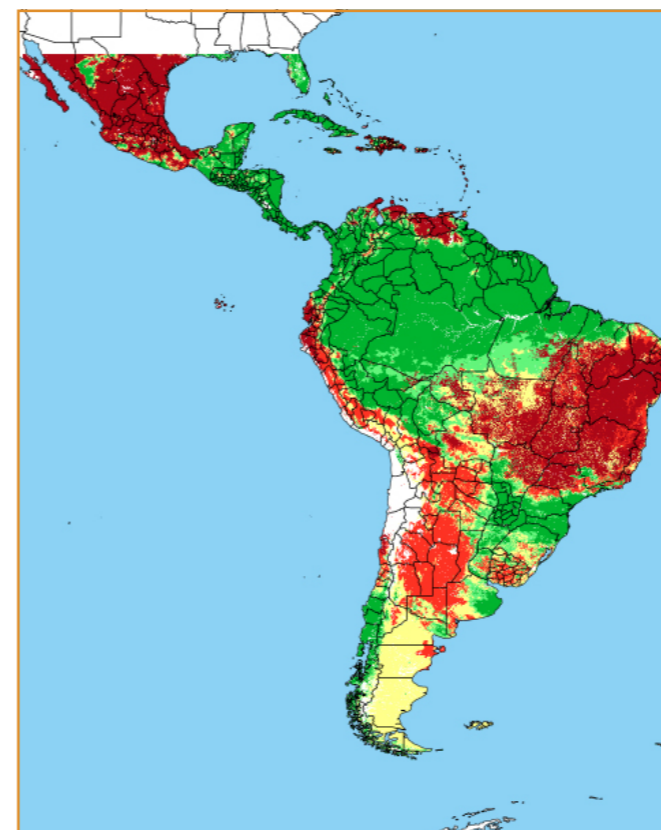
CALENDÁRIO JULIANO



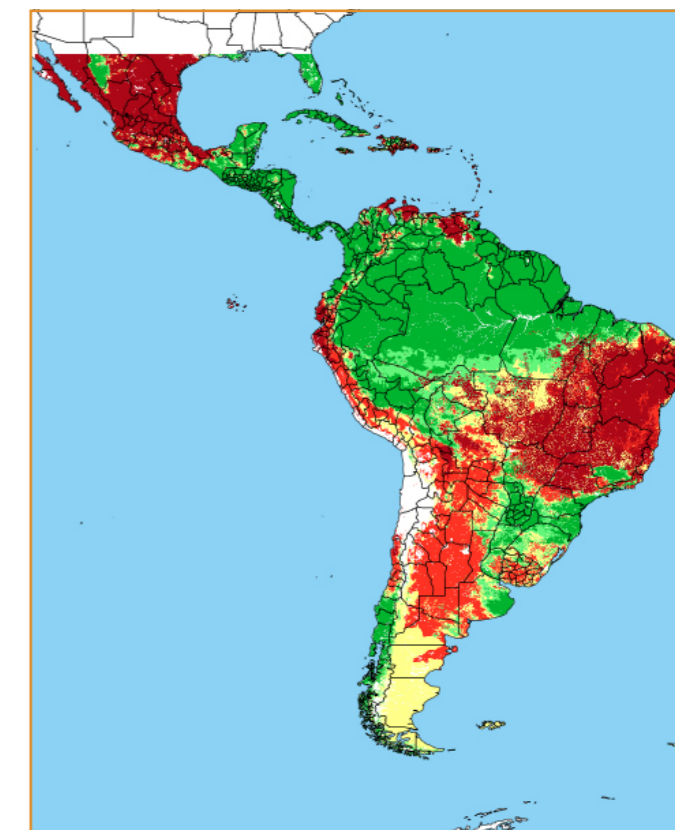
domingo, 3 de junho



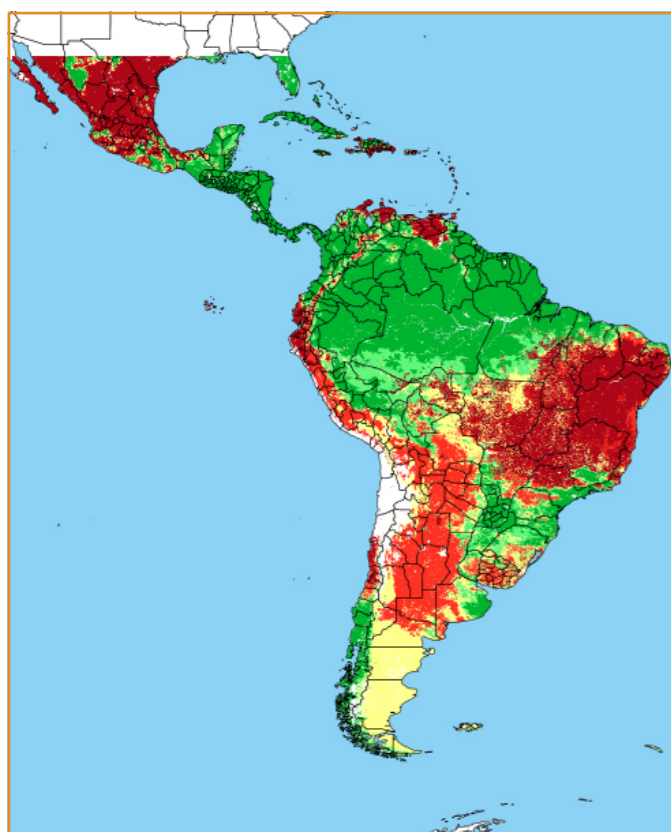
segunda-feira, 4 de junho



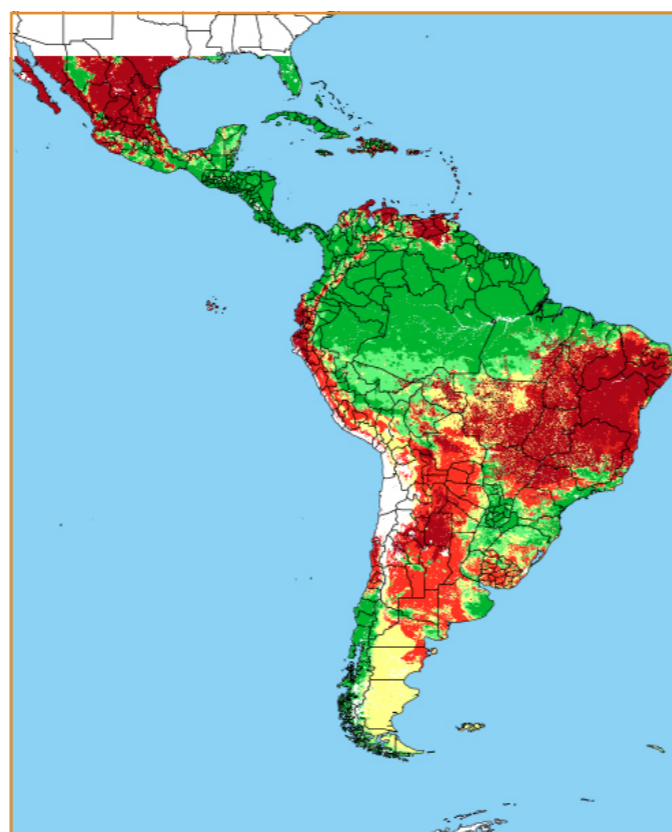
terça-feira, 5 de junho



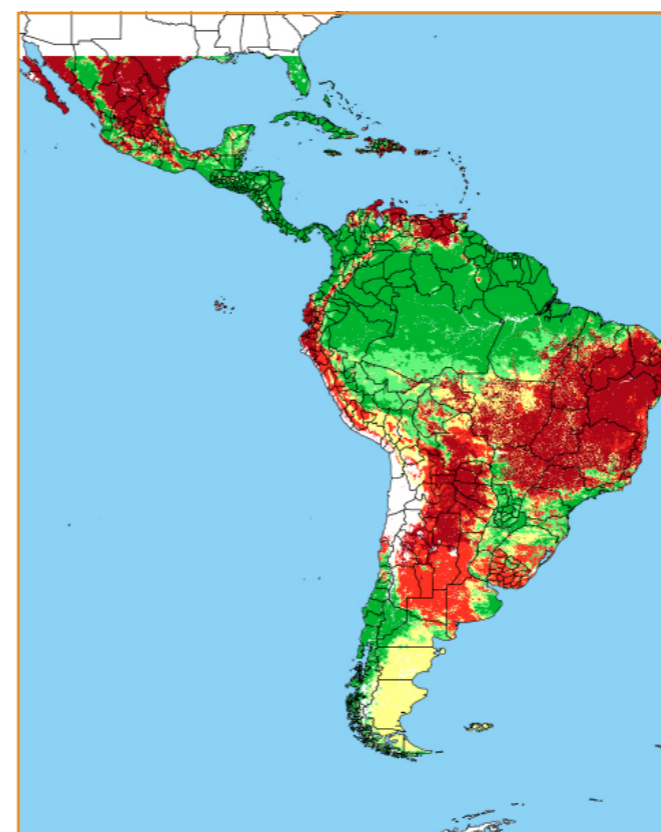
quarta-feira, 6 de junho



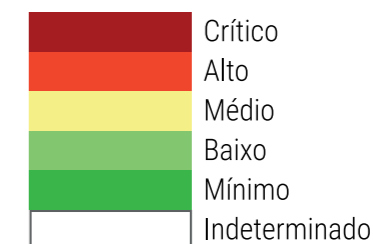
quinta-feira, 7 de junho



sexta-feira, 8 de junho



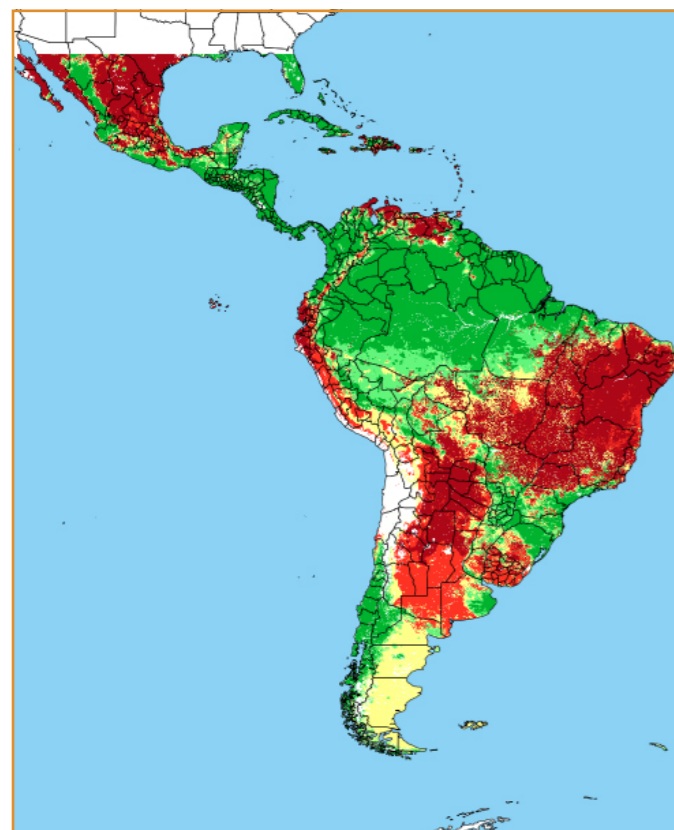
sábado, 9 de junho



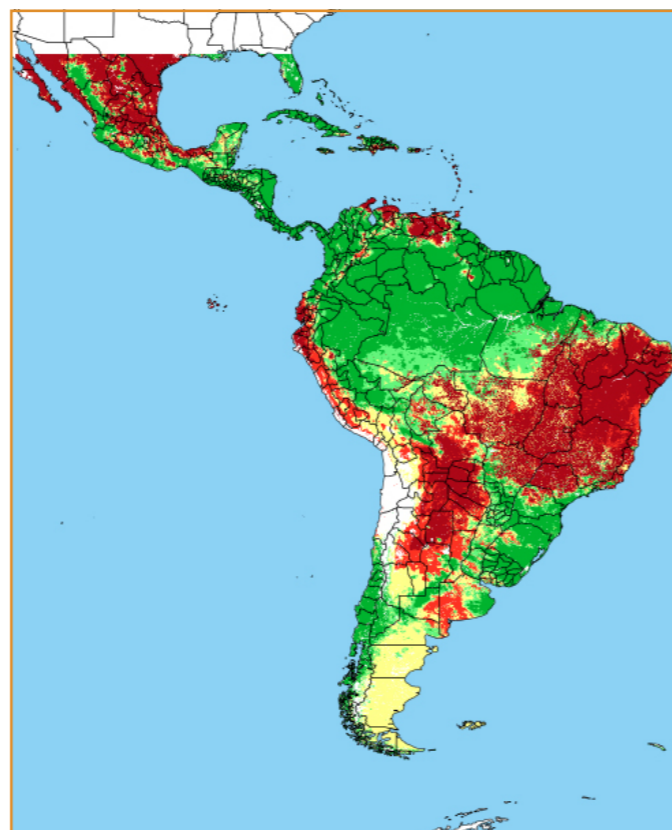
JUNHO / 2018

D	S	T	Q	Q	S	S
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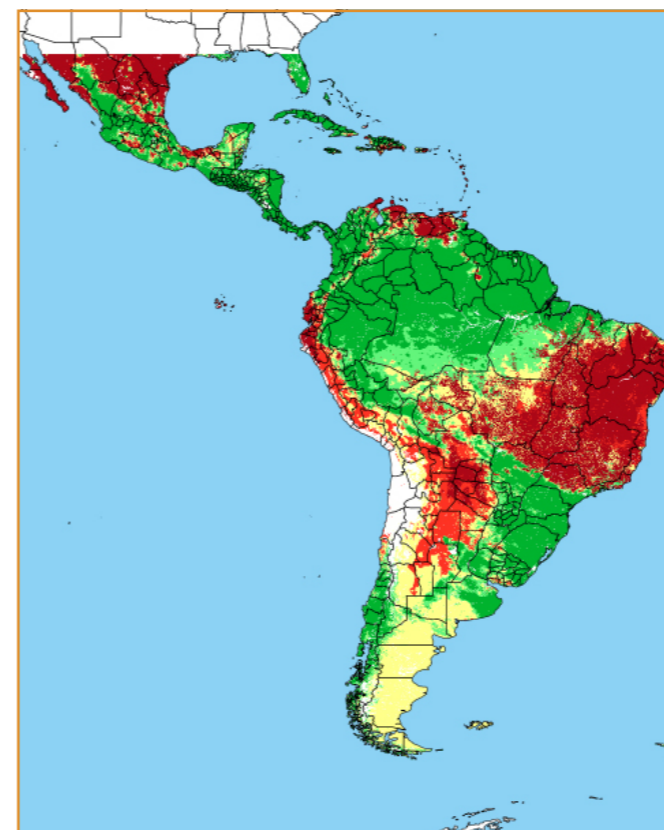
CALENDÁRIO JULIANO



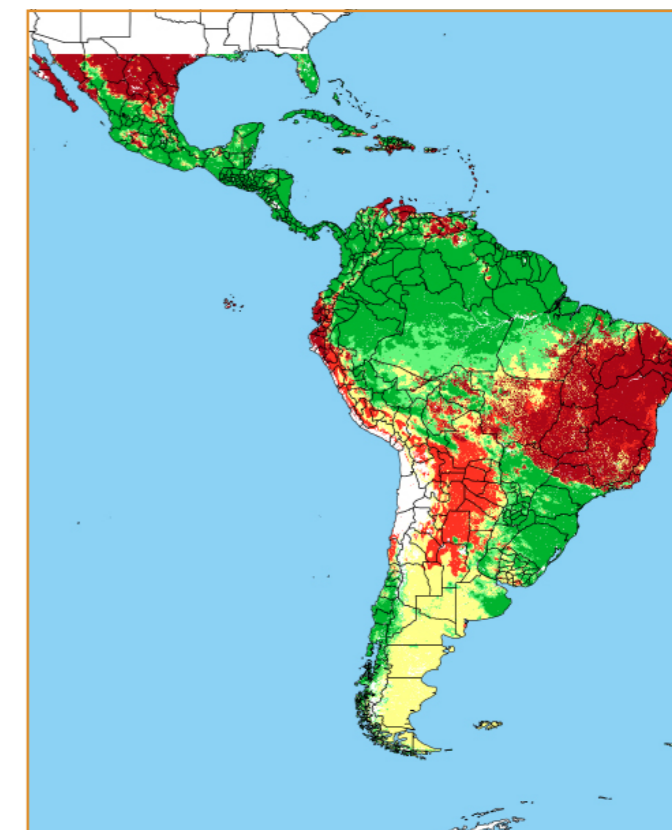
domingo, 10 de junho



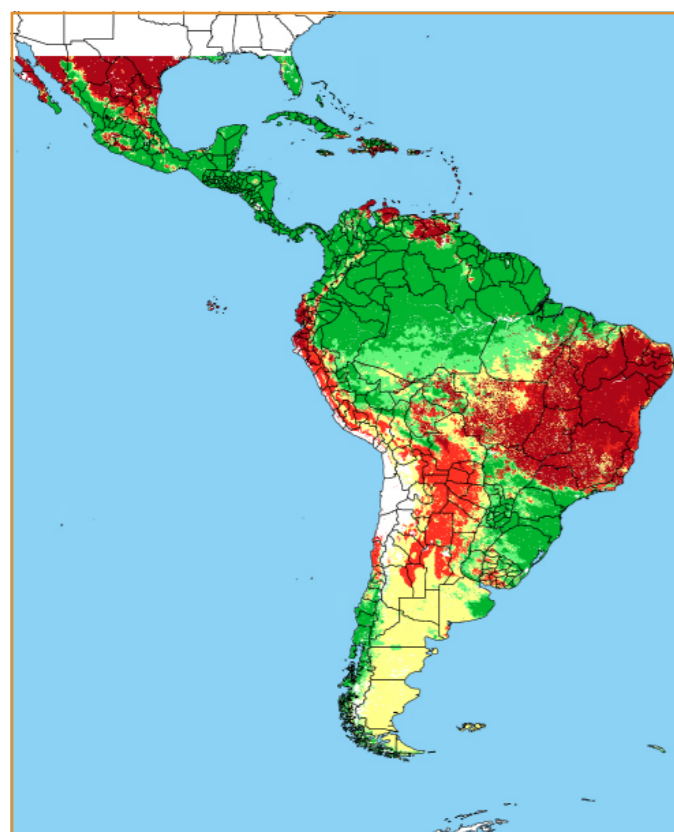
segunda-feira, 11 de junho



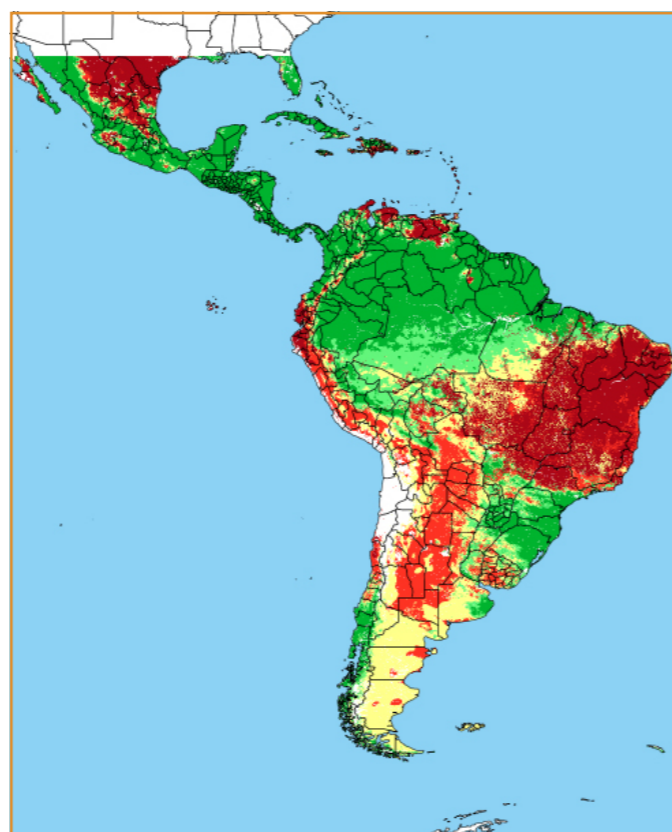
terça-feira, 12 de junho



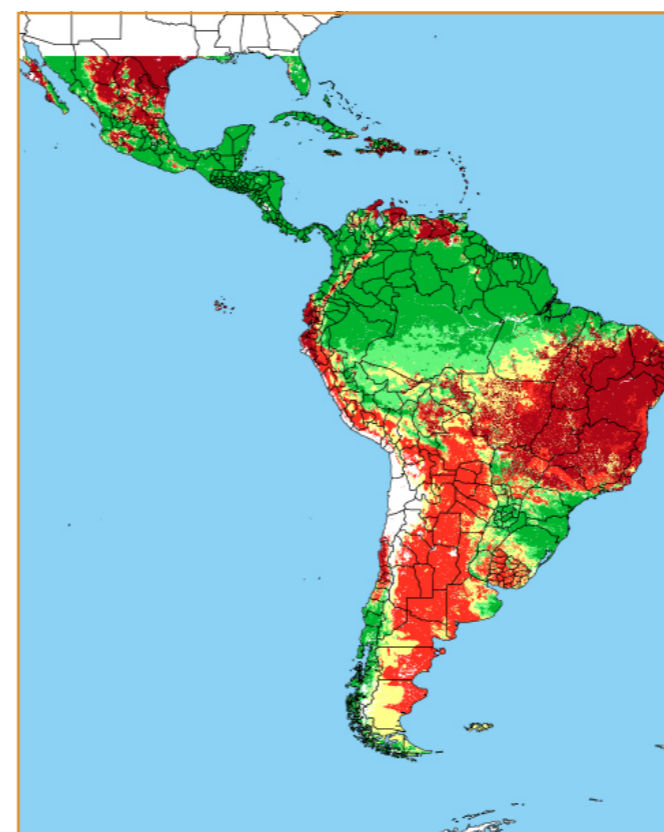
quarta-feira, 13 de junho



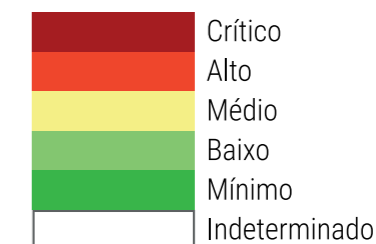
quinta-feira, 14 de junho



sexta-feira, 15 de junho



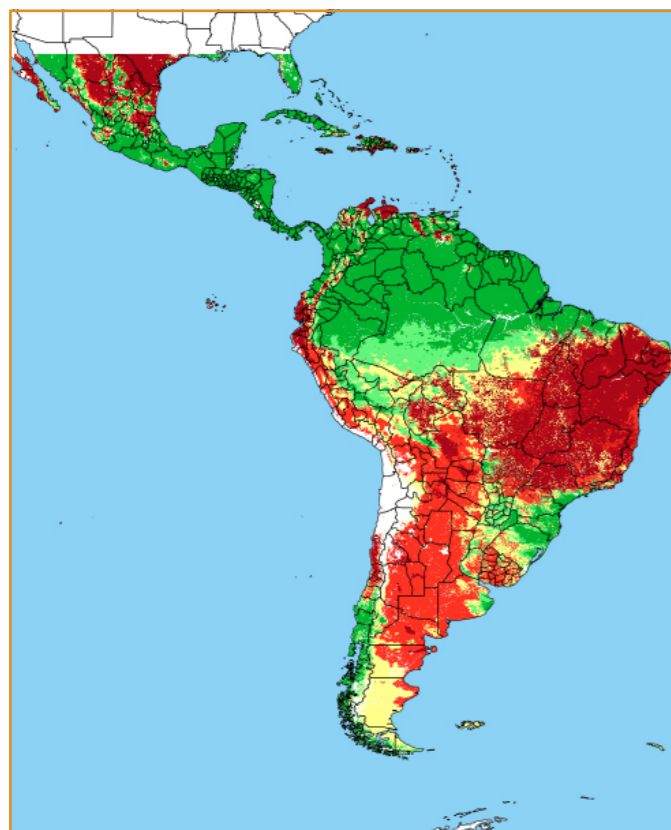
sábado, 16 de junho



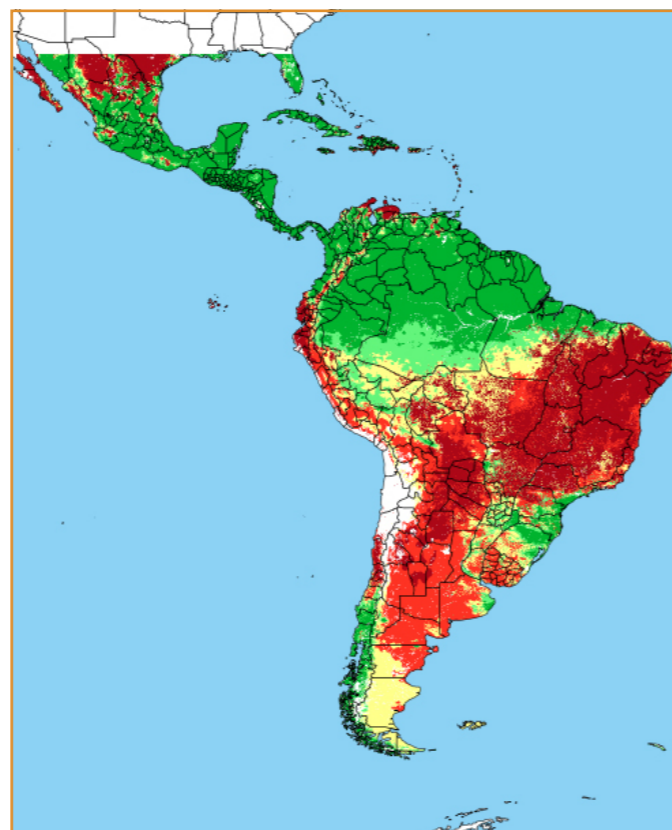
JUNHO / 2018

D	S	T	Q	Q	S	S
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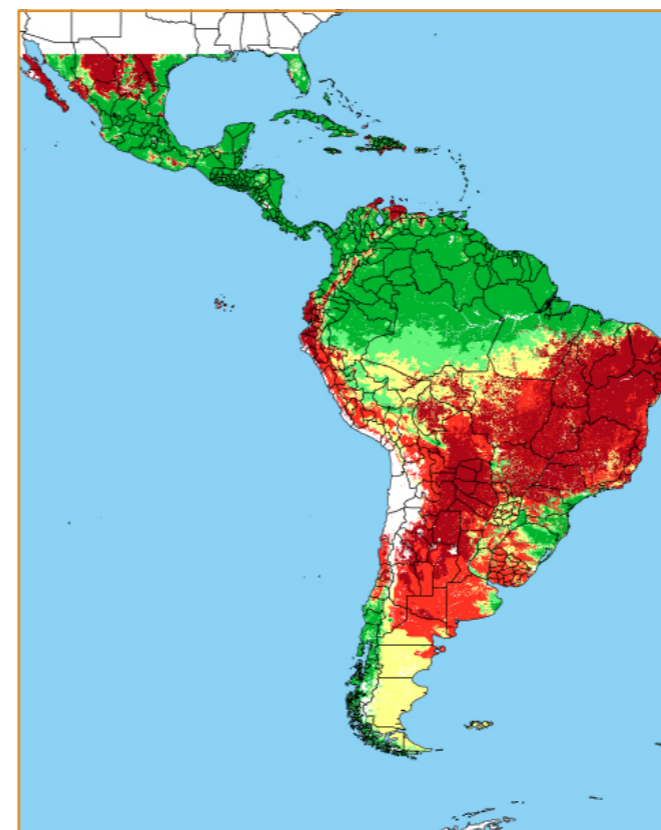
CALENDÁRIO JULIANO



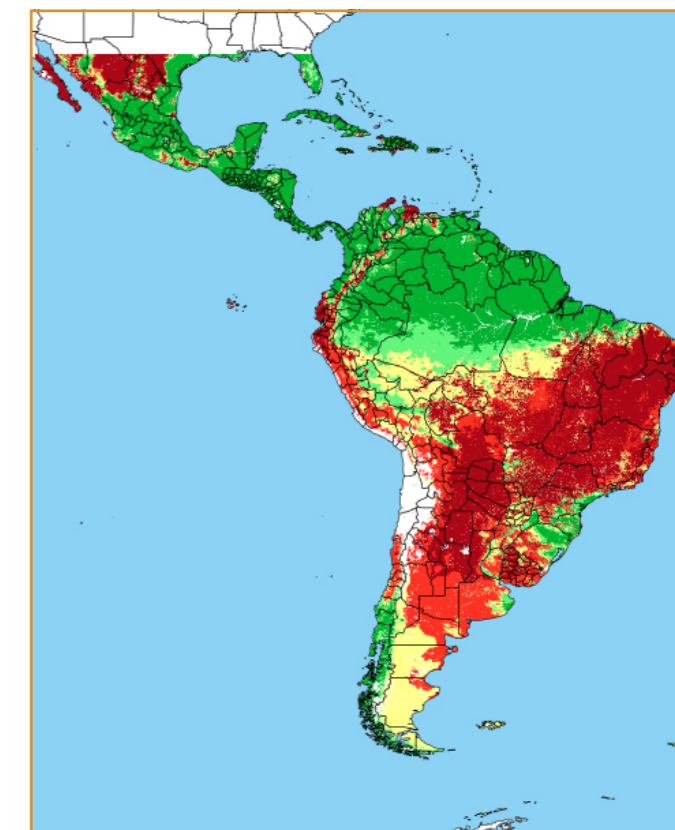
domingo, 17 de junho



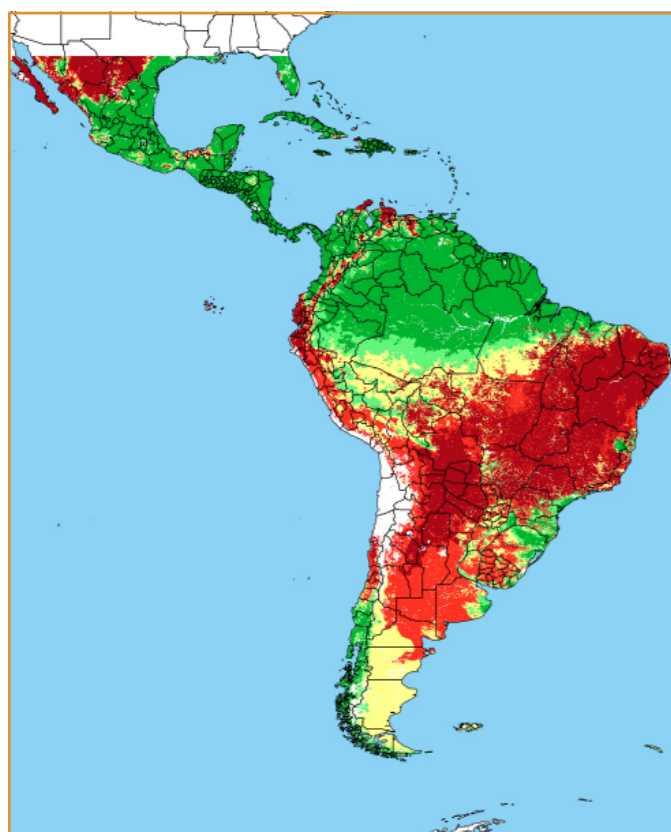
segunda-feira, 18 de junho



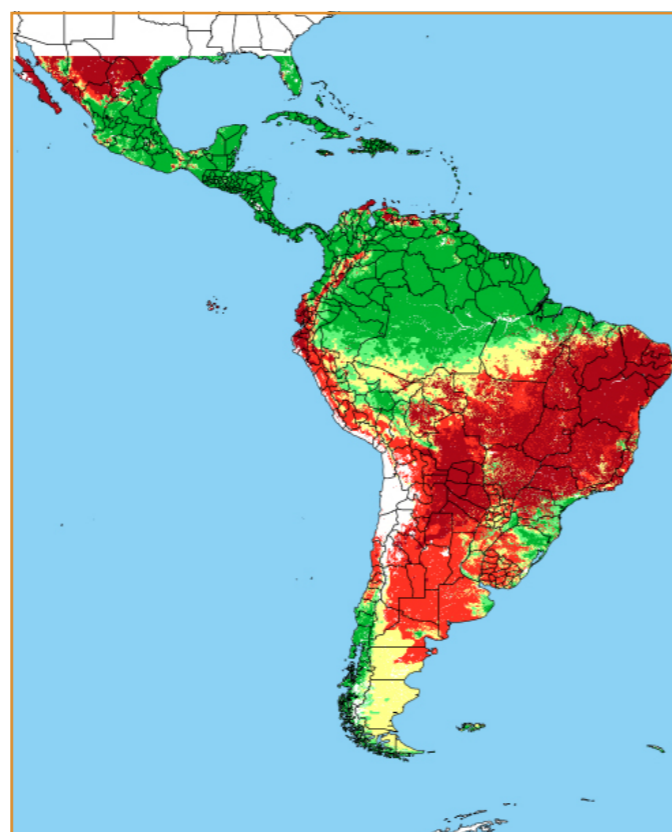
terça-feira, 19 de junho



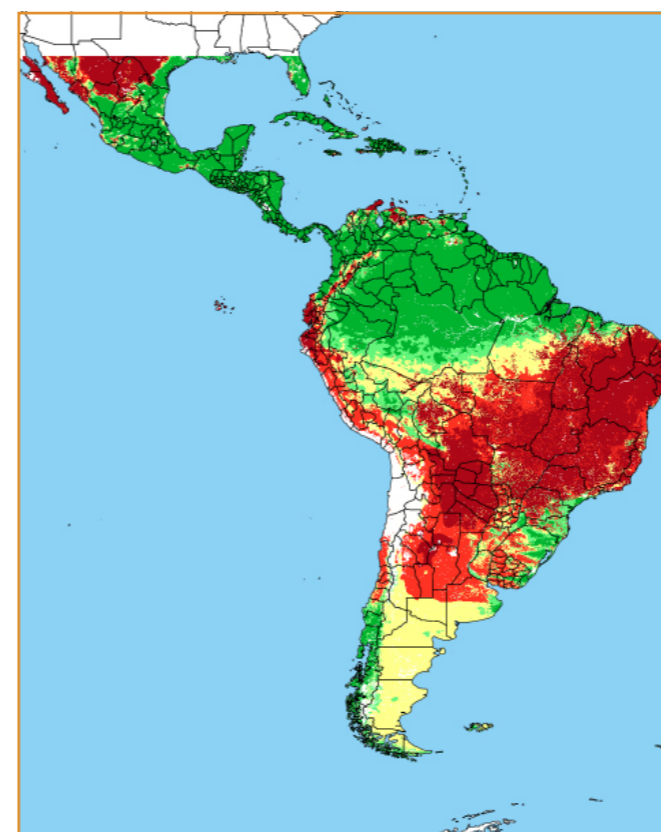
quarta-feira, 20 de junho



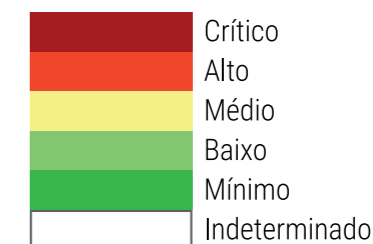
quinta-feira, 21 de junho



sexta-feira, 22 de junho



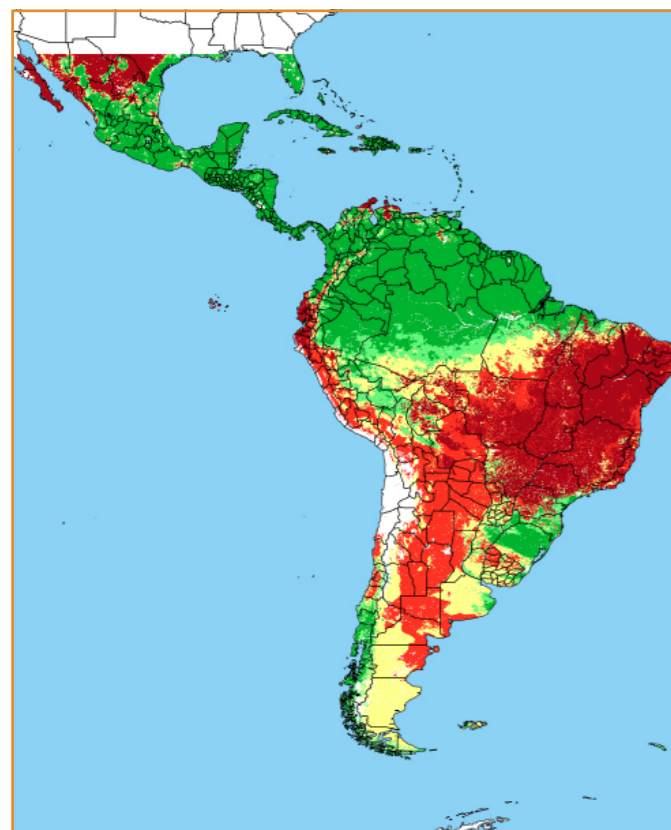
sábado, 23 de junho



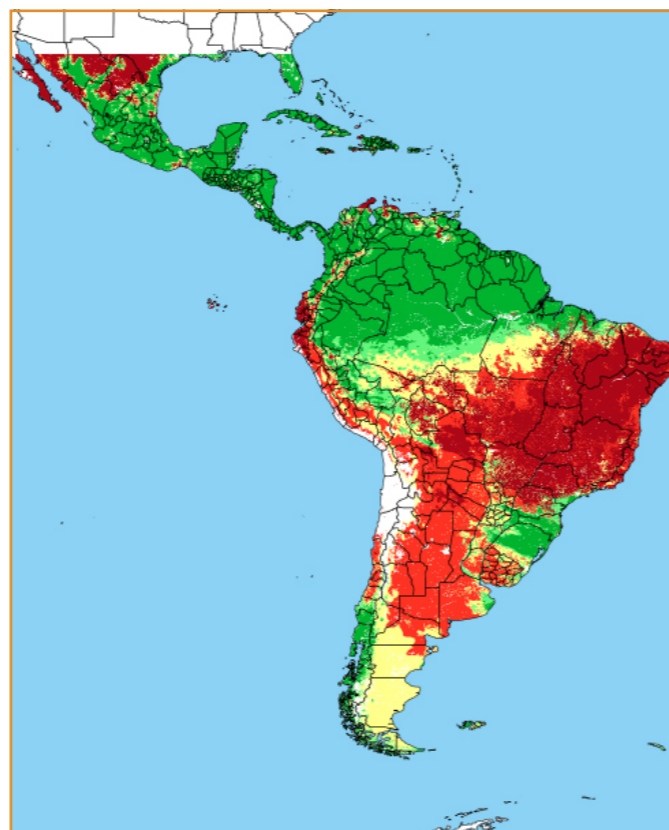
JUNHO / 2018

D	S	T	Q	Q	S	S
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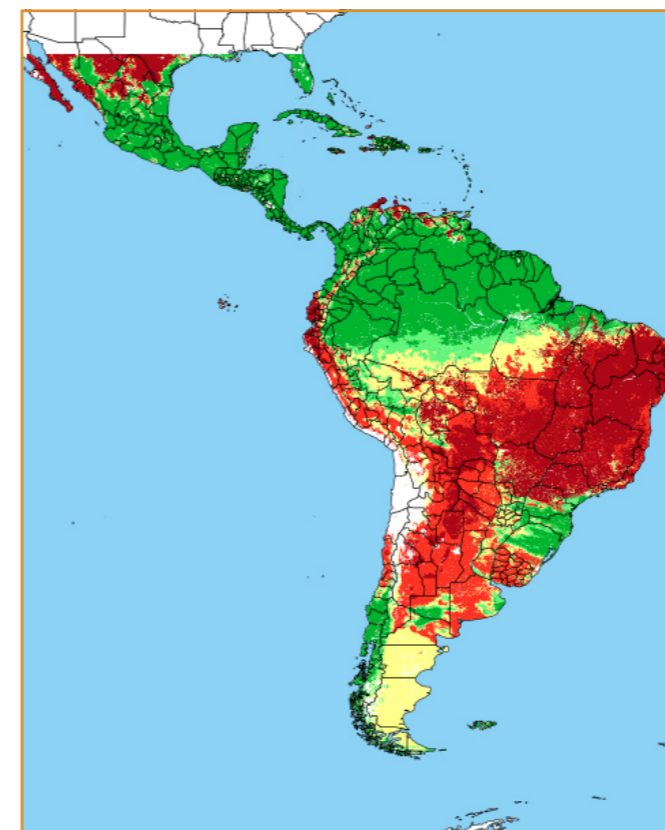
CALENDÁRIO JULIANO



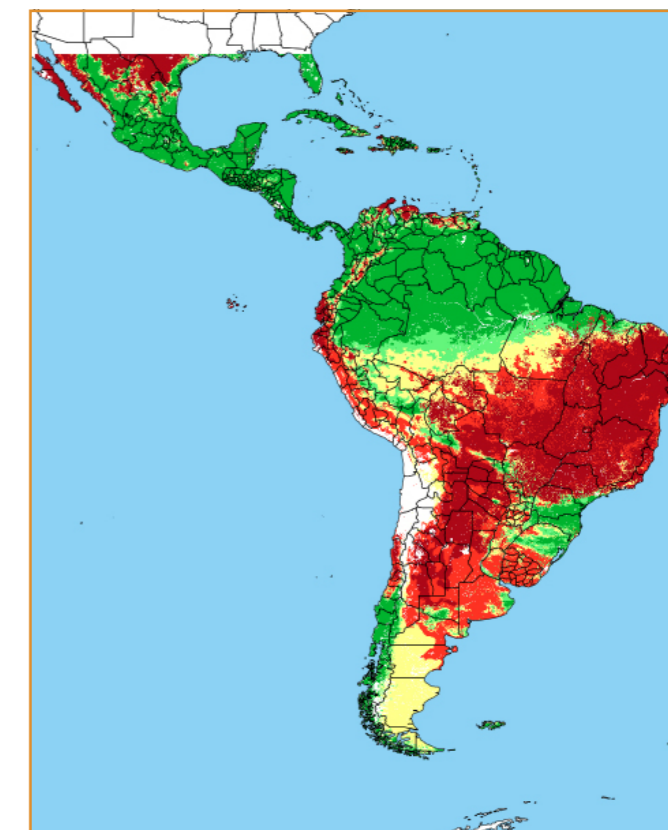
domingo, 24 de junho



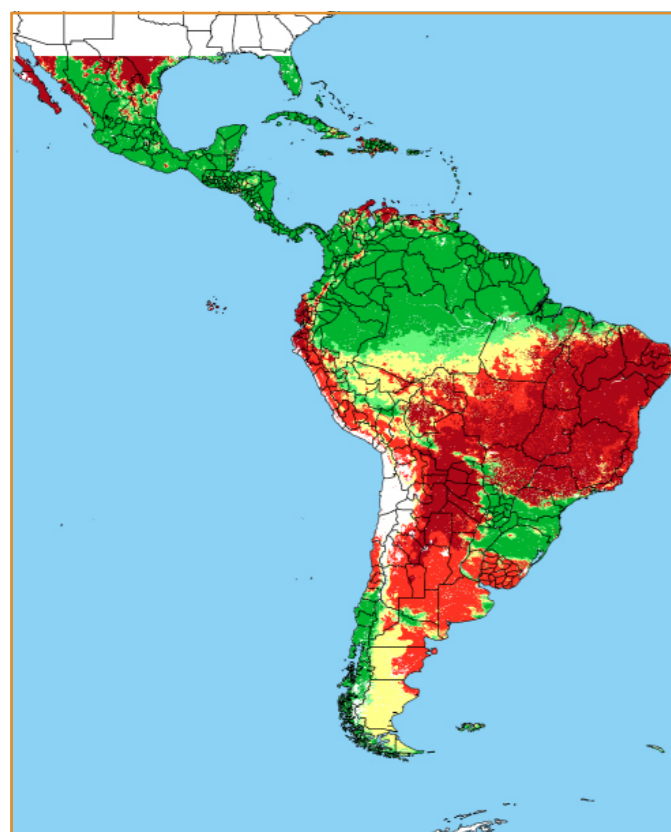
segunda-feira, 25 de junho



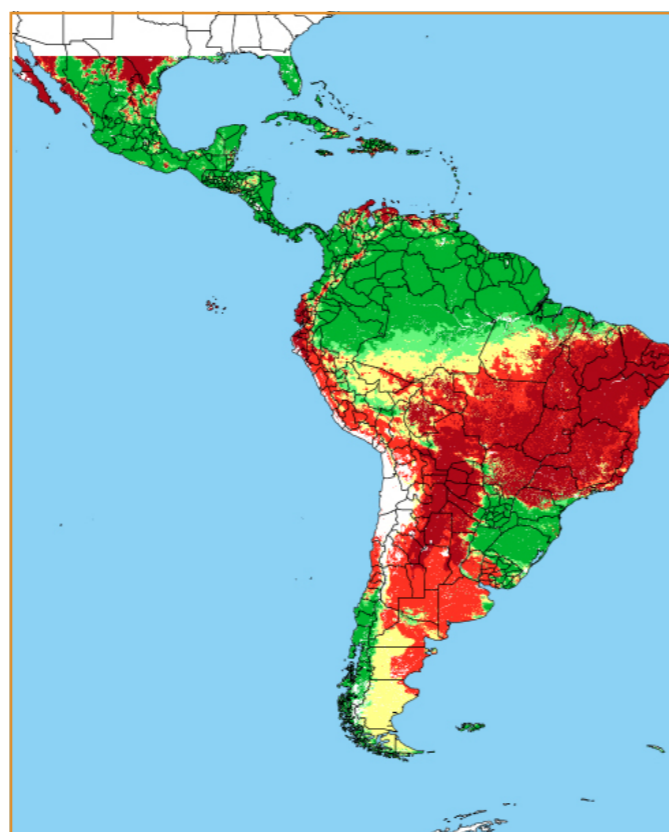
terça-feira, 26 de junho



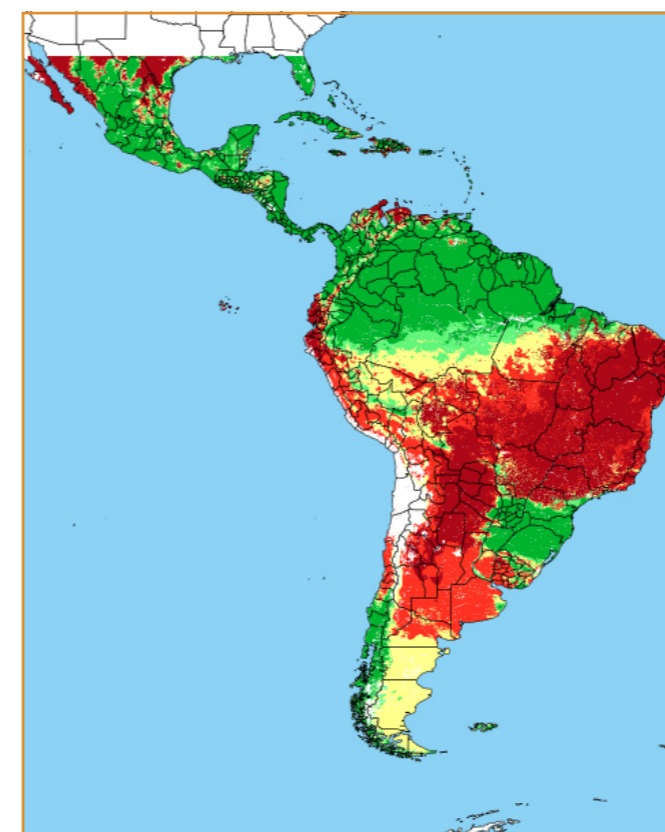
quarta-feira, 27 de junho



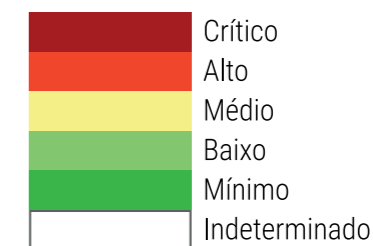
quinta-feira, 28 de junho



sexta-feira, 29 de junho



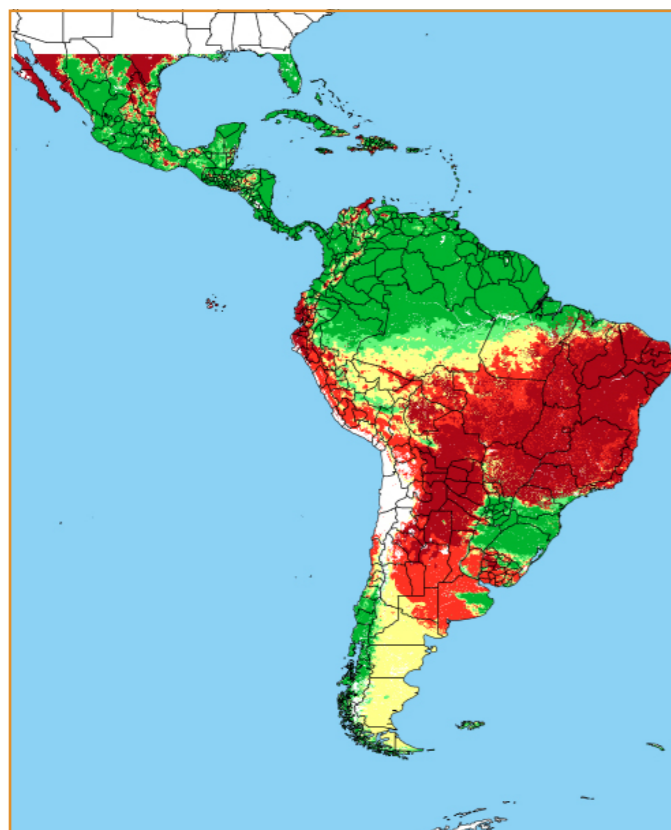
sábado, 30 de junho



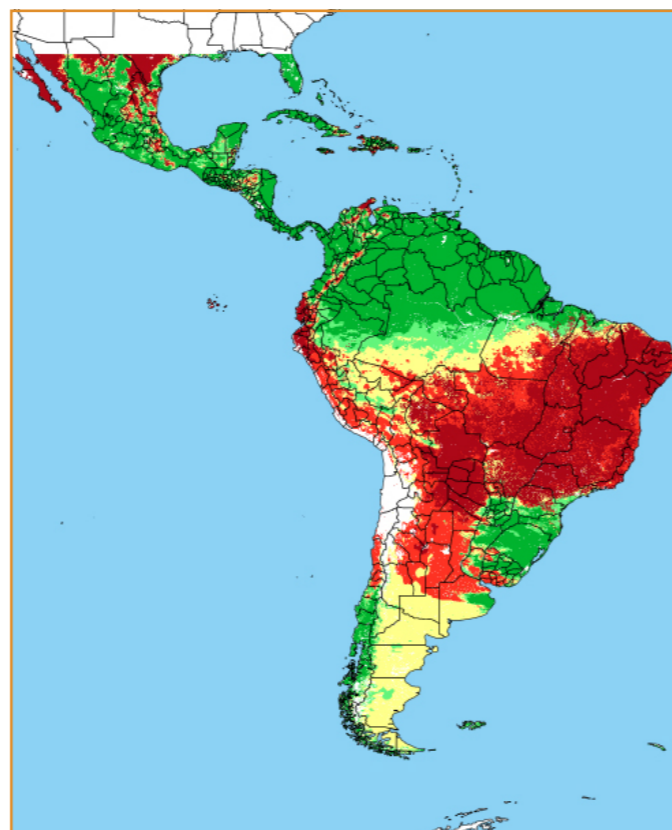
JUNHO / 2018							
D	S	T	Q	Q	S	S	
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175	176	177	178	179	180	181	

CALENDÁRIO JULIANO

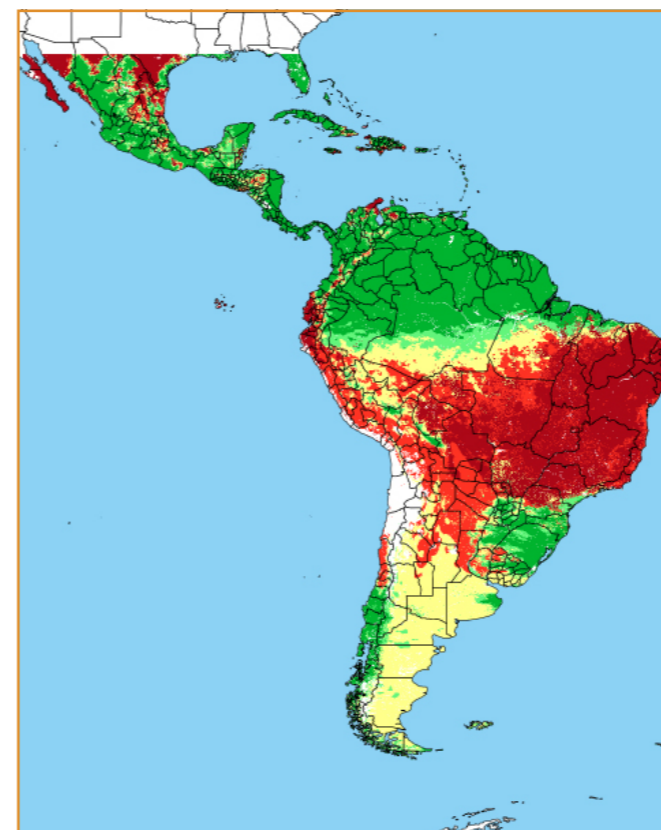




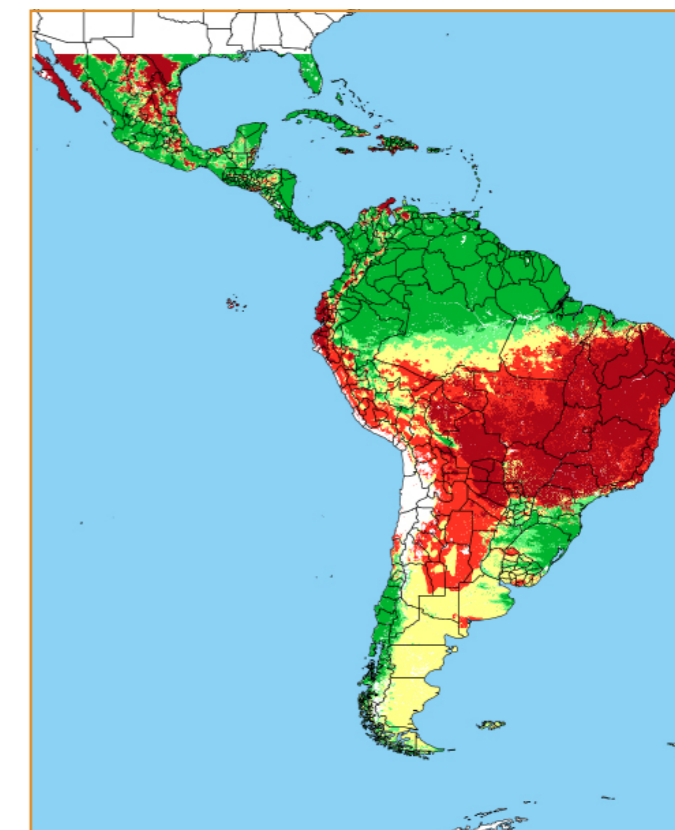
domingo, 1 de julho



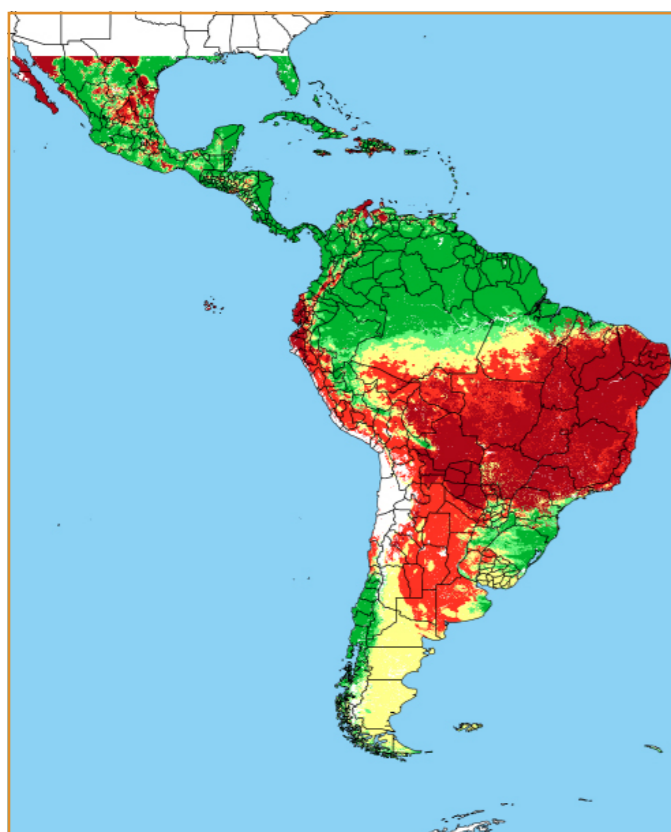
segunda-feira, 2 de julho



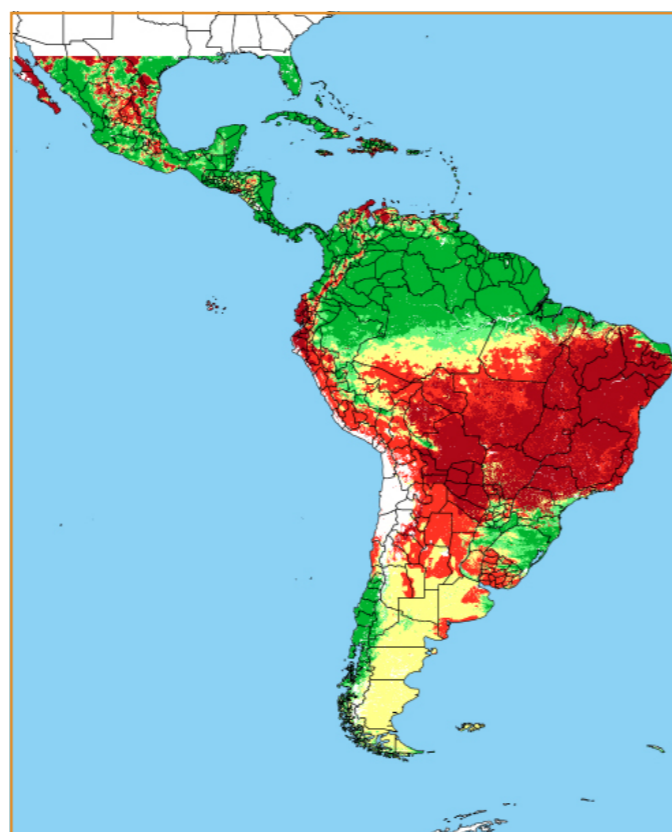
terça-feira, 3 de julho



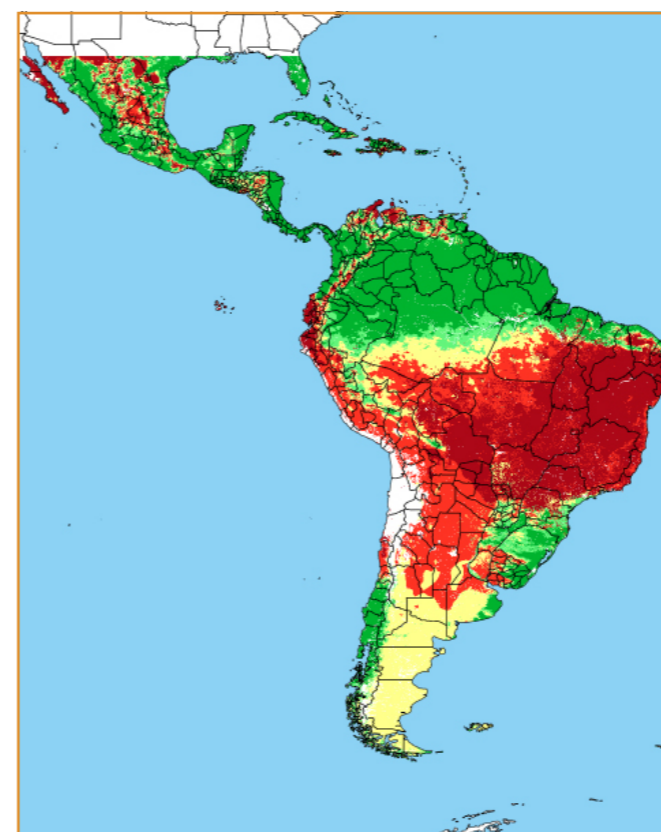
quarta-feira, 4 de julho



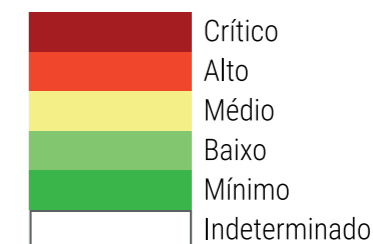
quinta-feira, 5 de julho



sexta-feira, 6 de julho

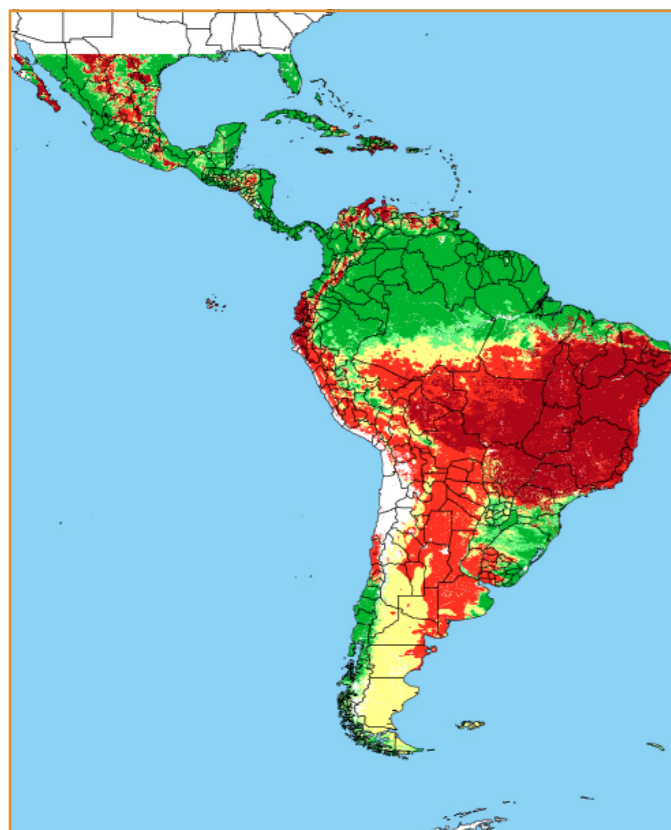


sábado, 7 de julho

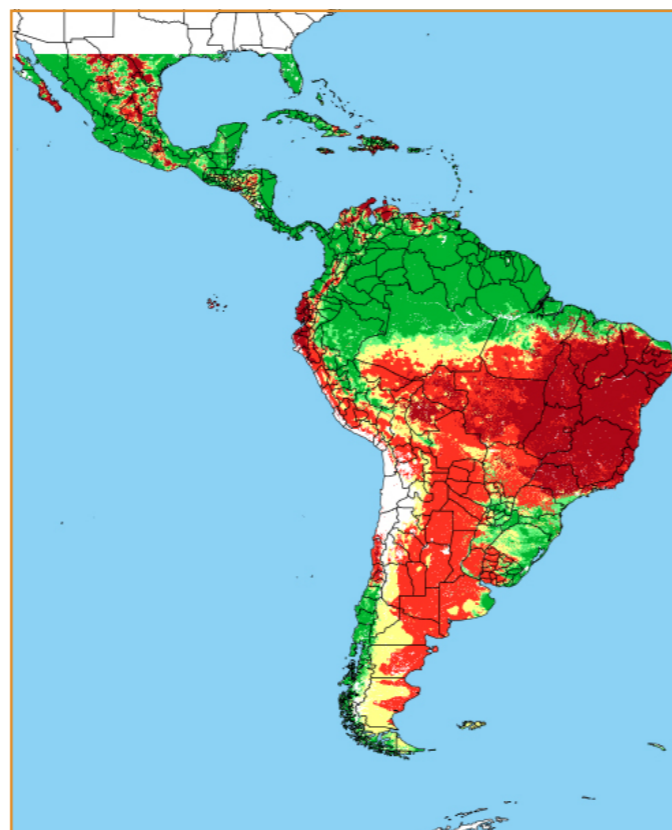


JULHO / 2018							
D	S	T	Q	Q	S	S	
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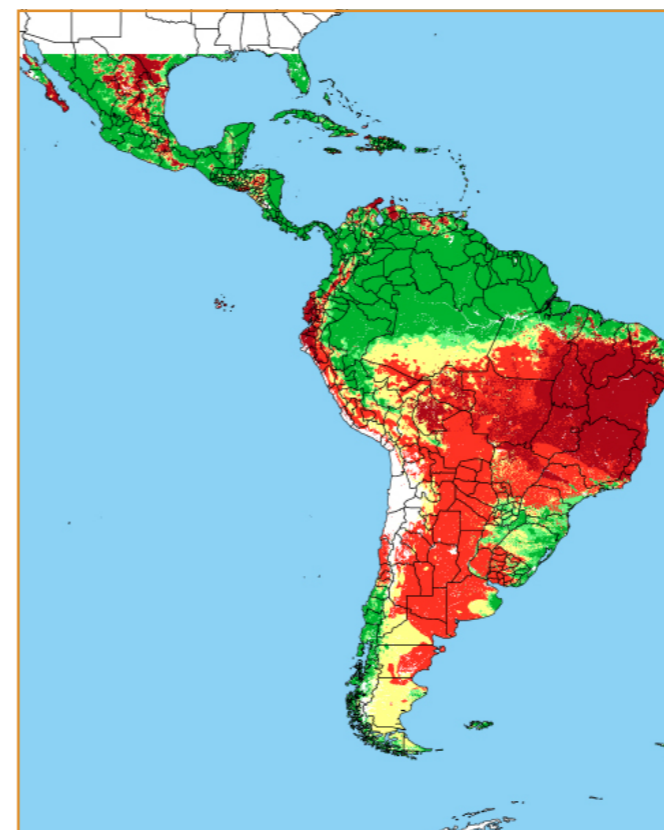
CALENDÁRIO JULIANO



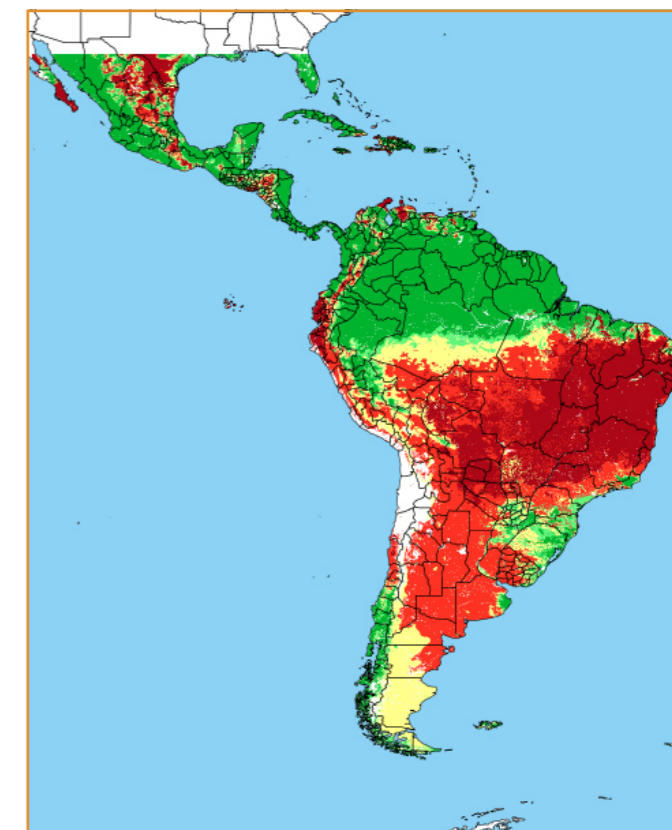
domingo, 8 de julho



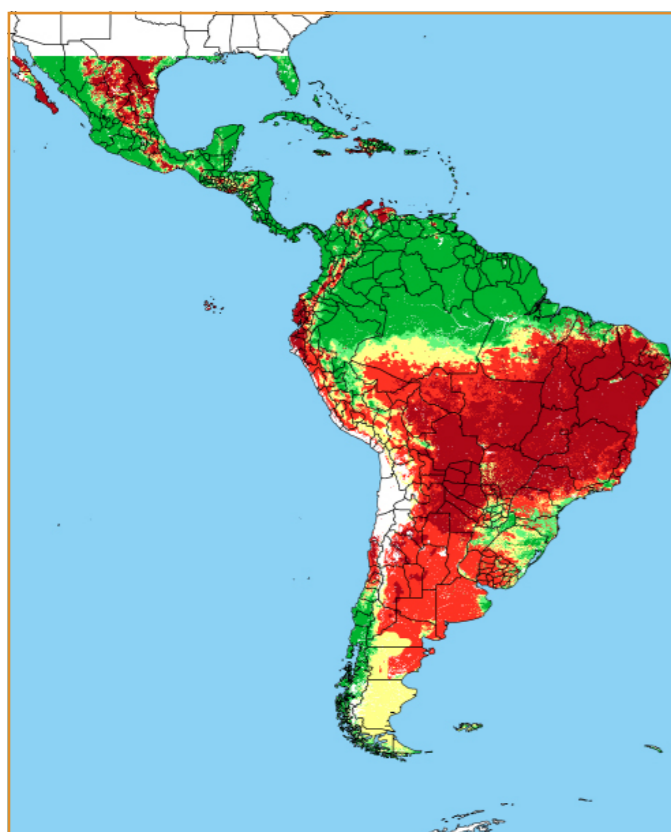
segunda-feira, 9 de julho



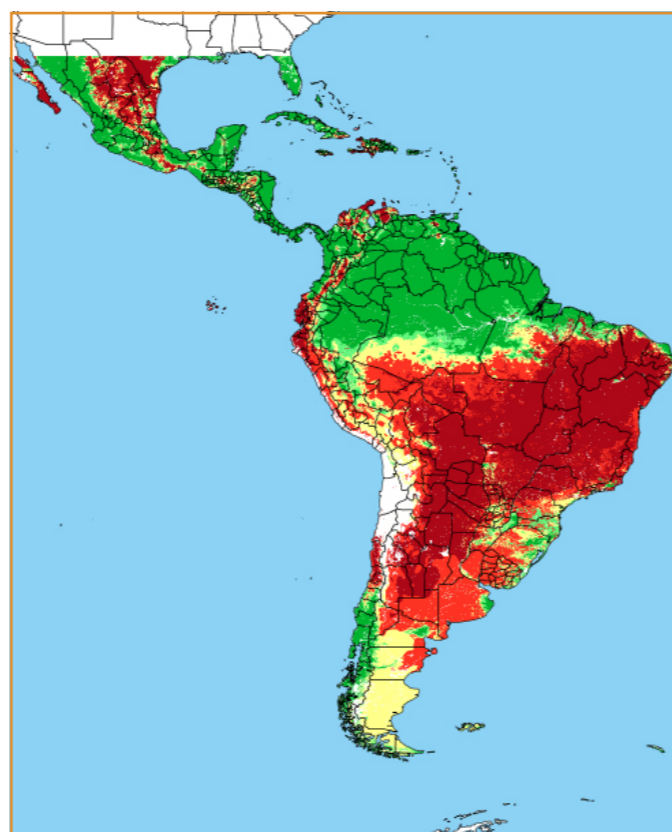
terça-feira, 10 de julho



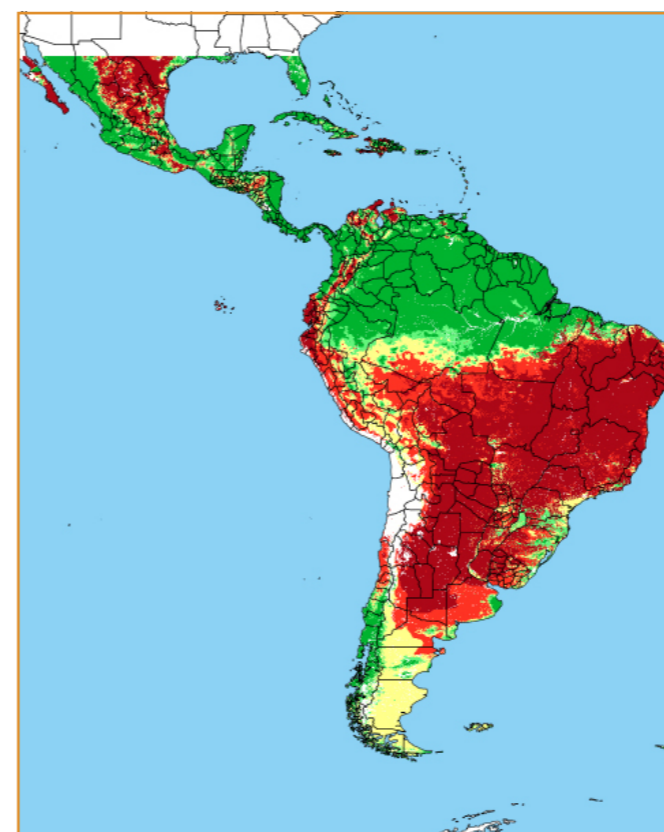
quarta-feira, 11 de julho



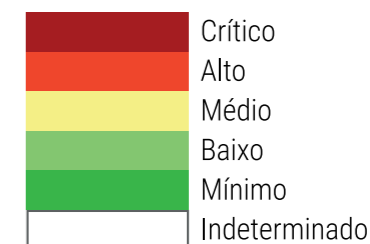
quinta-feira, 12 de julho



sexta-feira, 13 de julho

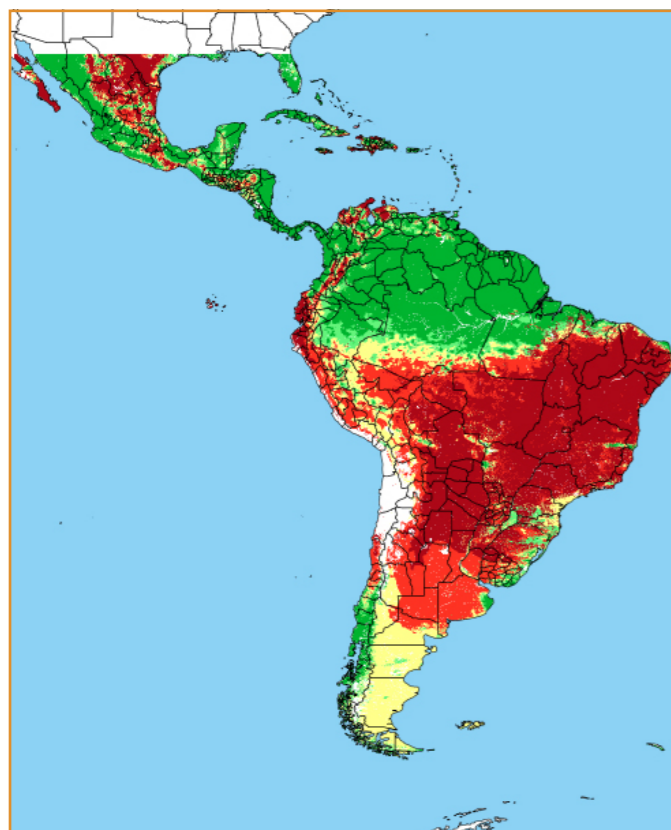


sábado, 14 de julho

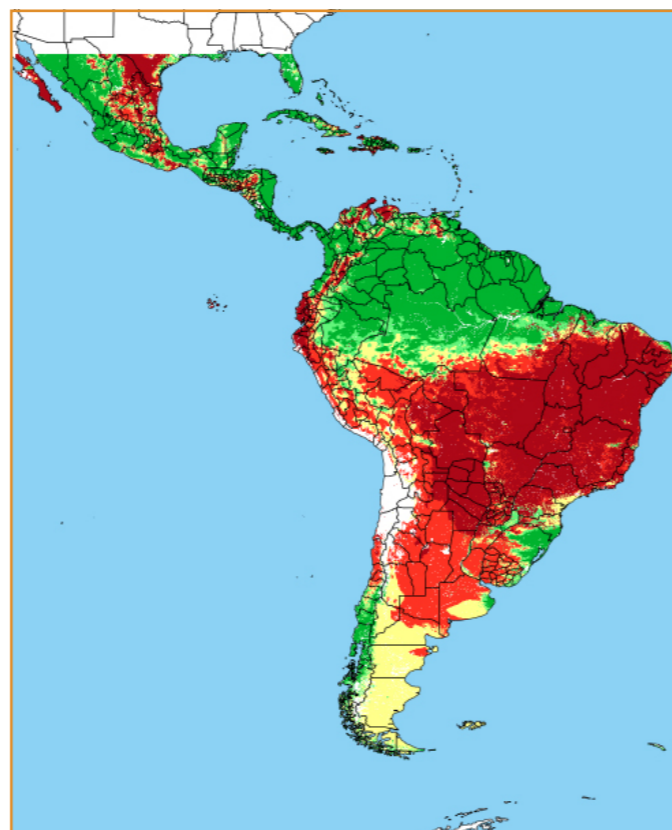


JULHO / 2018						
D	S	T	Q	Q	S	S
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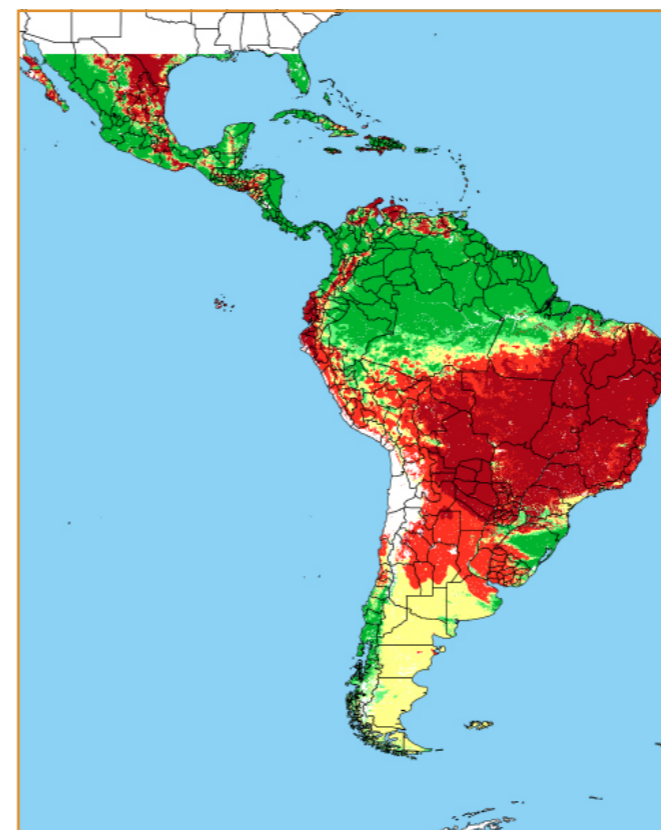
CALENDÁRIO JULIANO



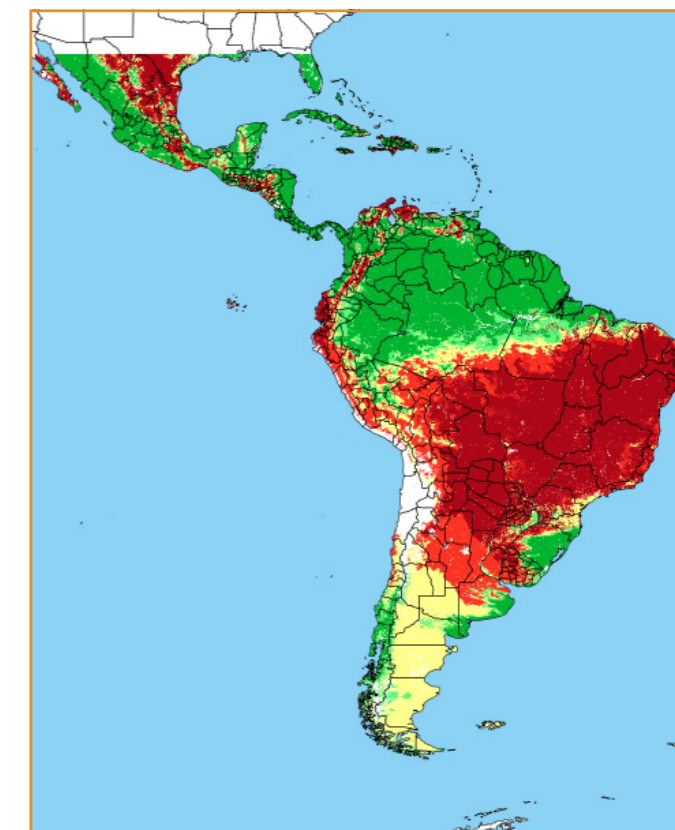
domingo, 15 de julho



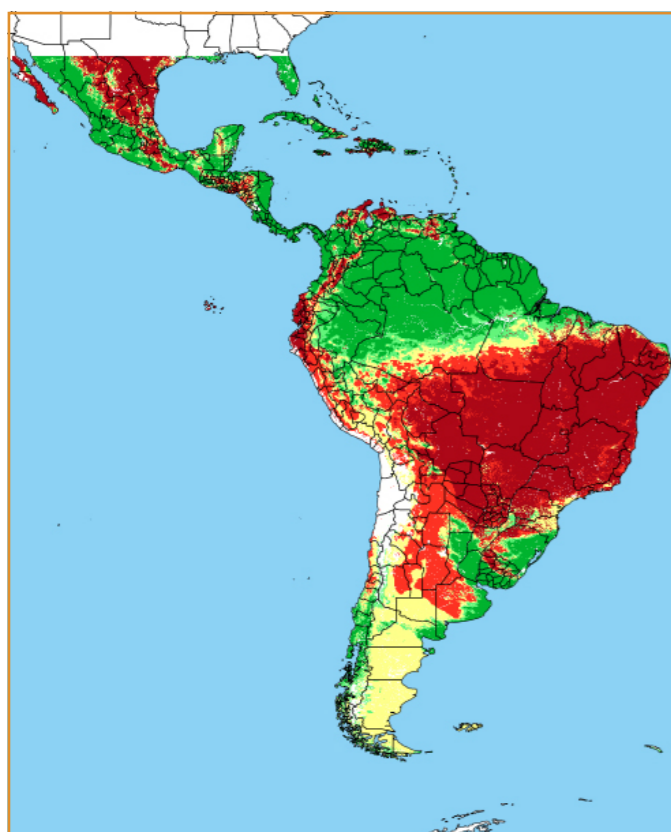
segunda-feira, 16 de julho



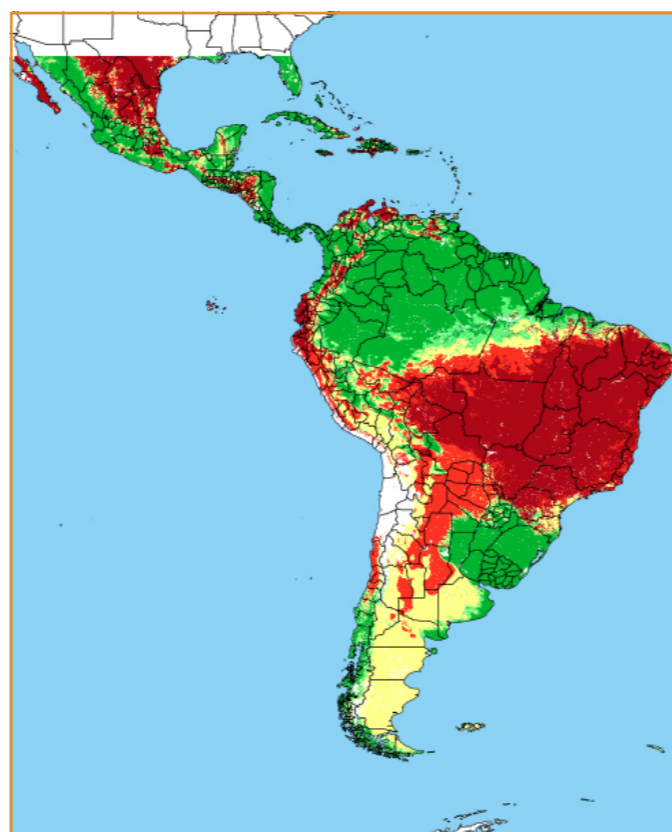
terça-feira, 17 de julho



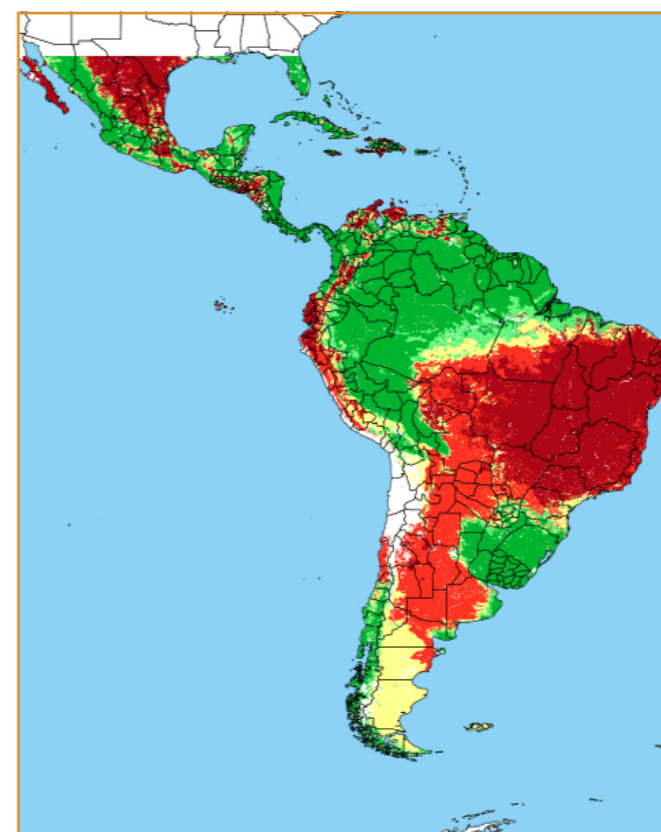
quarta-feira, 18 de julho



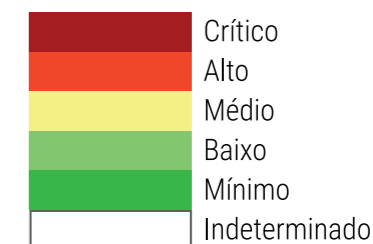
quinta-feira, 19 de julho



sexta-feira, 20 de julho

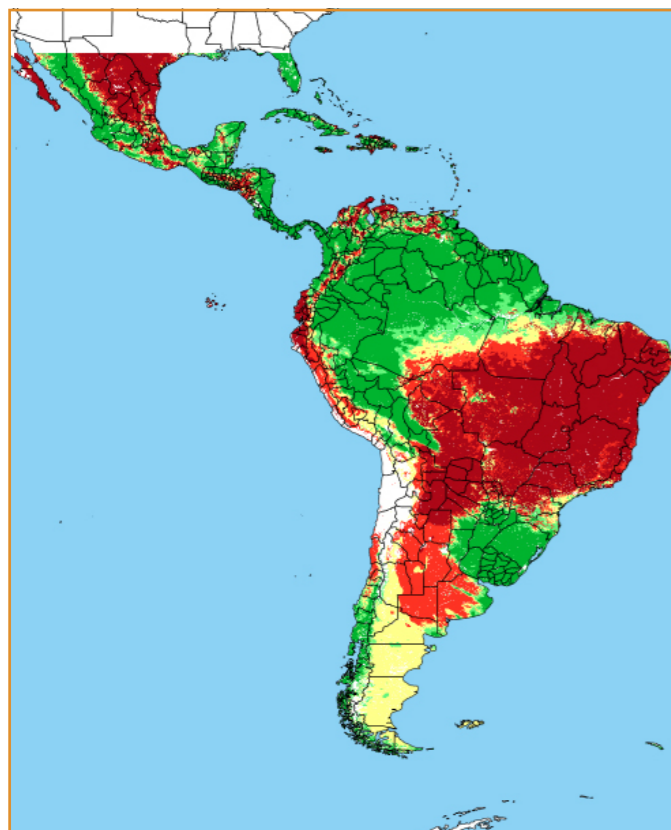


sábado, 21 de julho

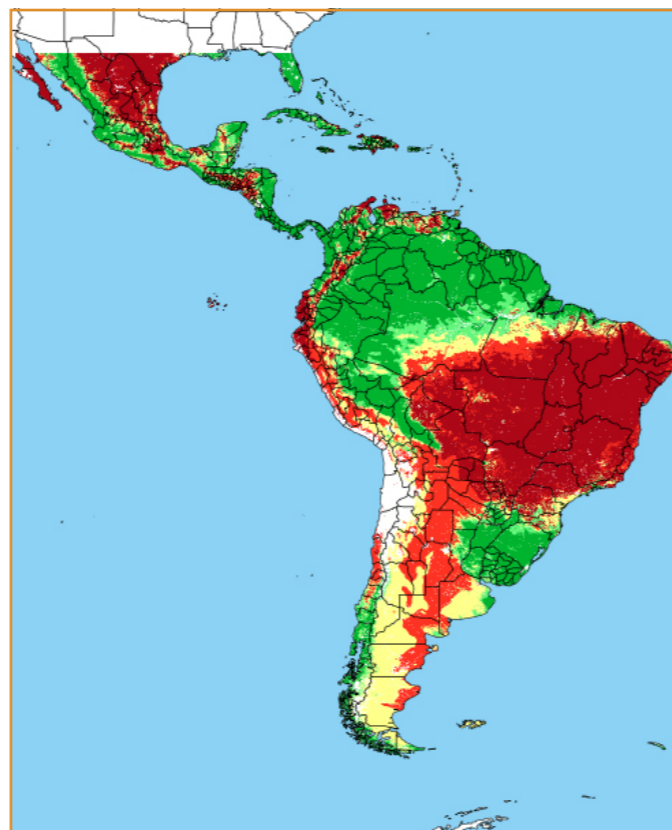


JULHO / 2018						
D	S	T	Q	Q	S	S
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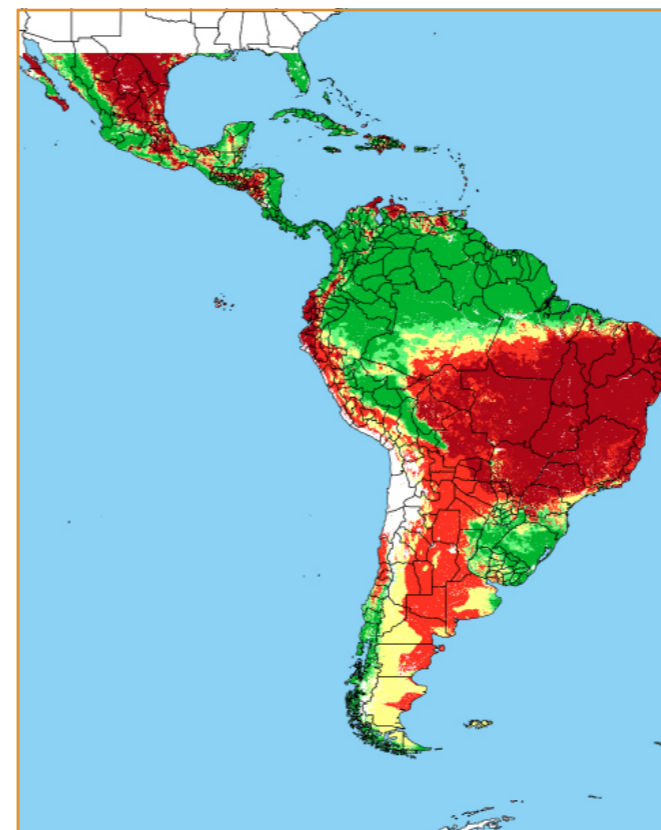
CALENDÁRIO JULIANO



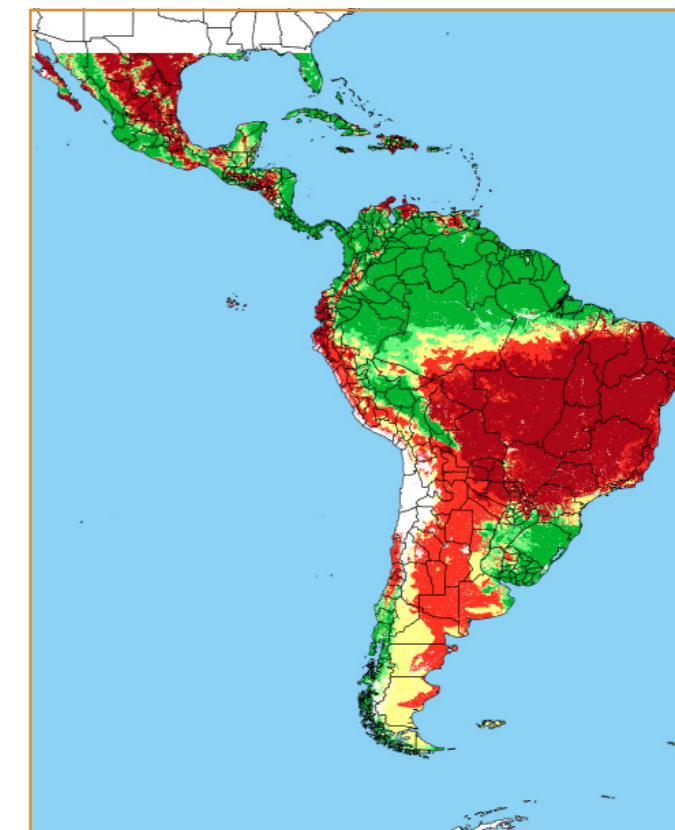
domingo, 22 de julho



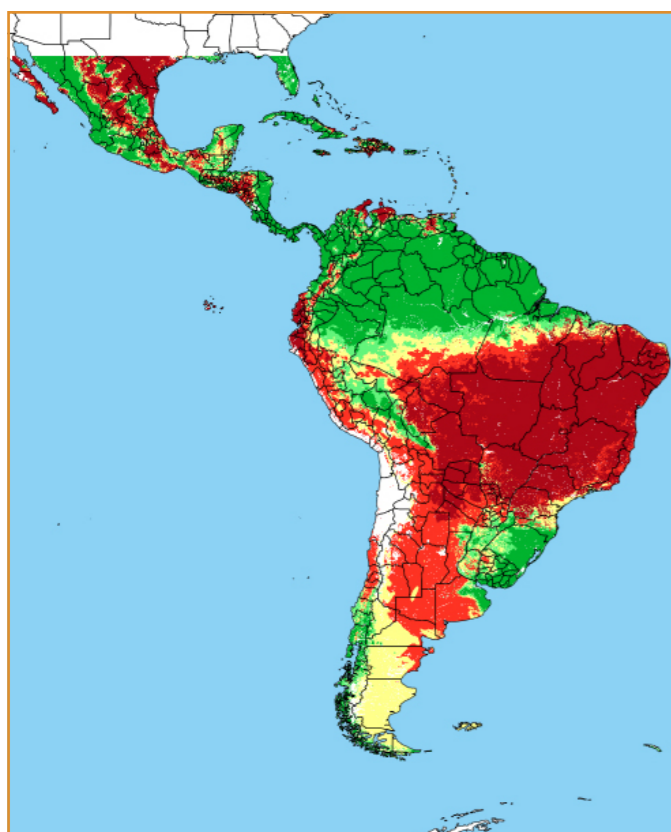
segunda-feira, 23 de julho



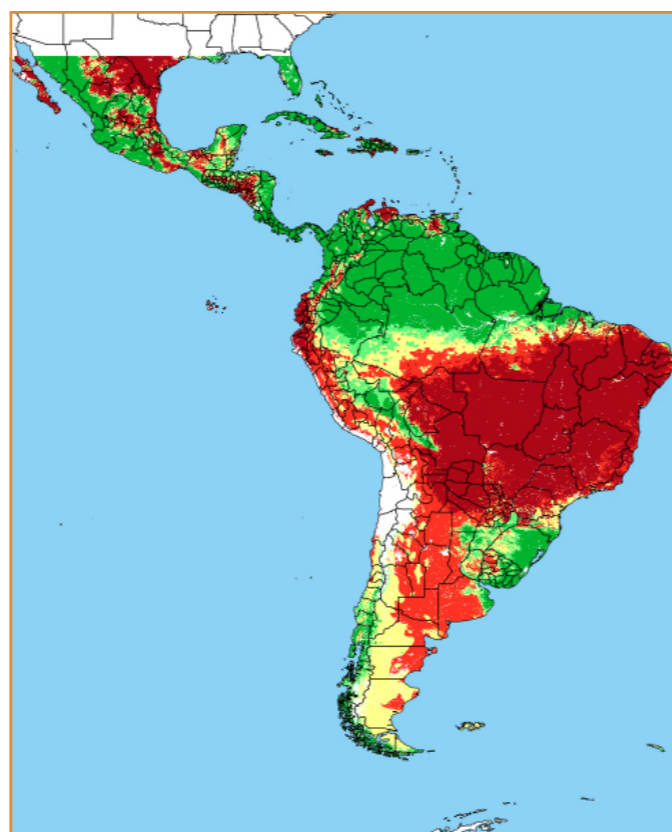
terça-feira, 24 de julho



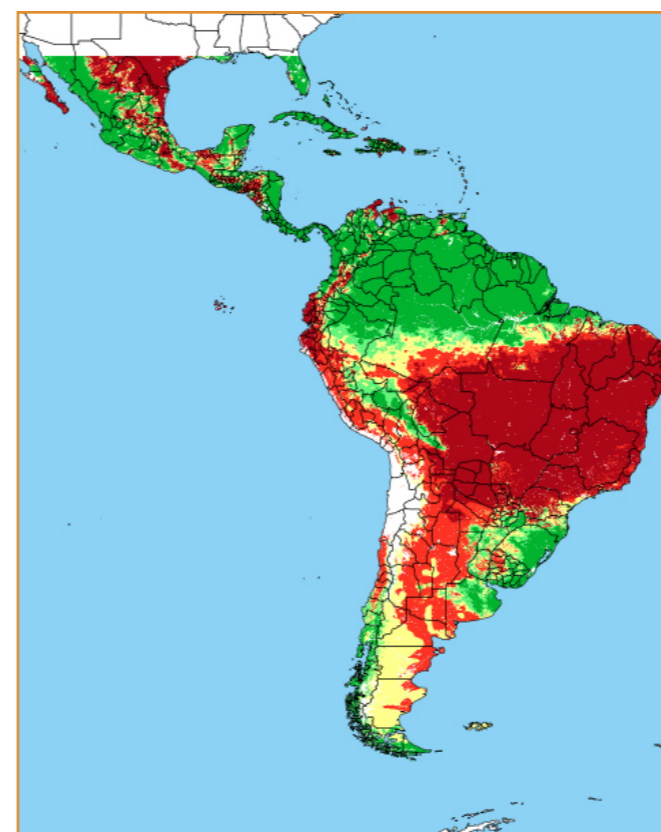
quarta-feira, 25 de julho



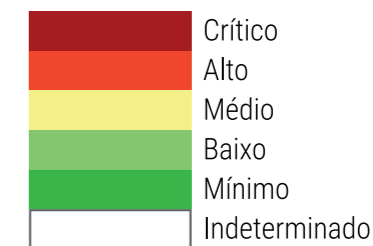
quinta-feira, 26 de julho



sexta-feira, 27 de julho



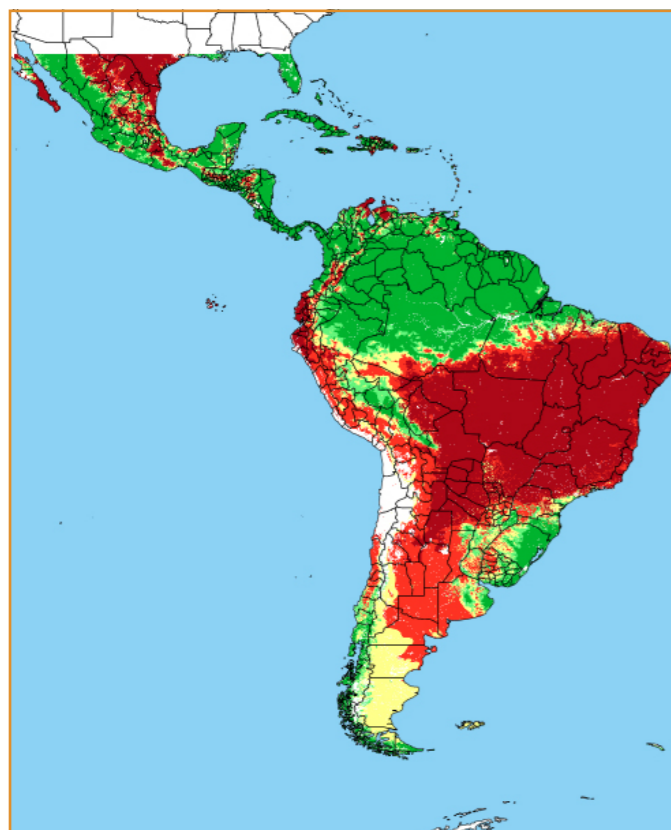
sábado, 28 de julho



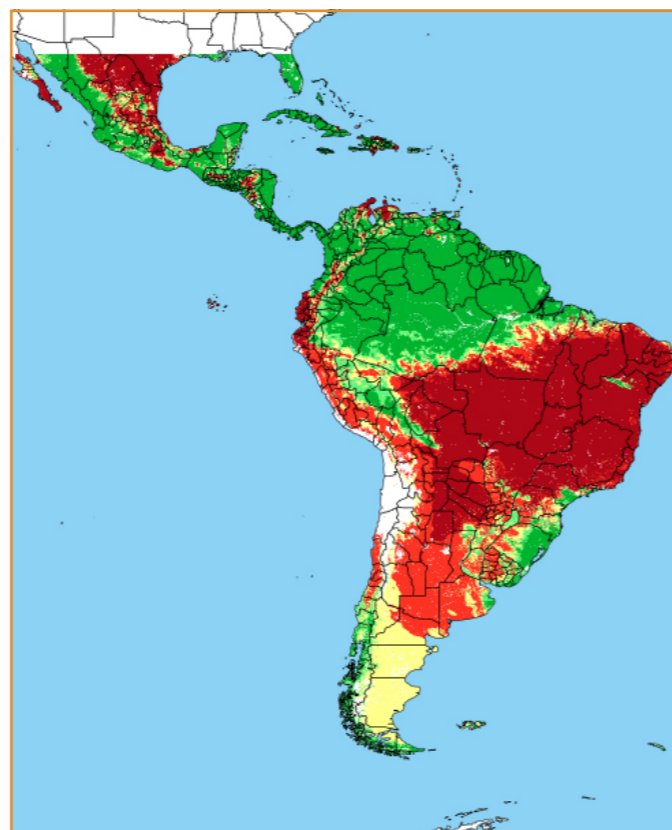
JULHO / 2018

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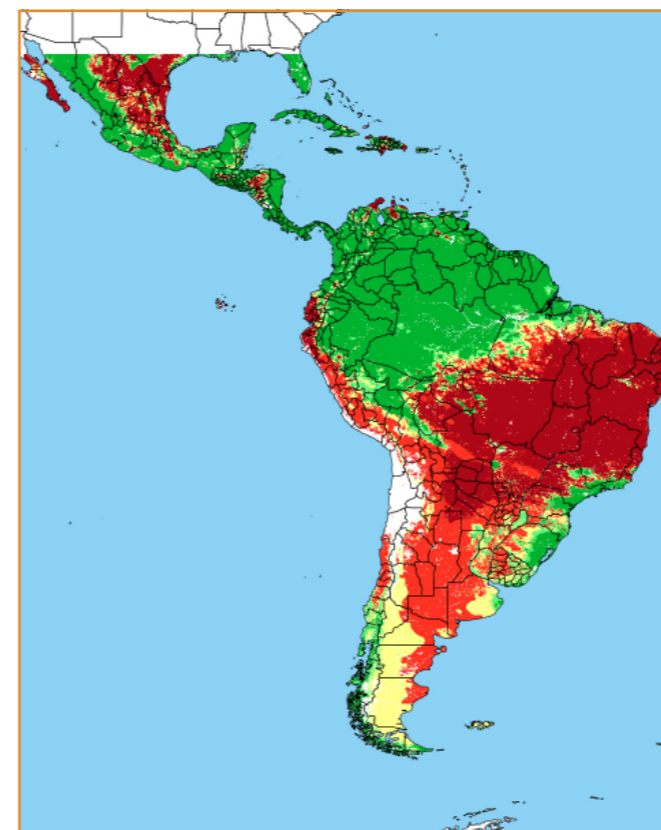
CALENDÁRIO JULIANO



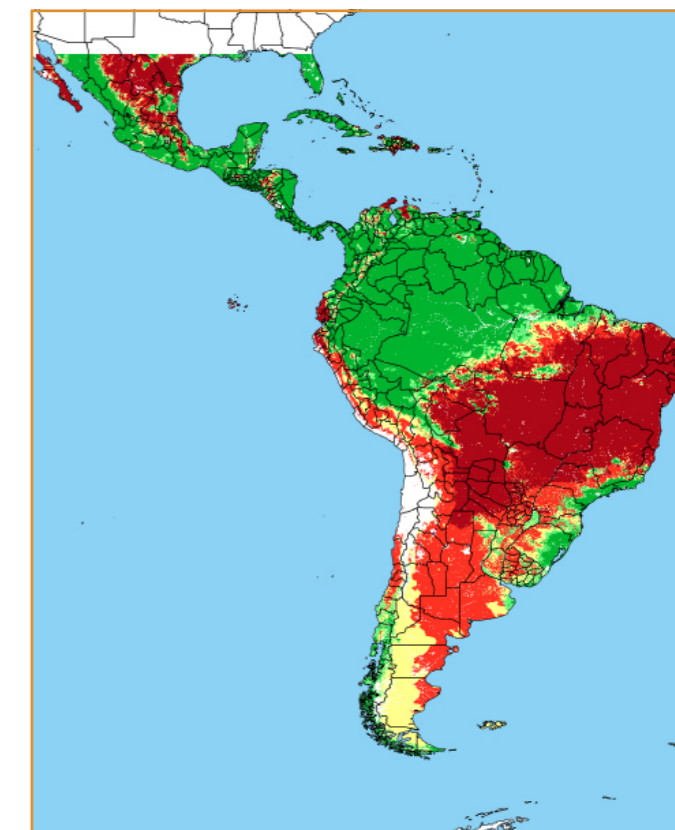
domingo, 29 de julho



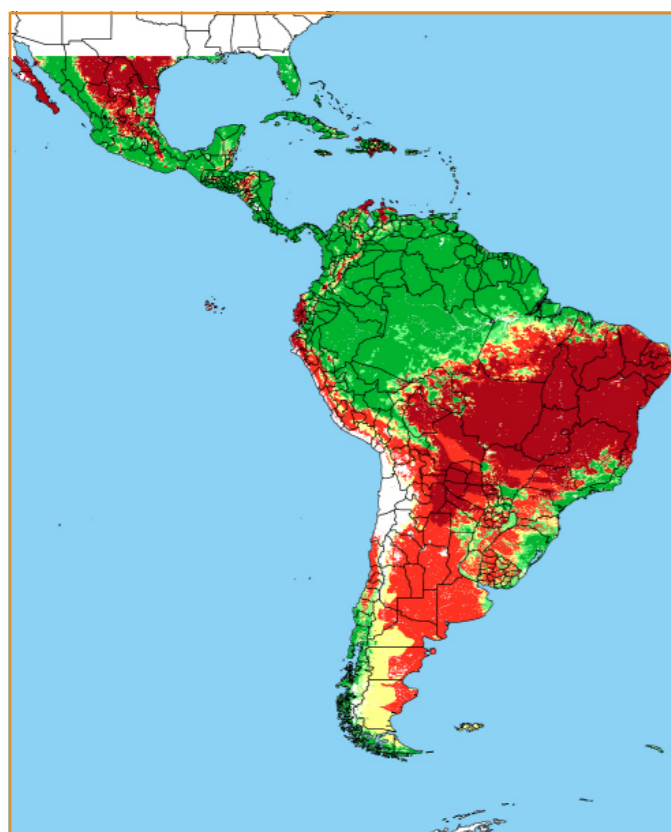
segunda-feira, 30 de julho



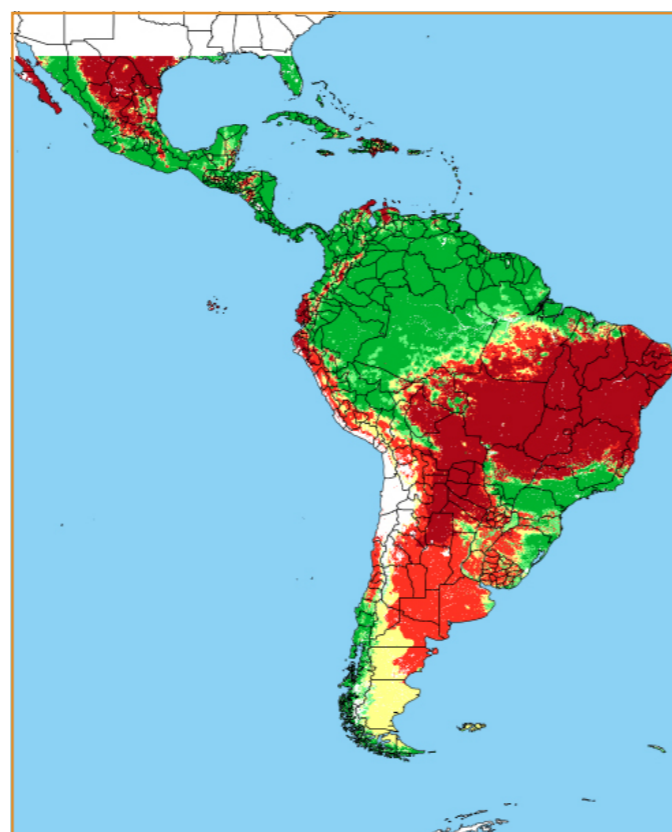
terça-feira, 31 de julho



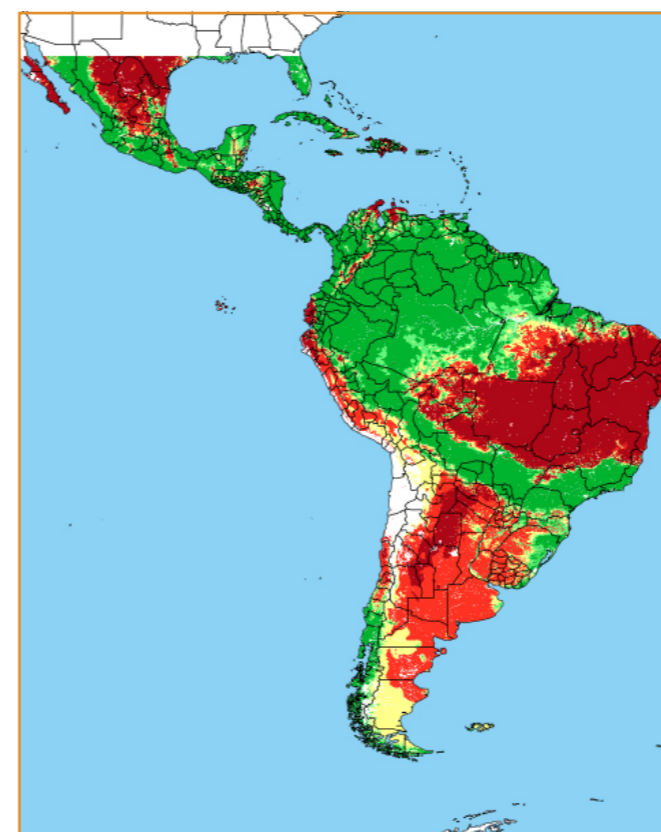
quarta-feira, 1 de agosto



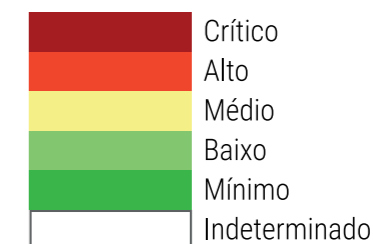
quinta-feira, 2 de agosto



sexta-feira, 3 de agosto



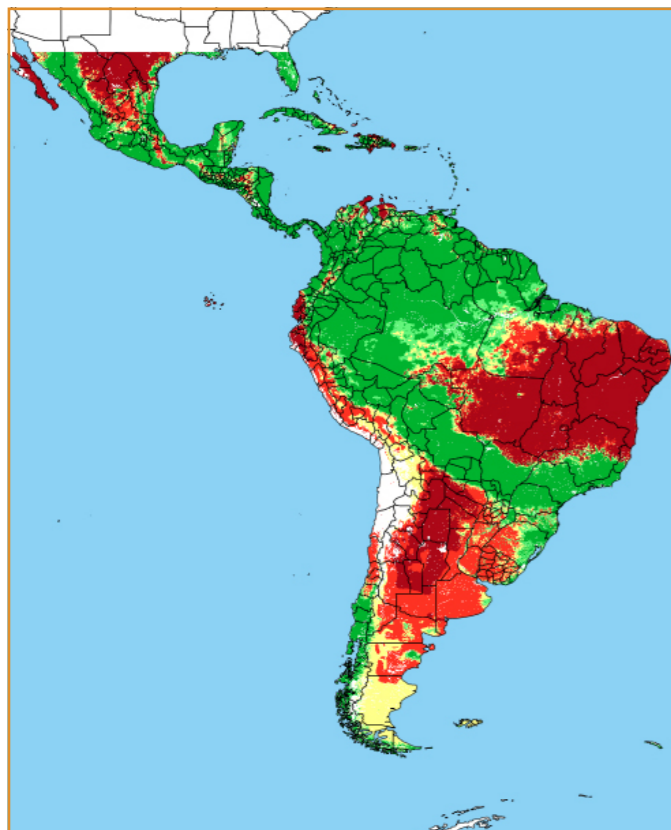
sábado, 4 de agosto



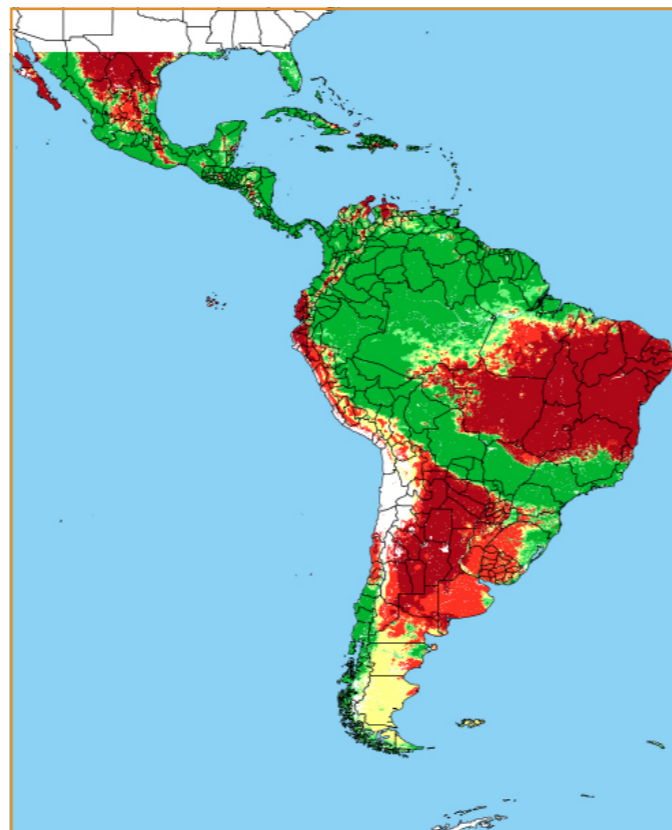
JULHO / 2018

D	S	T	Q	Q	S	S
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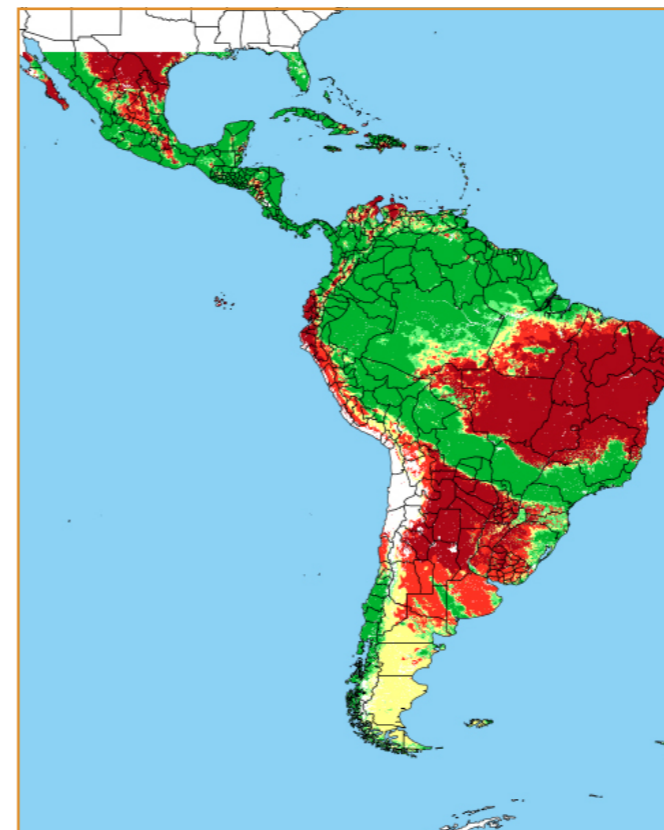
CALENDÁRIO JULIANO



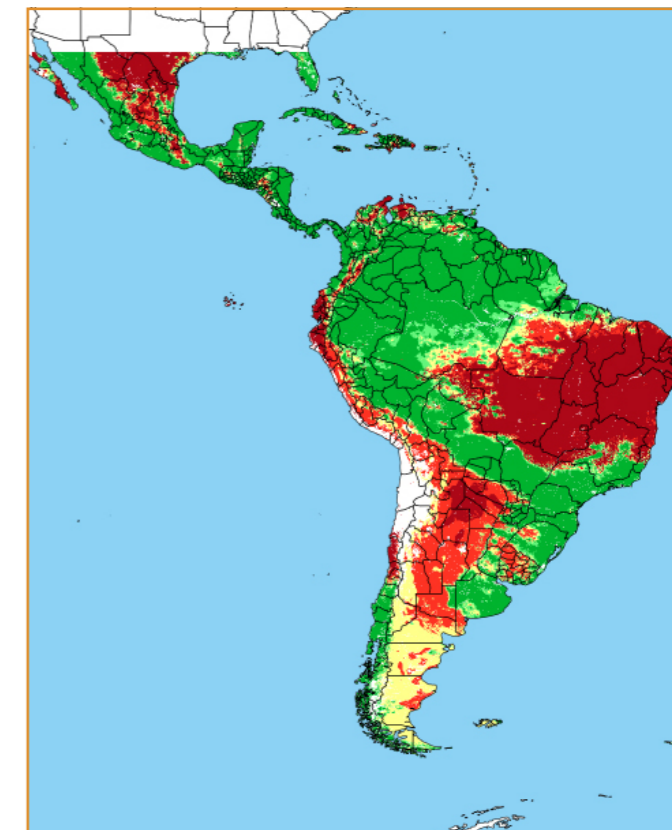
domingo, 5 de agosto



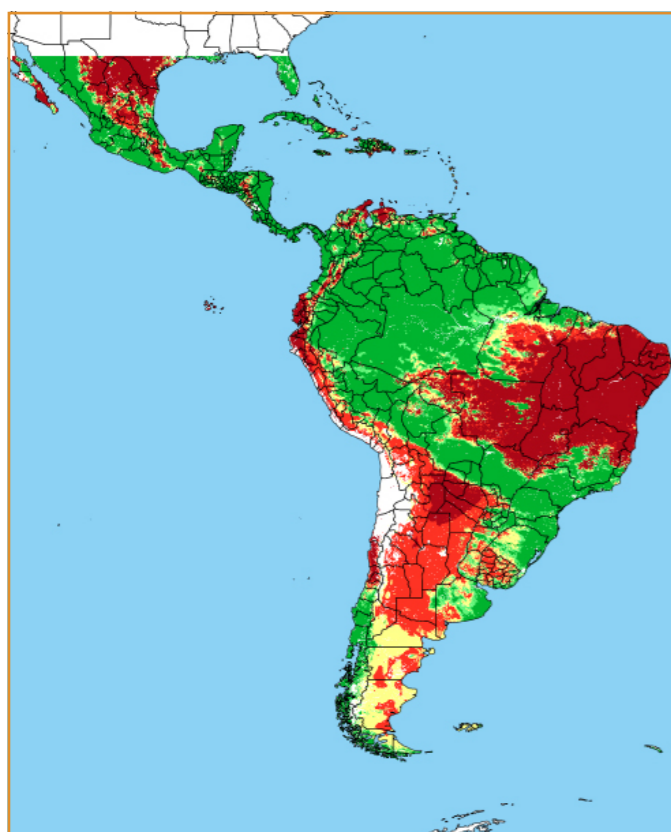
segunda-feira, 6 de agosto



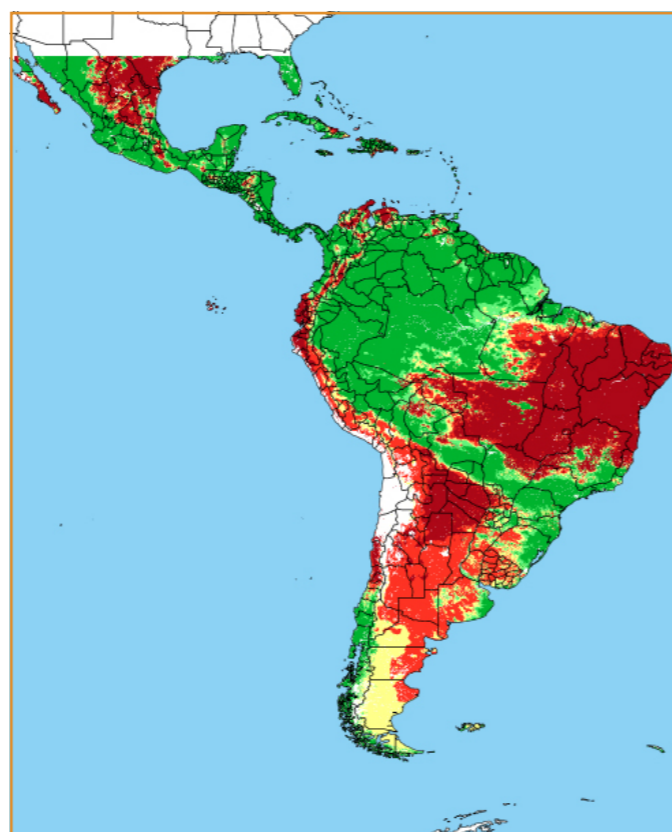
terça-feira, 7 de agosto



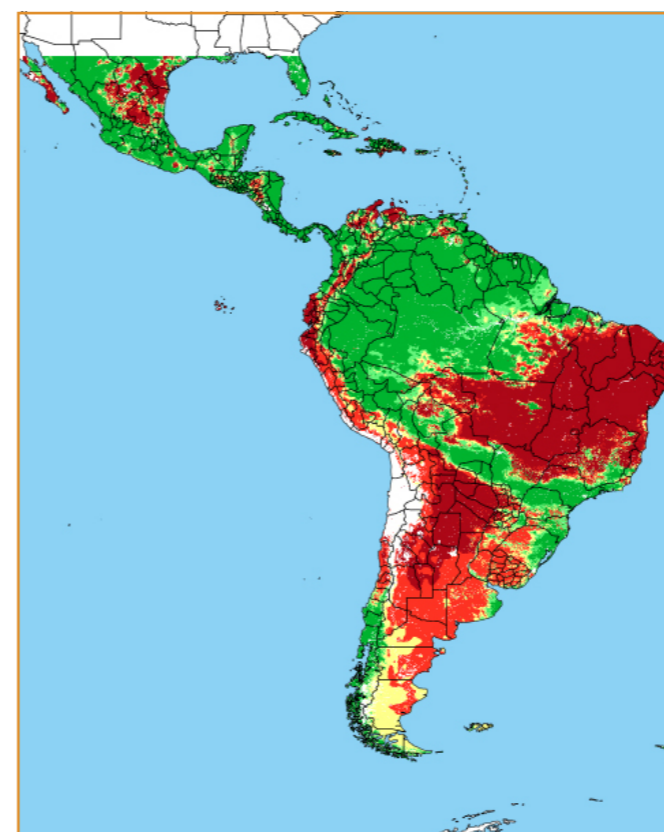
quarta-feira, 8 de agosto



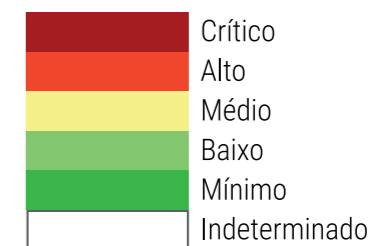
quinta-feira, 9 de agosto



sexta-feira, 10 de agosto

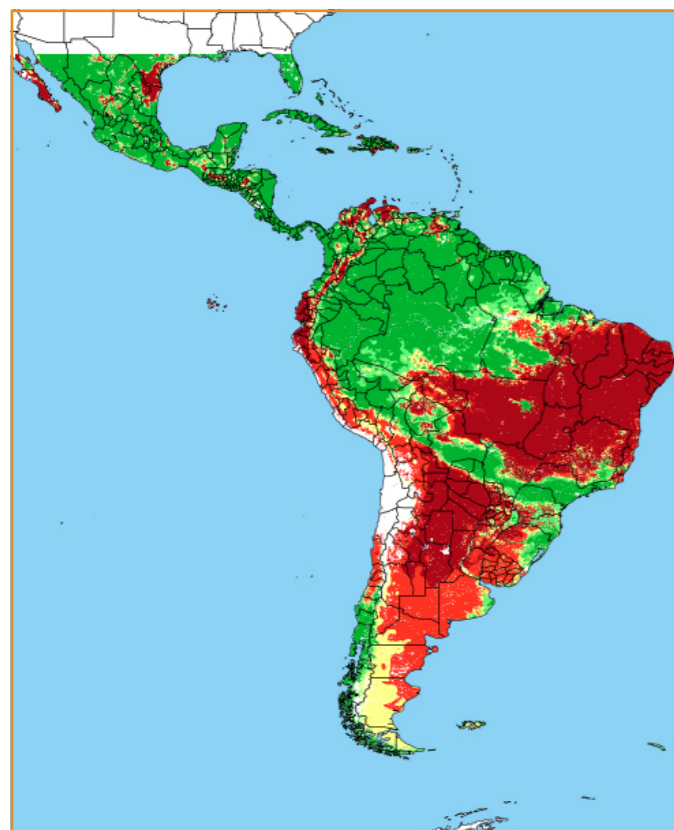


sábado, 11 de agosto

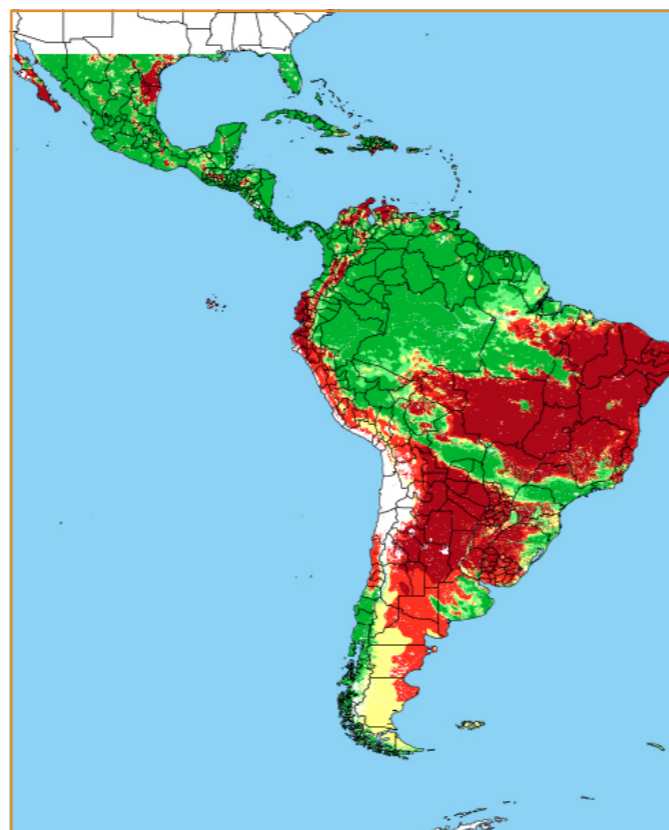


AGOSTO / 2018						
D	S	T	Q	Q	S	S
			213	214	215	216
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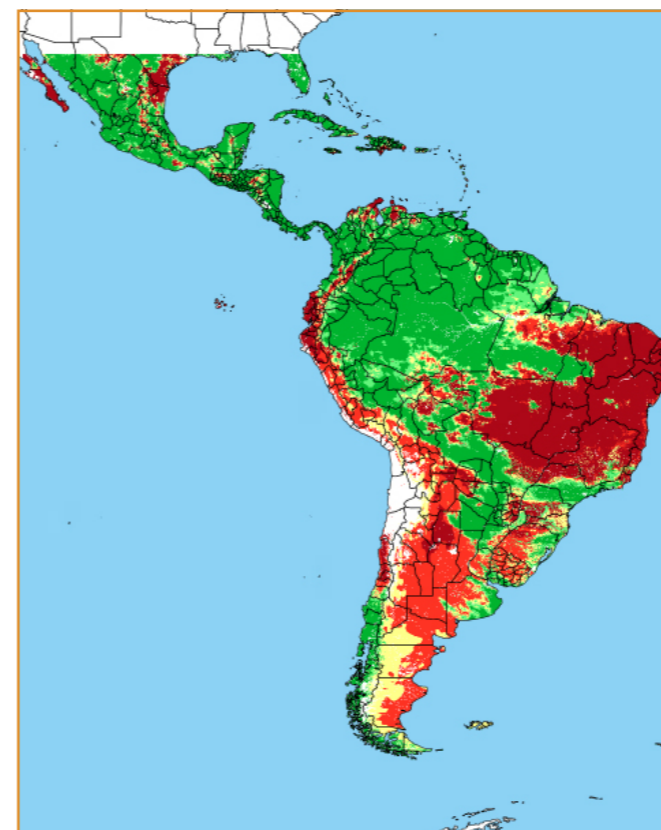
CALENDÁRIO JULIANO



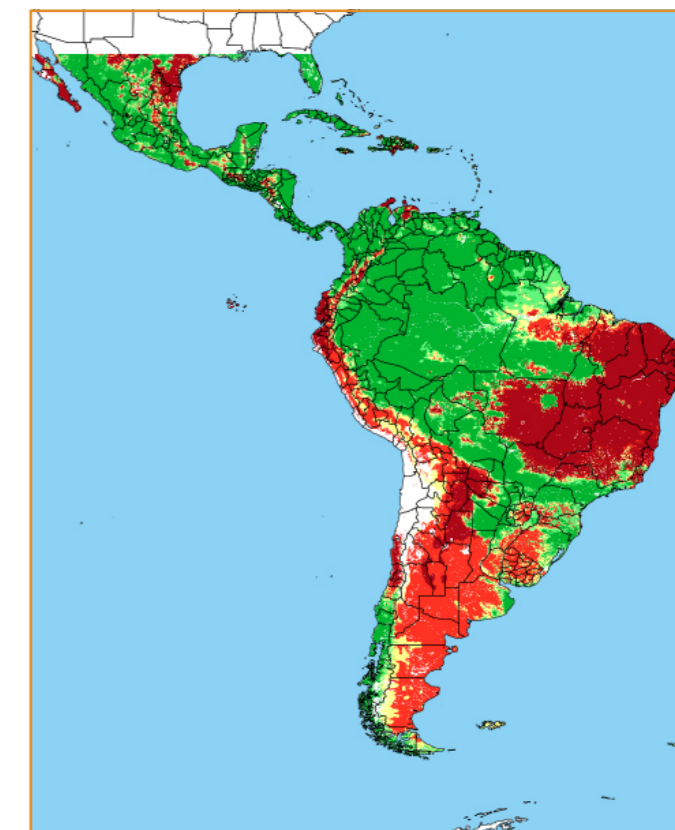
domingo, 12 de agosto



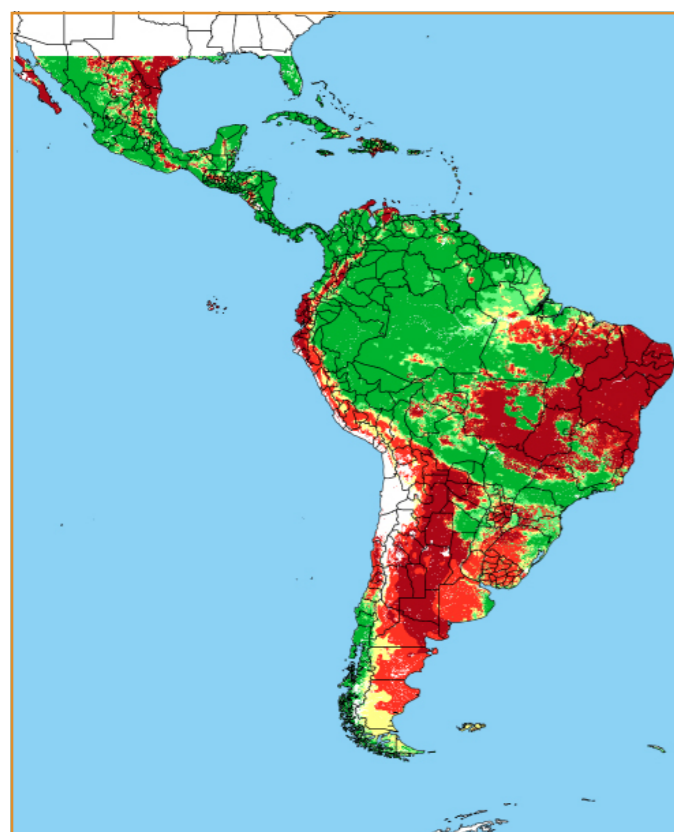
segunda-feira, 13 de agosto



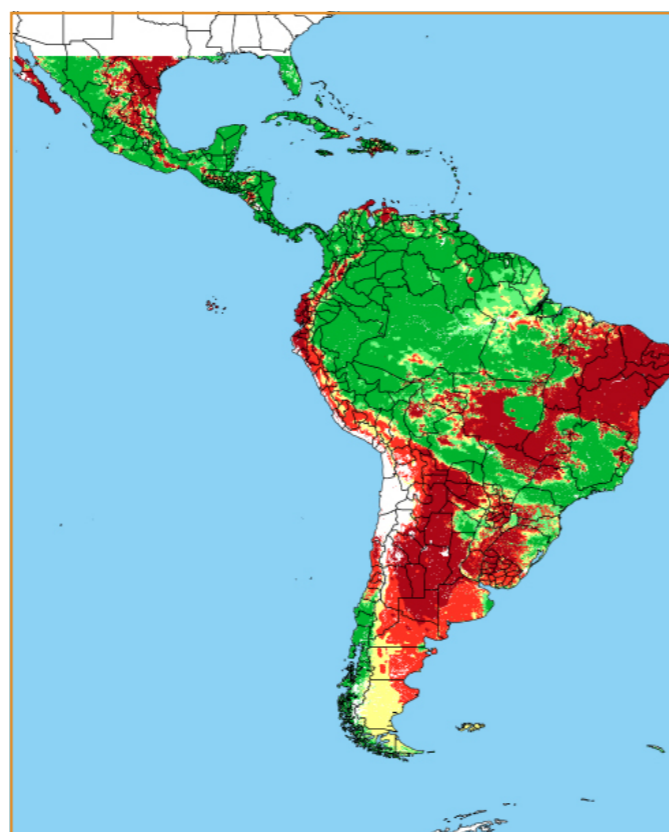
terça-feira, 14 de agosto



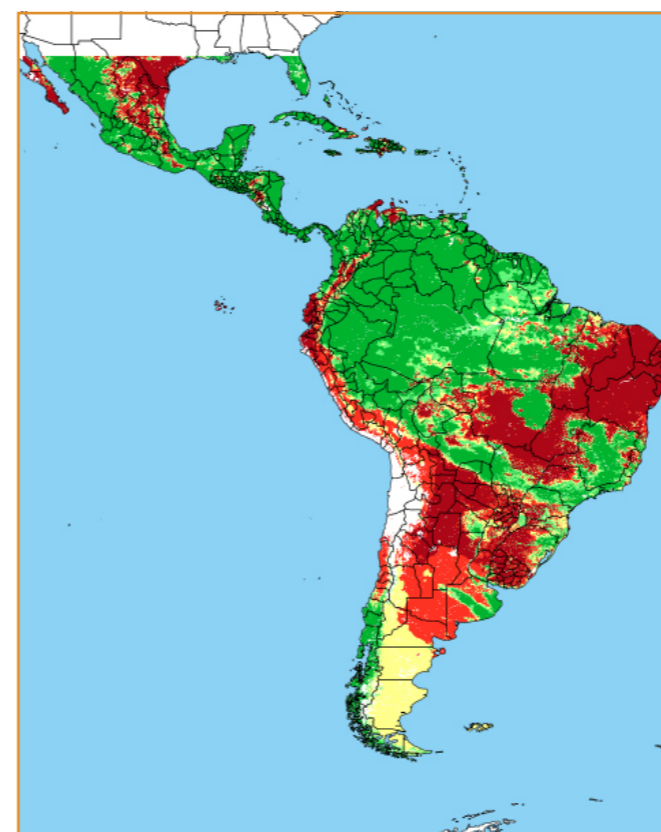
quarta-feira, 15 de agosto



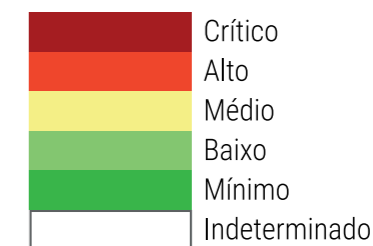
quinta-feira, 16 de agosto



sexta-feira, 17 de agosto

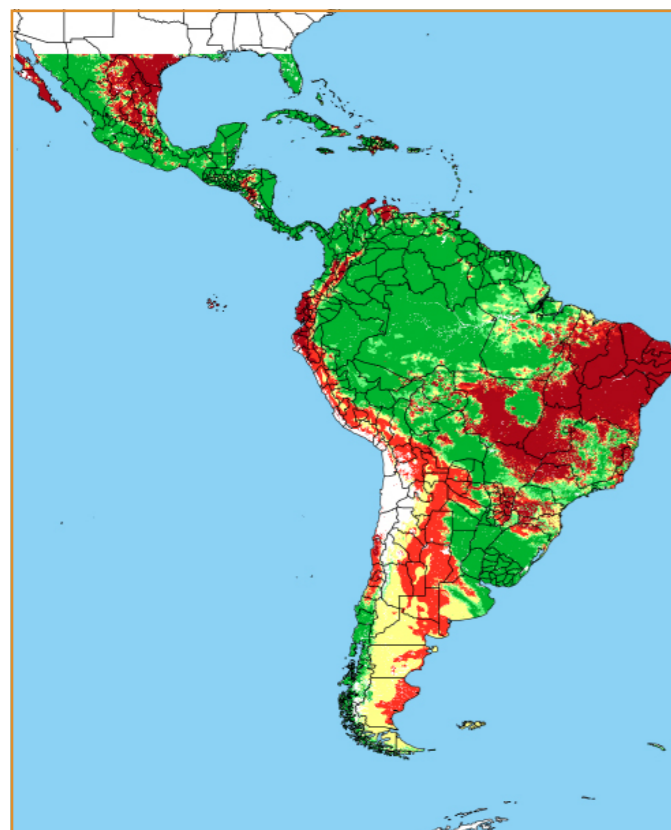


sábado, 18 de agosto

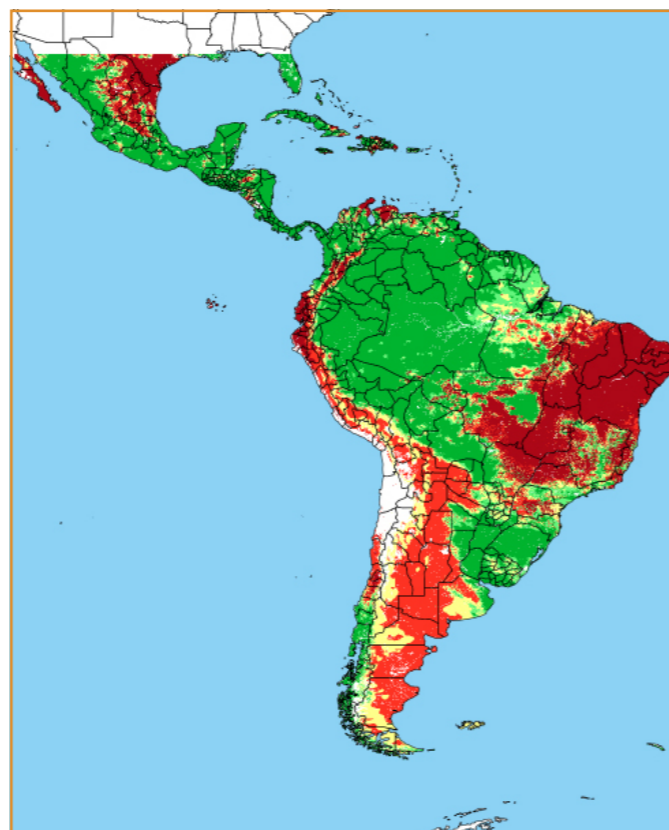


AGOSTO / 2018						
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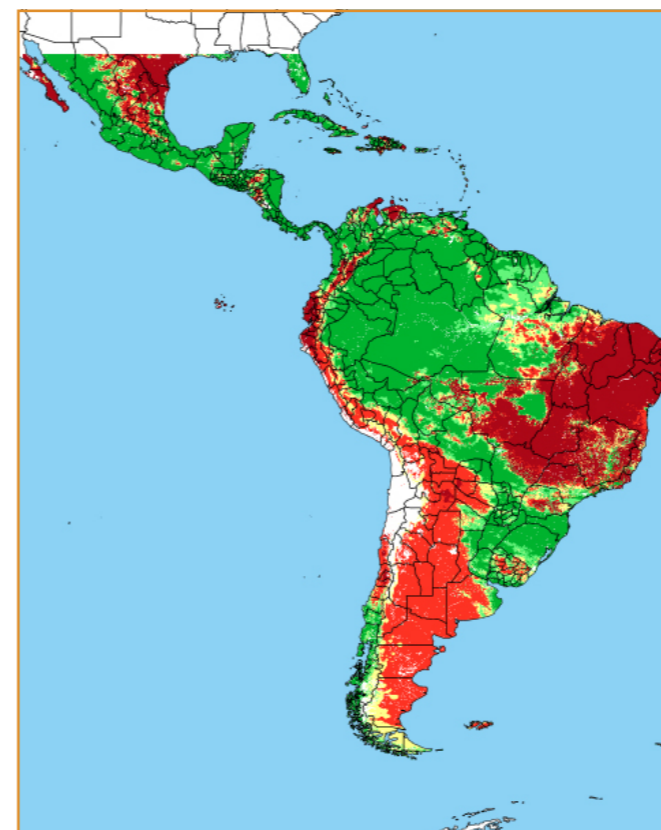
CALENDÁRIO JULIANO



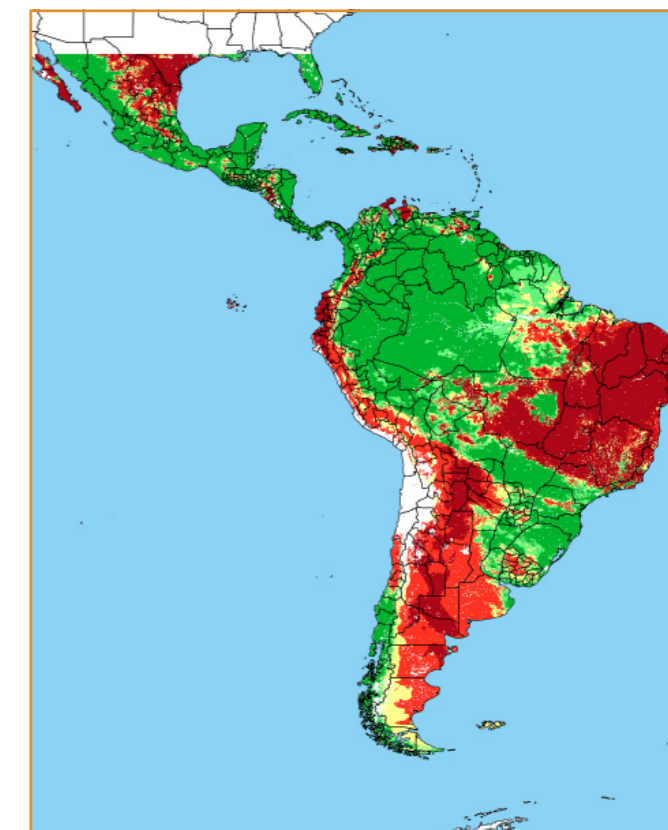
domingo, 19 de agosto



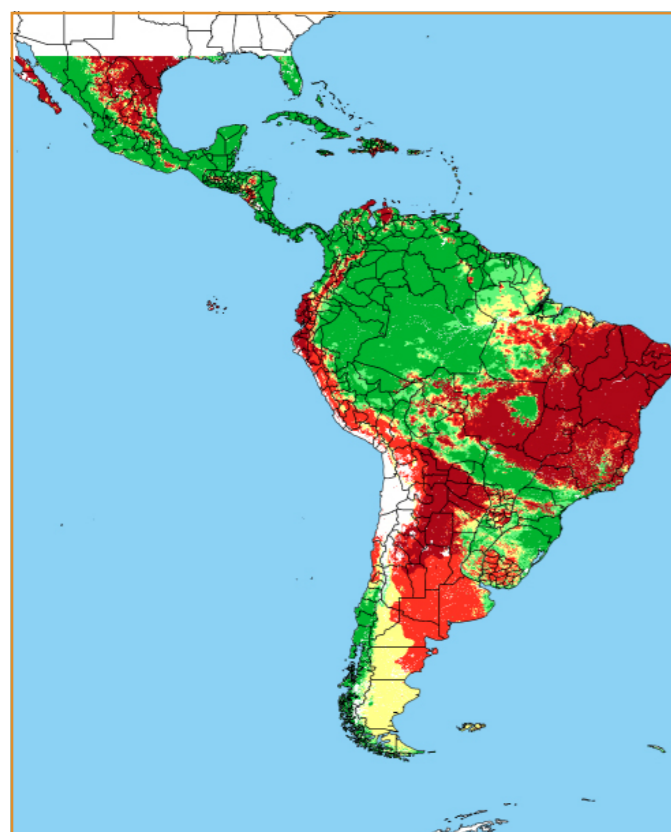
segunda-feira, 20 de agosto



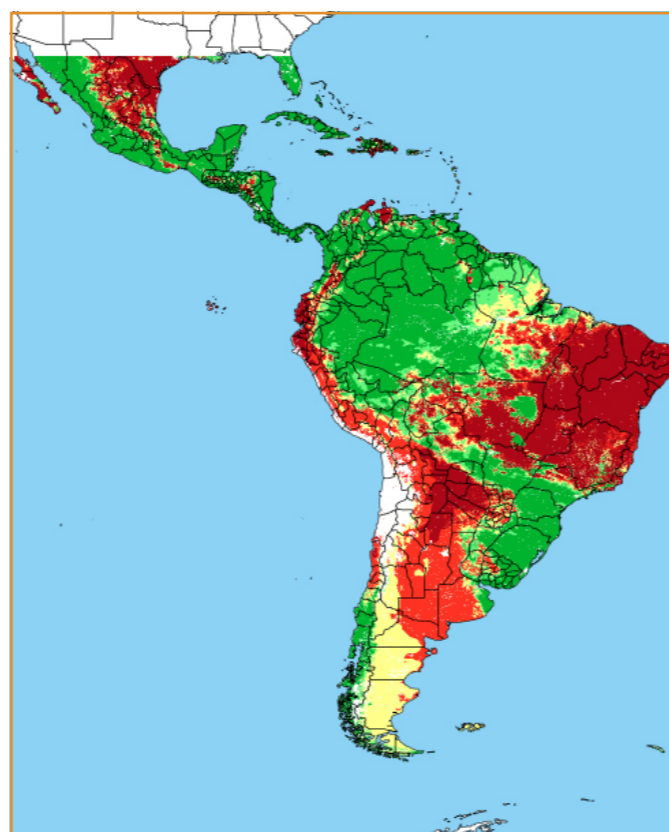
terça-feira, 21 de agosto



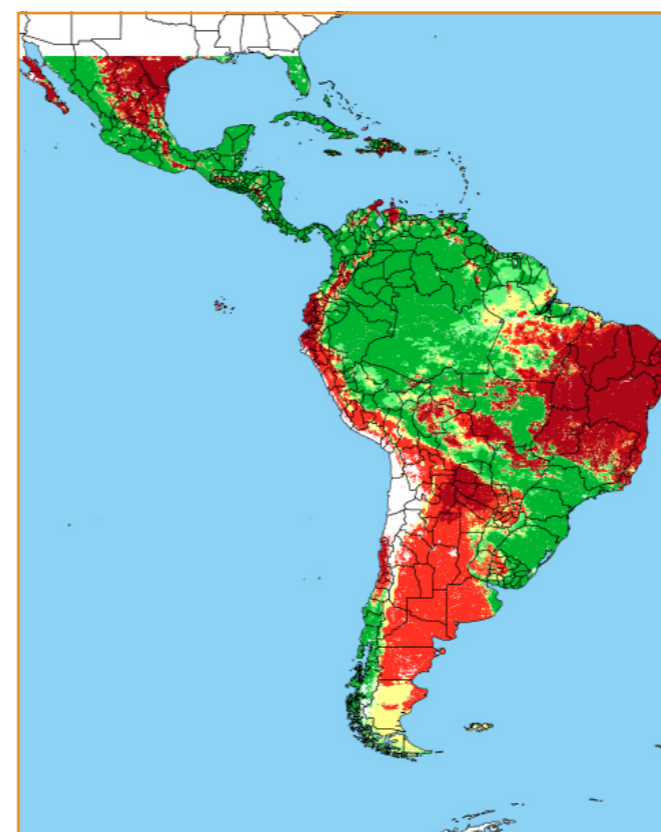
quarta-feira, 22 de agosto



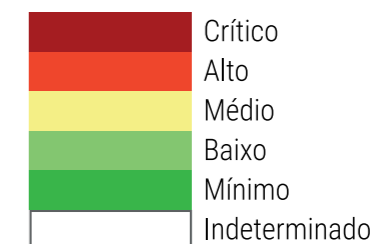
quinta-feira, 23 de agosto



sexta-feira, 24 de agosto



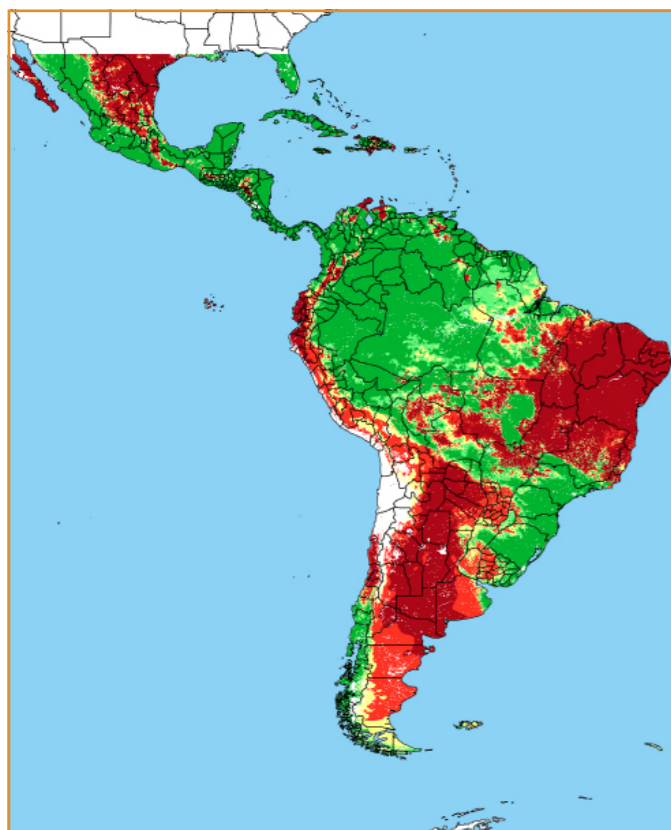
sábado, 25 de agosto



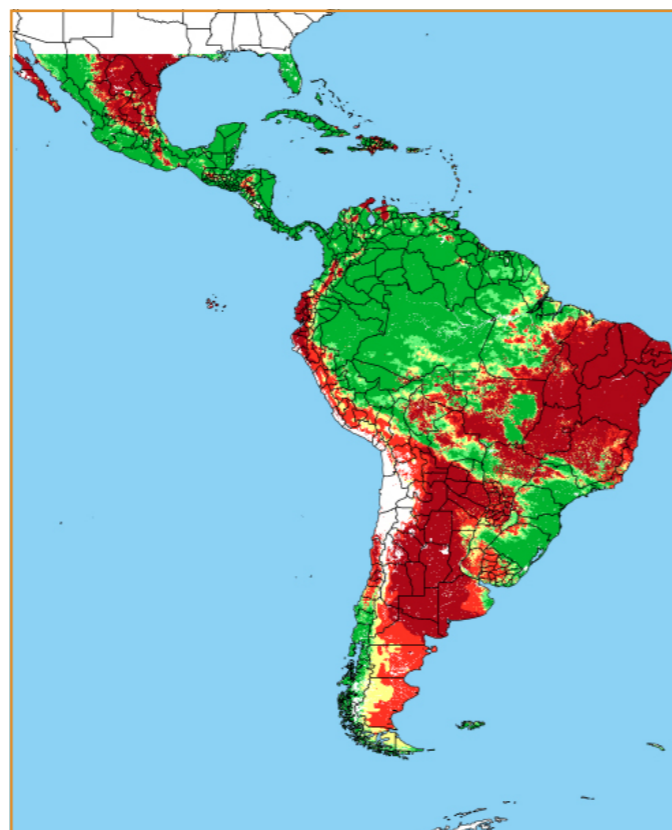
AGOSTO / 2018						
D	S	T	Q	Q	S	S
			213	214	215	216
217	218	219	220	221	222	223
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238	239	240	241	242	243	

CALENDÁRIO JULIANO

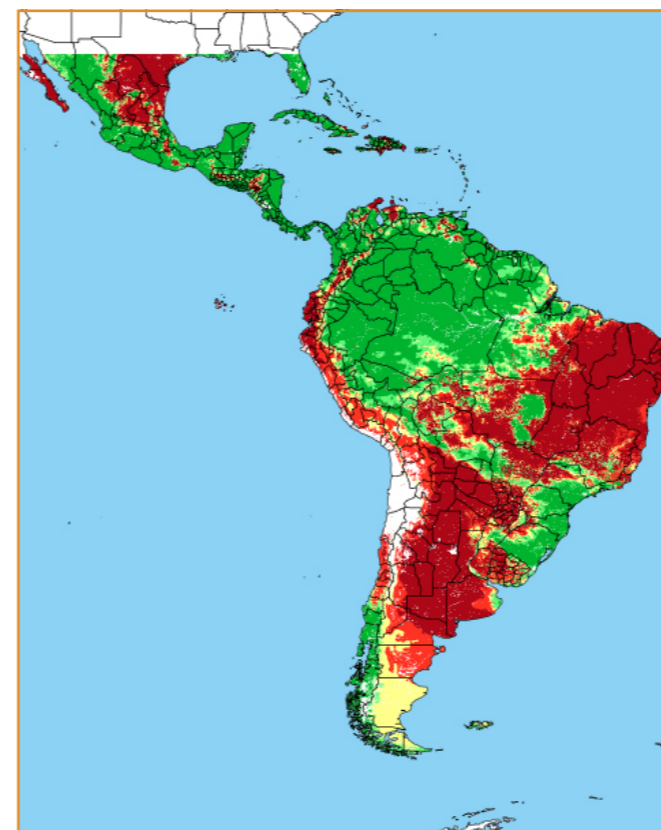




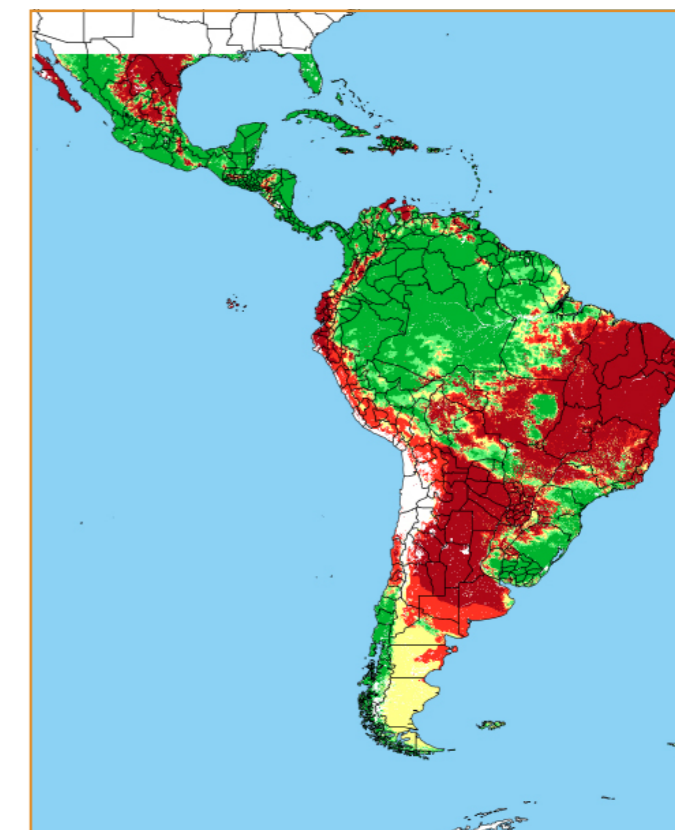
domingo, 26 de agosto



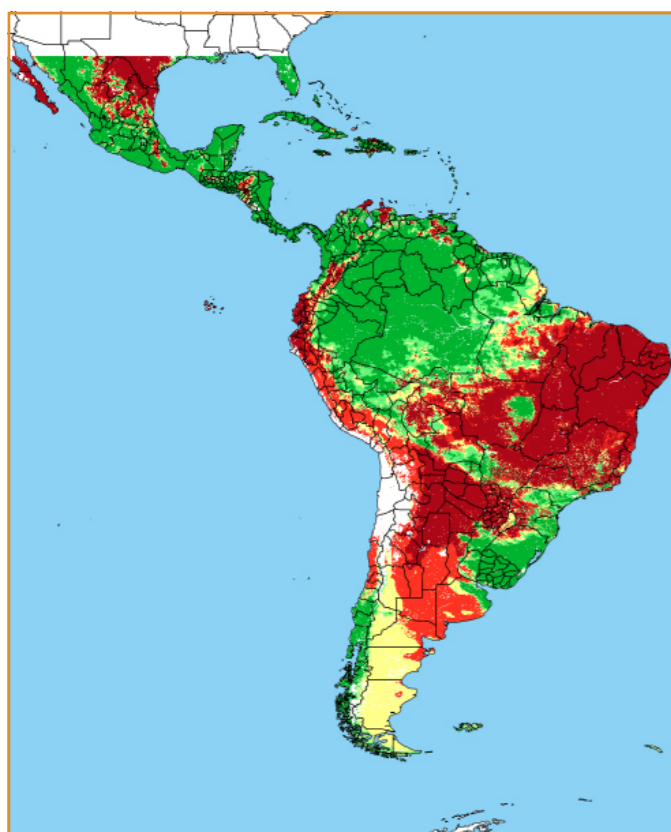
segunda-feira, 27 de agosto



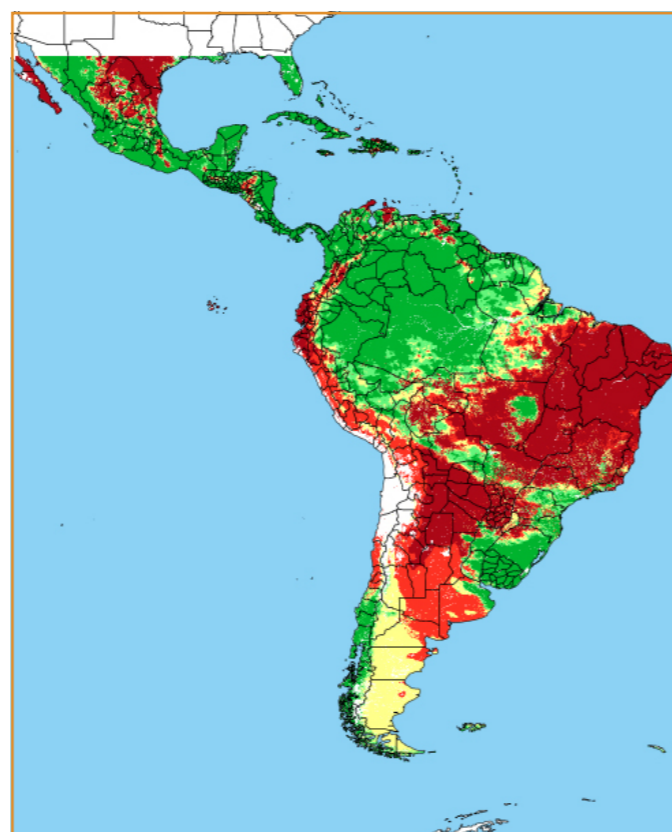
terça-feira, 28 de agosto



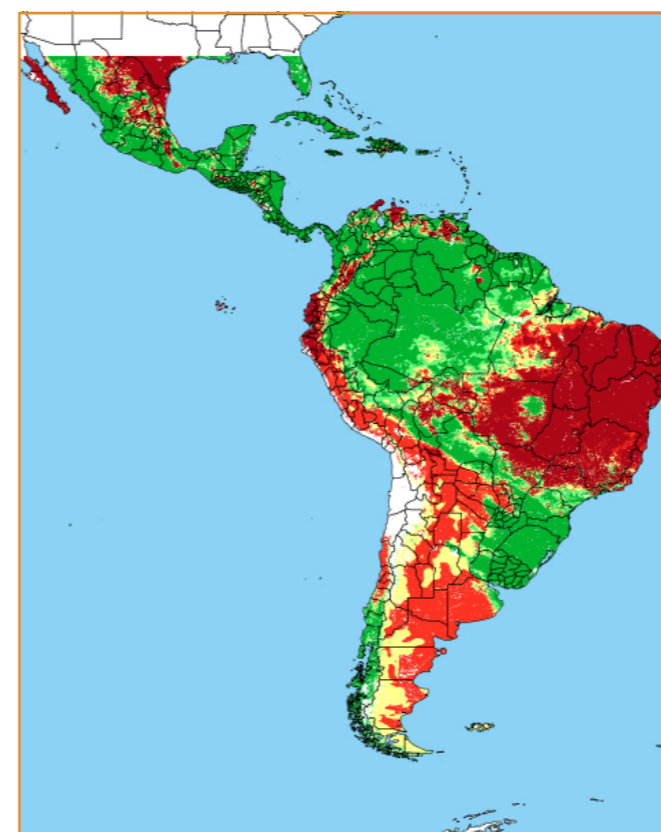
quarta-feira, 29 de agosto



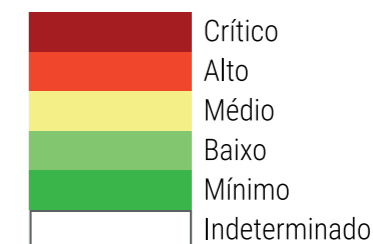
quinta-feira, 30 de agosto



sexta-feira, 31 de agosto

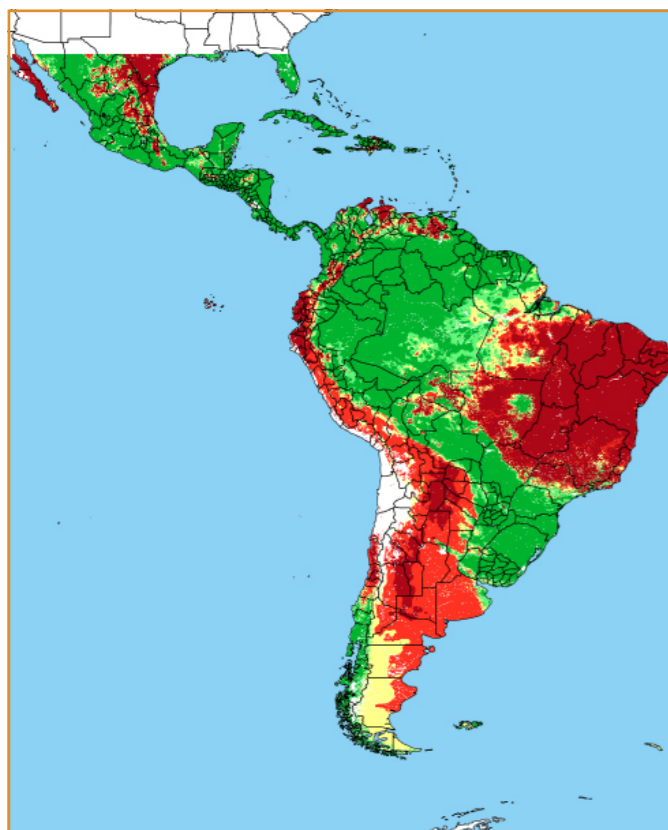


sábado, 1 de setembro

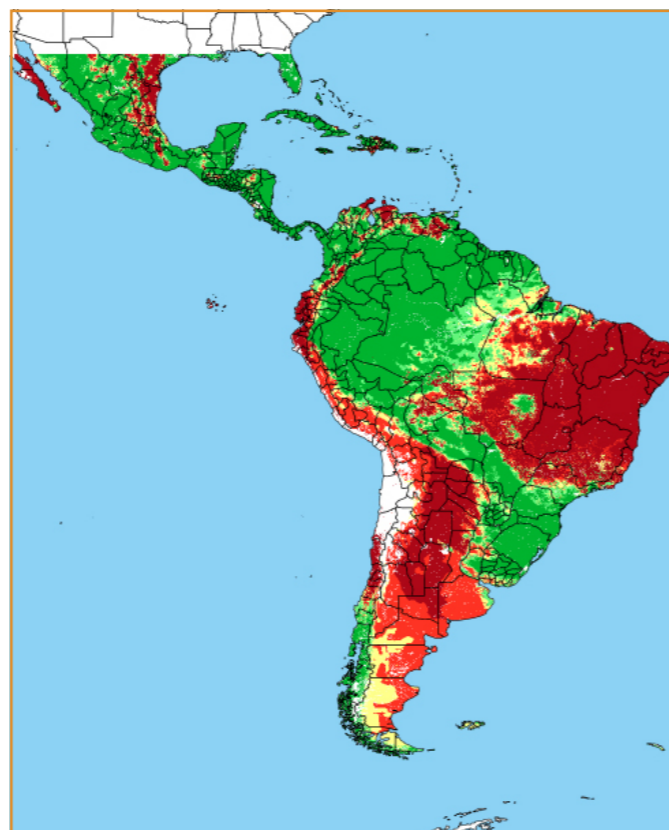


AGOSTO / 2018						
D	S	T	Q	Q	S	S
			213	214	215	216
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238	239	240	241	242	243	244

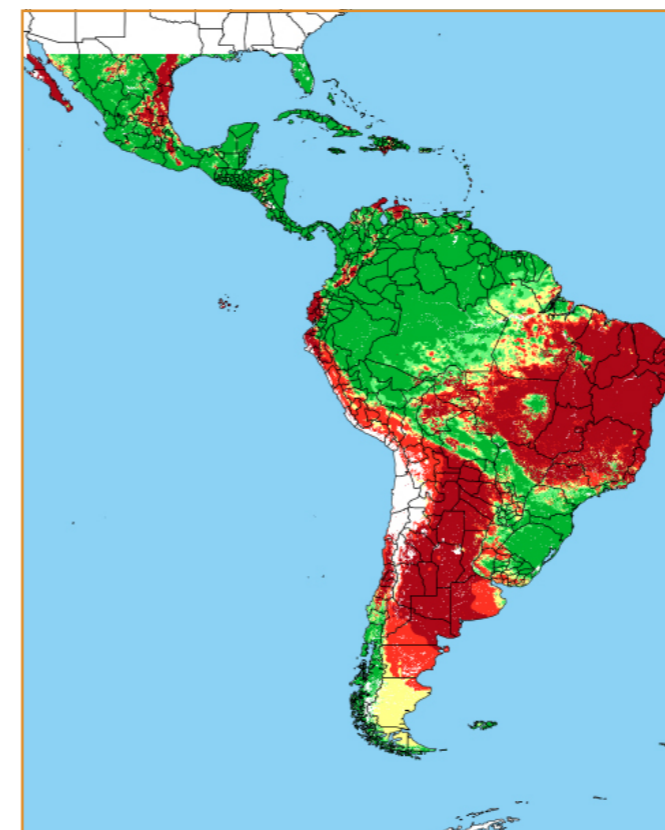
CALENDÁRIO JULIANO



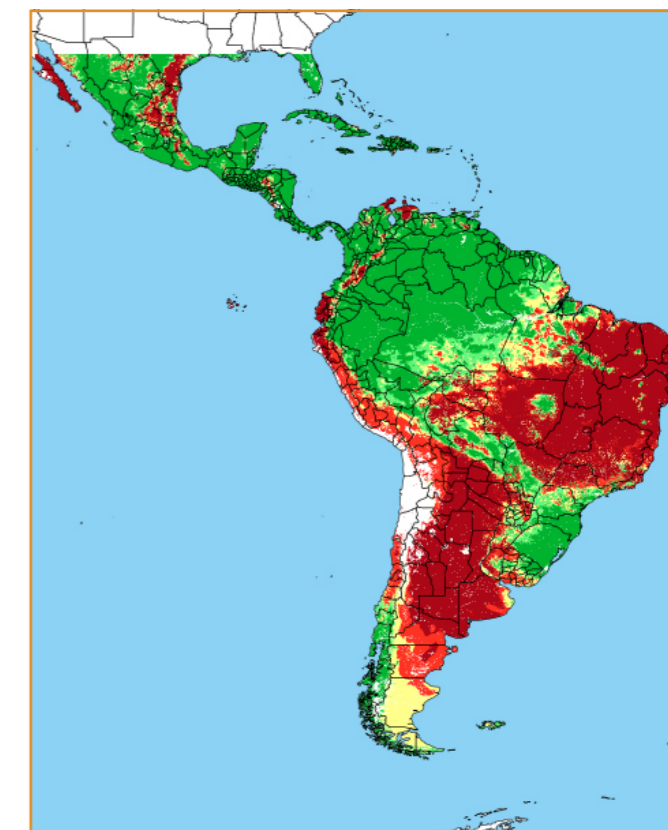
domingo, 2 de setembro



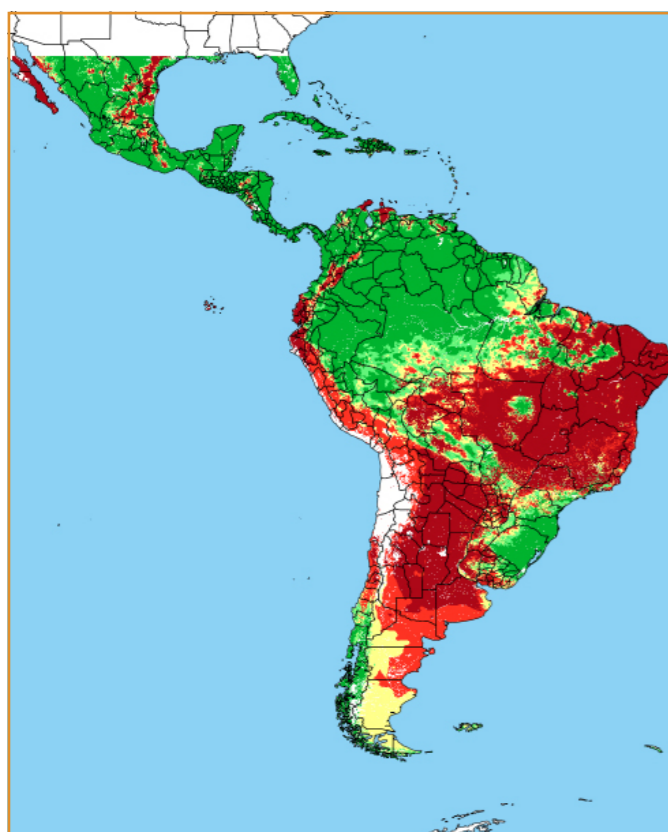
segunda-feira, 3 de setembro



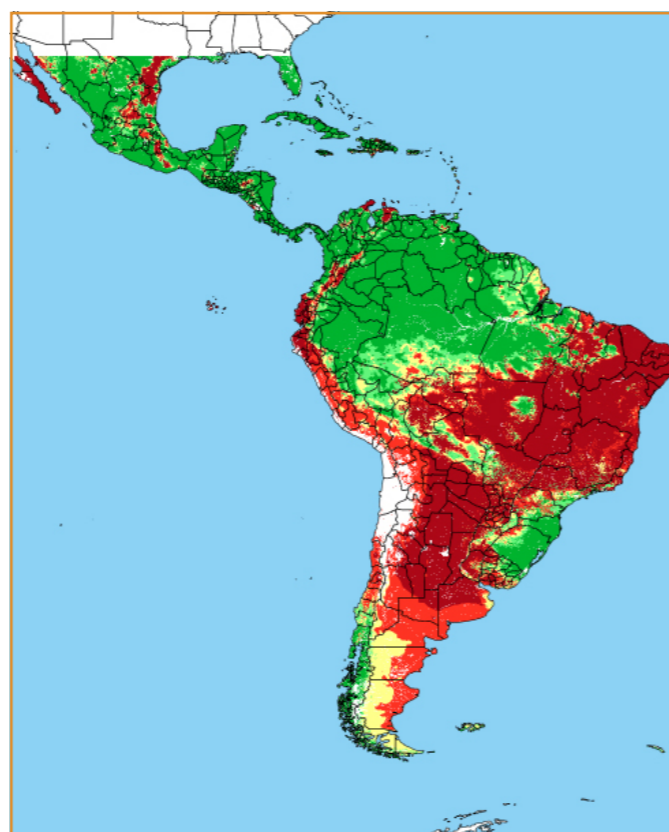
terça-feira, 4 de setembro



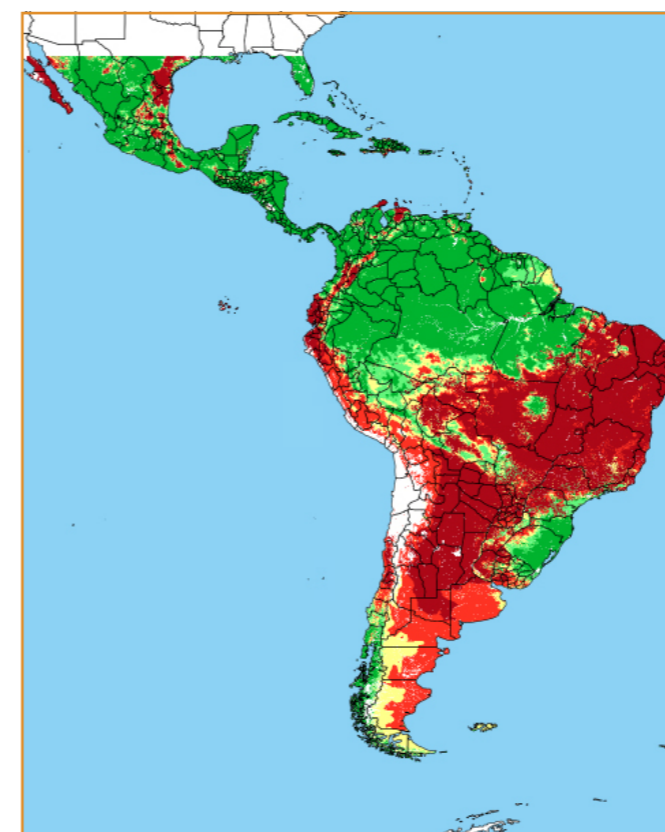
quarta-feira, 5 de setembro



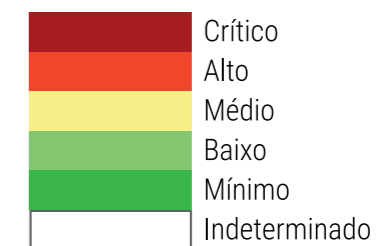
quinta-feira, 6 de setembro



sexta-feira, 7 de setembro

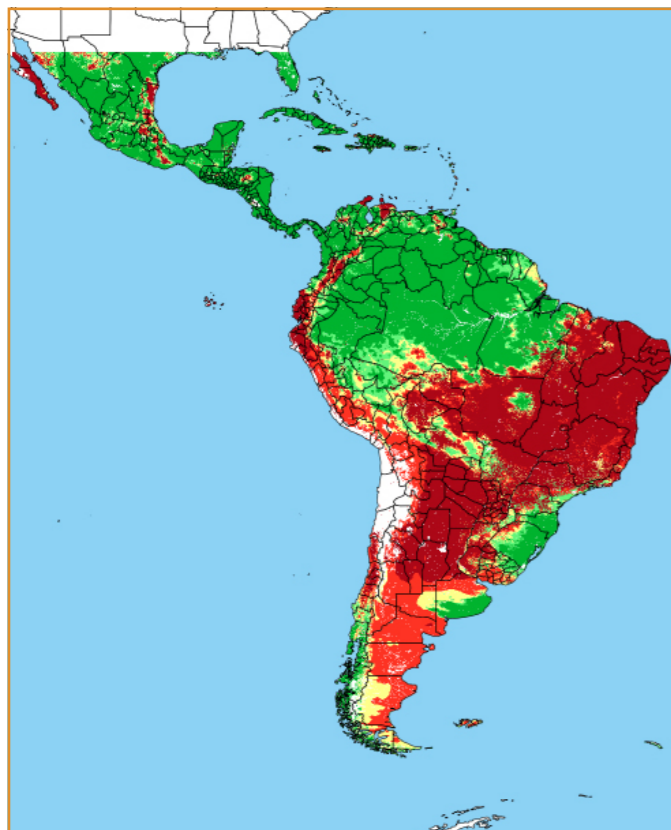


sábado, 8 de setembro

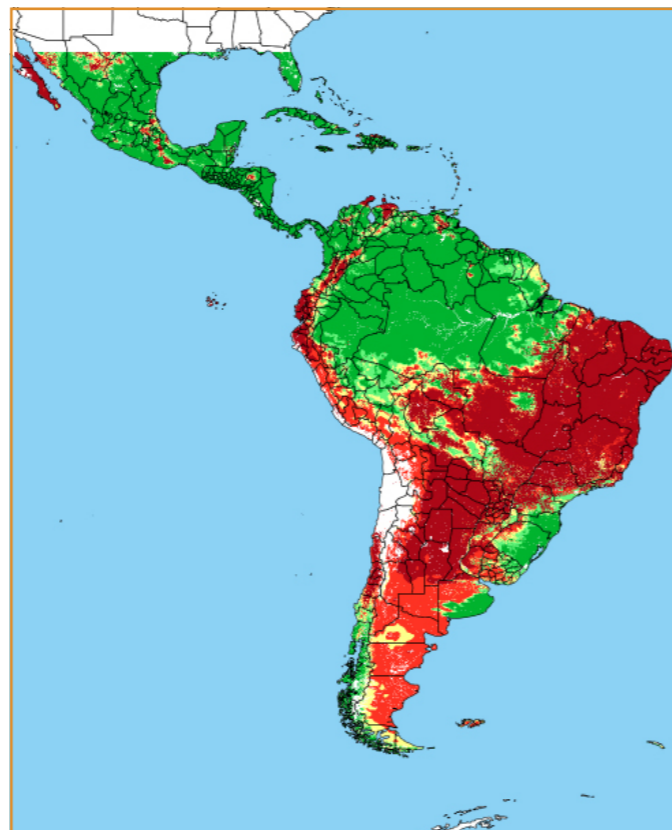


SETEMBRO / 2018						
D	S	T	Q	Q	S	S
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259	260	261	262	263	264	265
266	267	268	269	270	271	272
273						

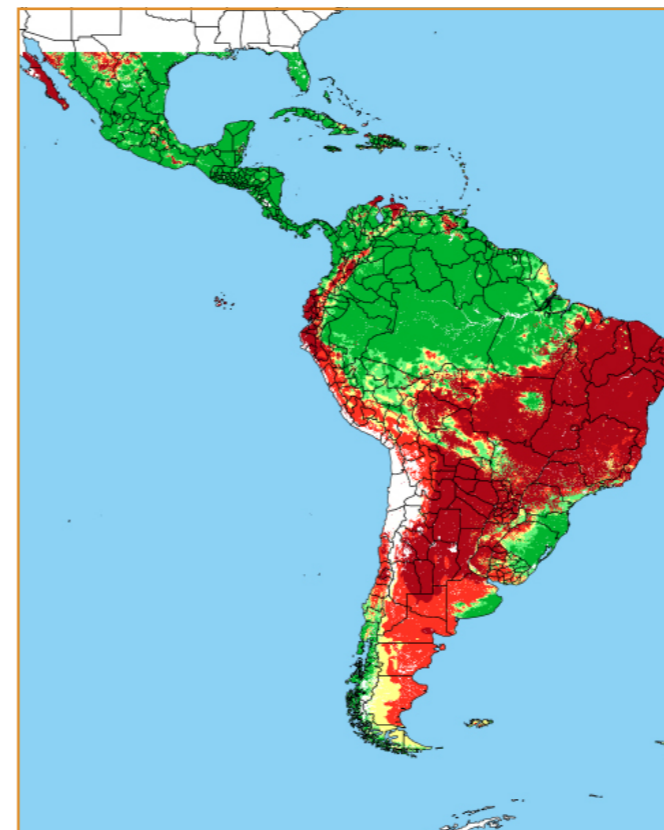
CALENDÁRIO JULIANO



domingo, 9 de setembro



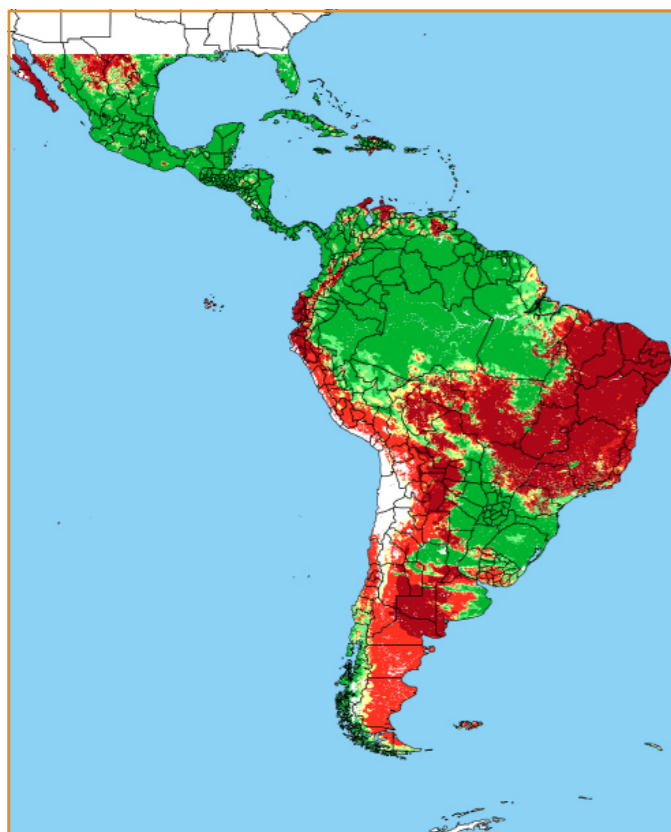
segunda-feira, 10 de setembro



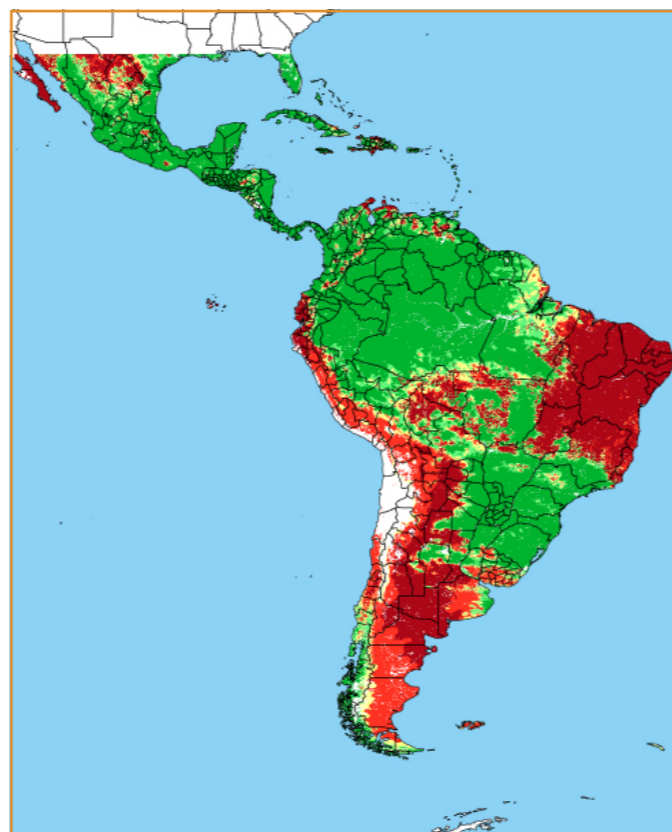
terça-feira, 11 de setembro



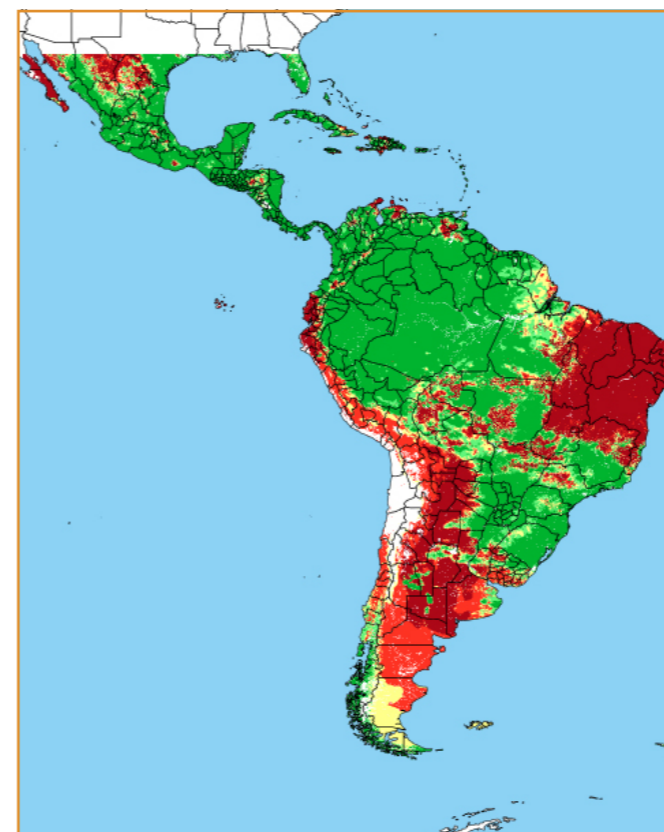
quarta-feira, 12 de setembro



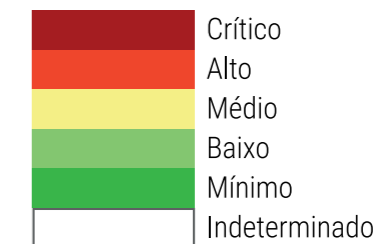
quinta-feira, 13 de setembro



sexta-feira, 14 de setembro



sábado, 15 de setembro



SETEMBRO / 2018						
D	S	T	Q	Q	S	S
						244
245	246	247	248	249	250	251
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259	260	261	262	263	264	265
266	267	268	269	270	271	272
273						

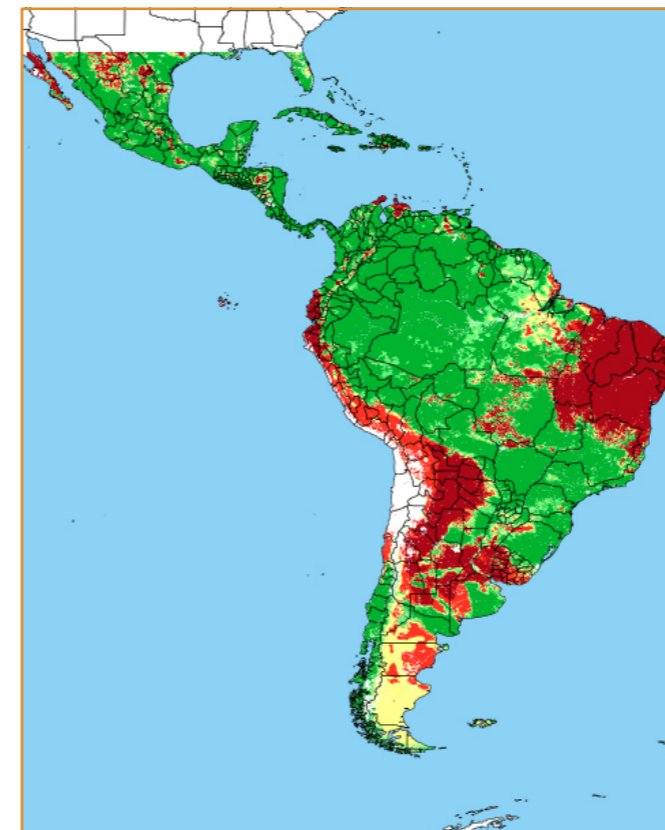
CALENDÁRIO JULIANO



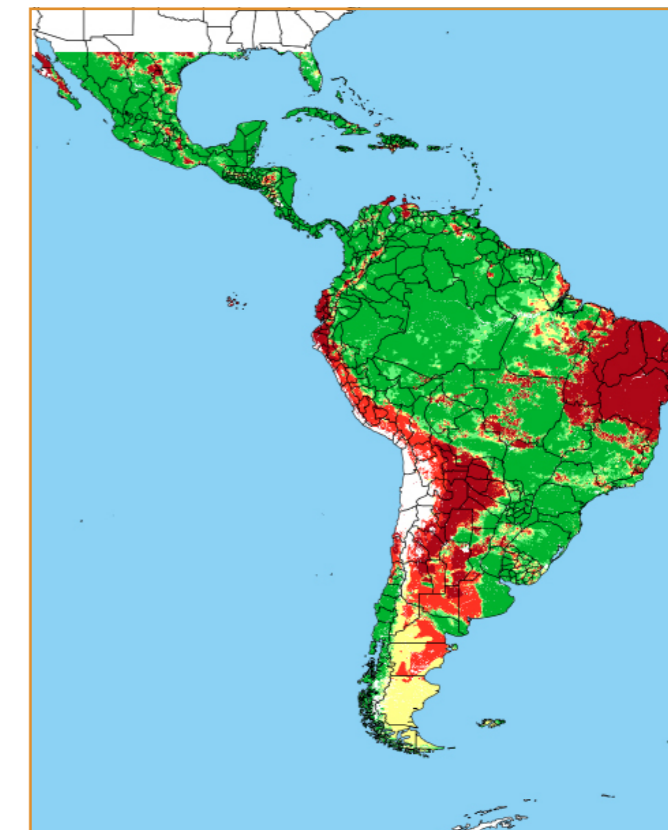
domingo, 16 de setembro



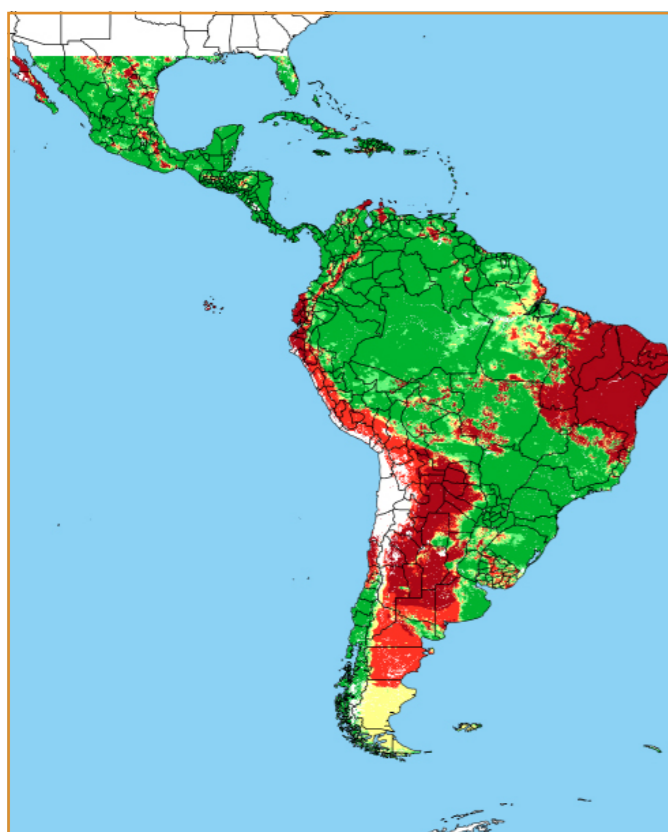
segunda-feira, 17 de setembro



terça-feira, 18 de setembro



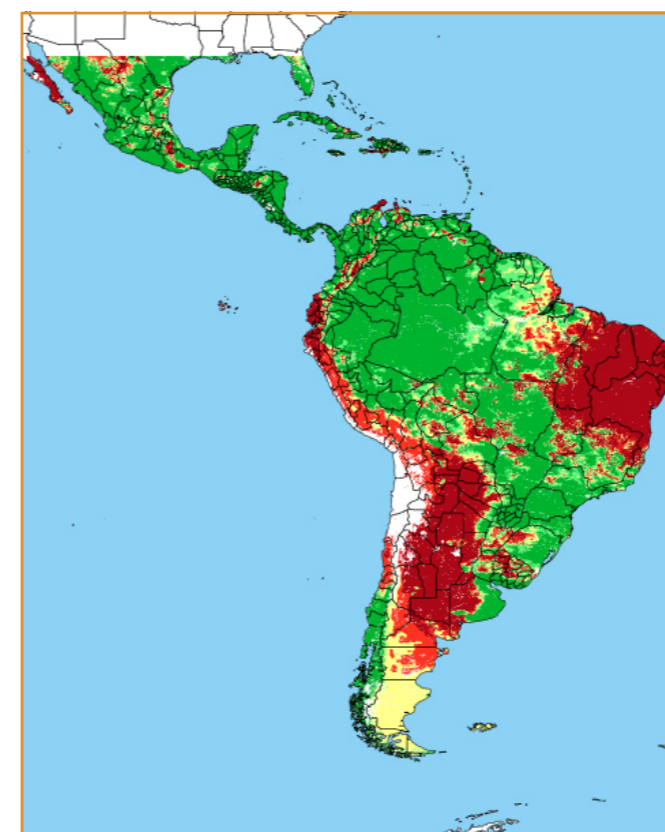
quarta-feira, 19 de setembro



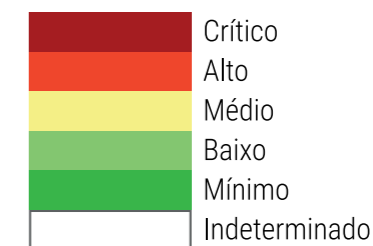
quinta-feira, 20 de setembro



sexta-feira, 21 de setembro

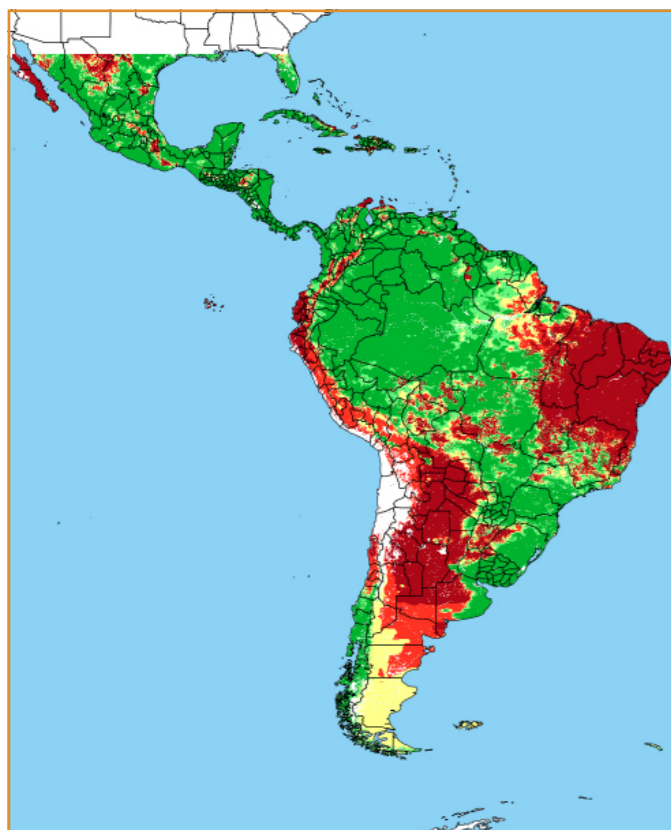


sábado, 22 de setembro

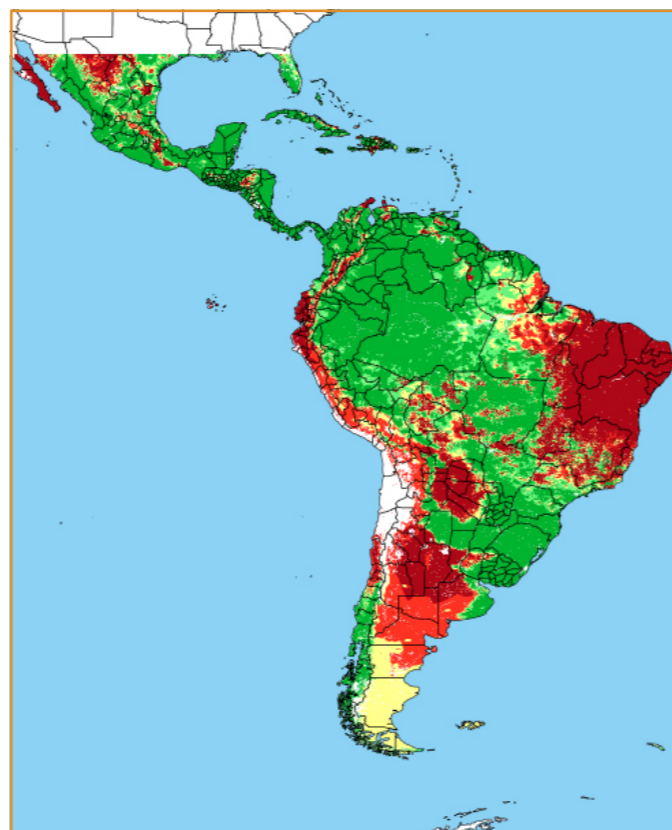


SETEMBRO / 2018						
D	S	T	Q	Q	S	S
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245	246	247	248	249	250	251
252	253	254	255	256	257	258
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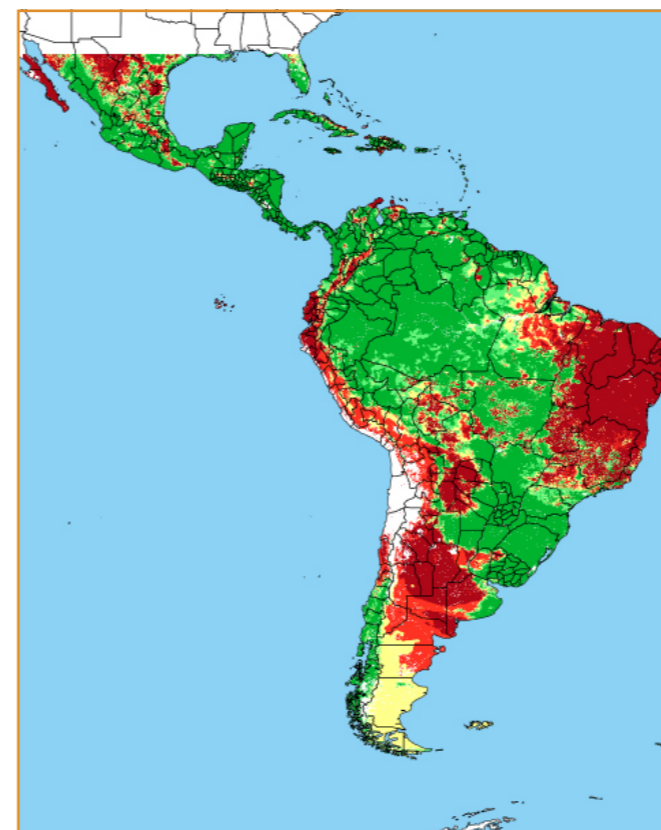
CALENDÁRIO JULIANO



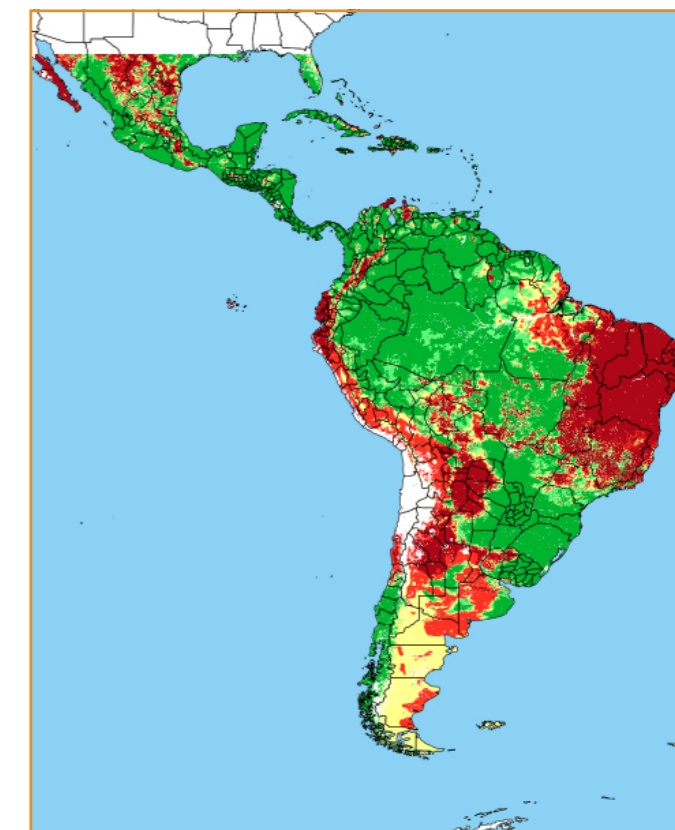
domingo, 23 de setembro



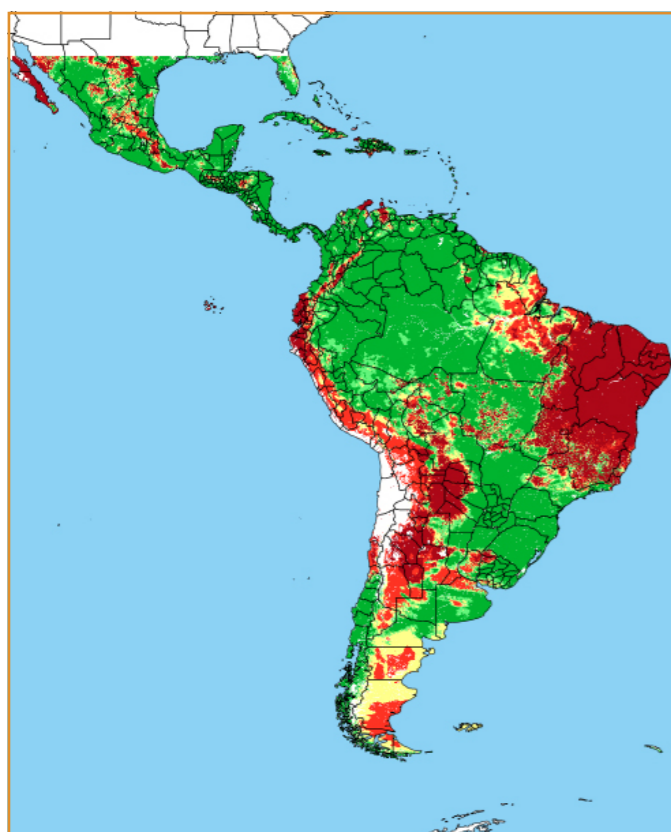
segunda-feira, 24 de setembro



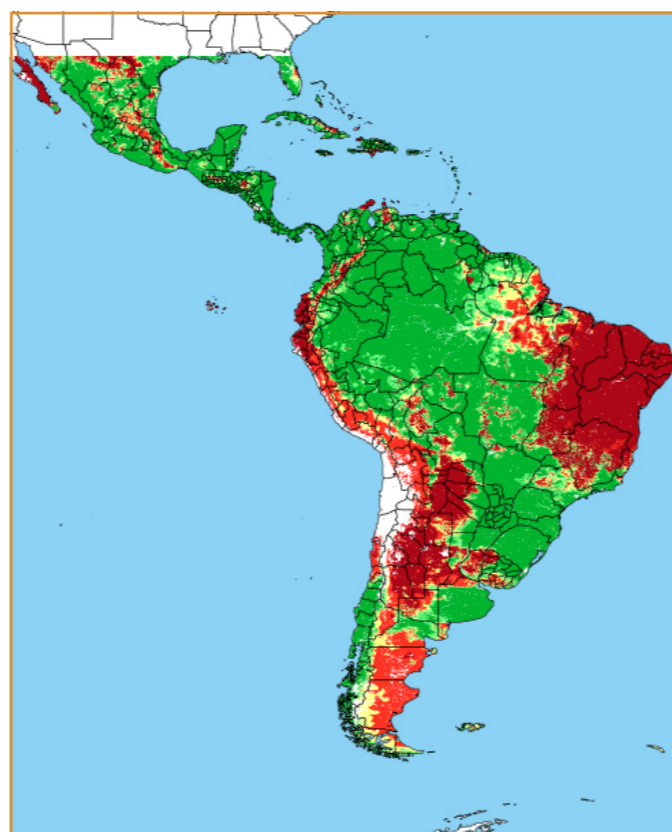
terça-feira, 25 de setembro



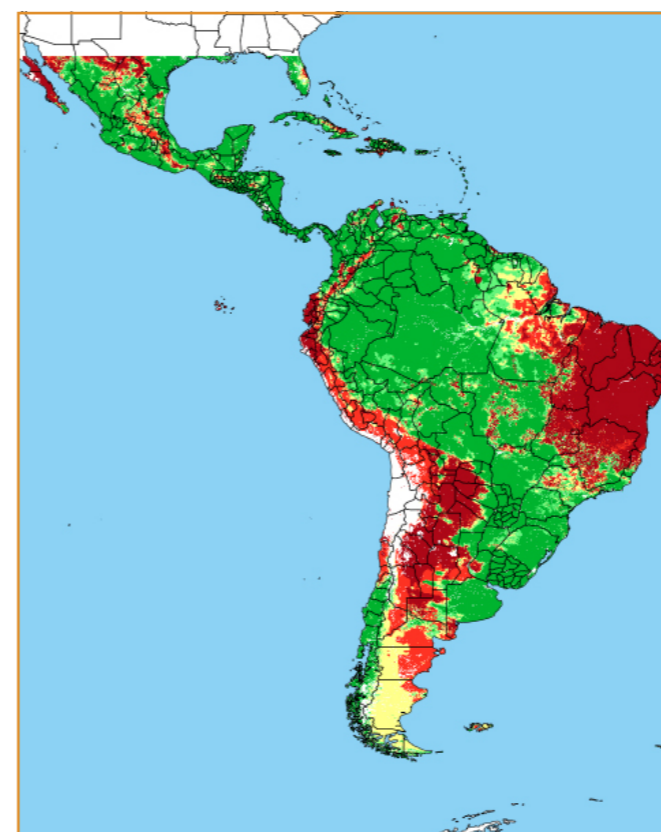
quarta-feira, 26 de setembro



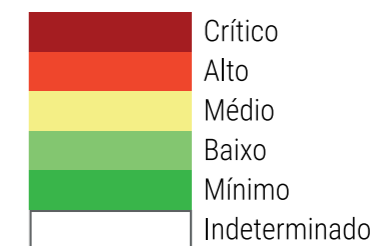
quinta-feira, 27 de setembro



sexta-feira, 28 de setembro

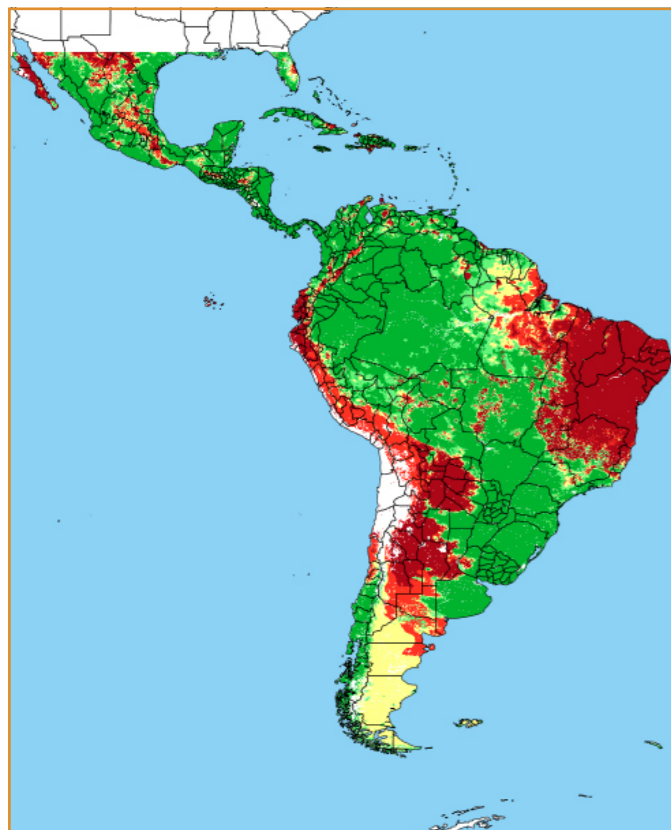


sábado, 29 de setembro

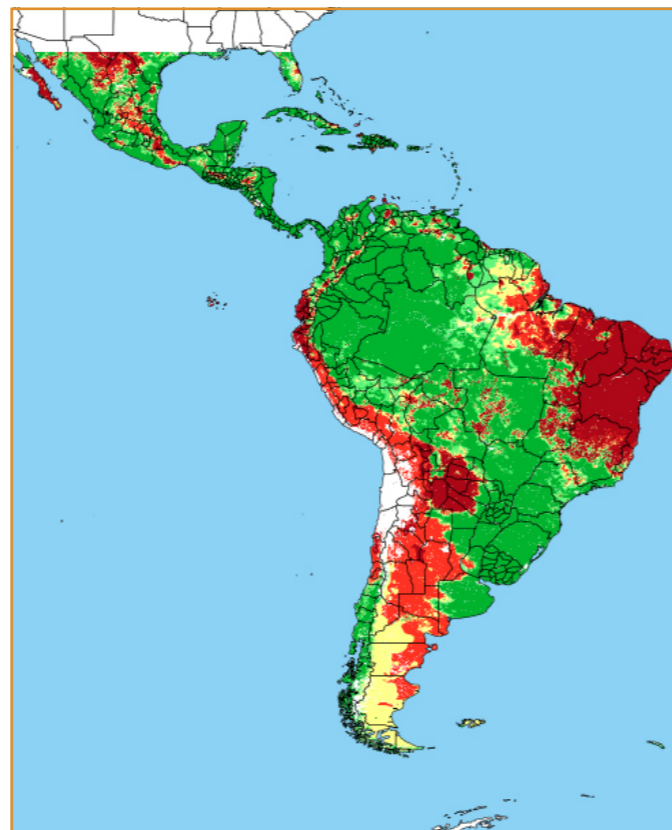


SETEMBRO / 2018						
D	S	T	Q	Q	S	S
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245	246	247	248	249	250	251
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259	260	261	262	263	264	265
266	267	268	269	270	271	272
273						

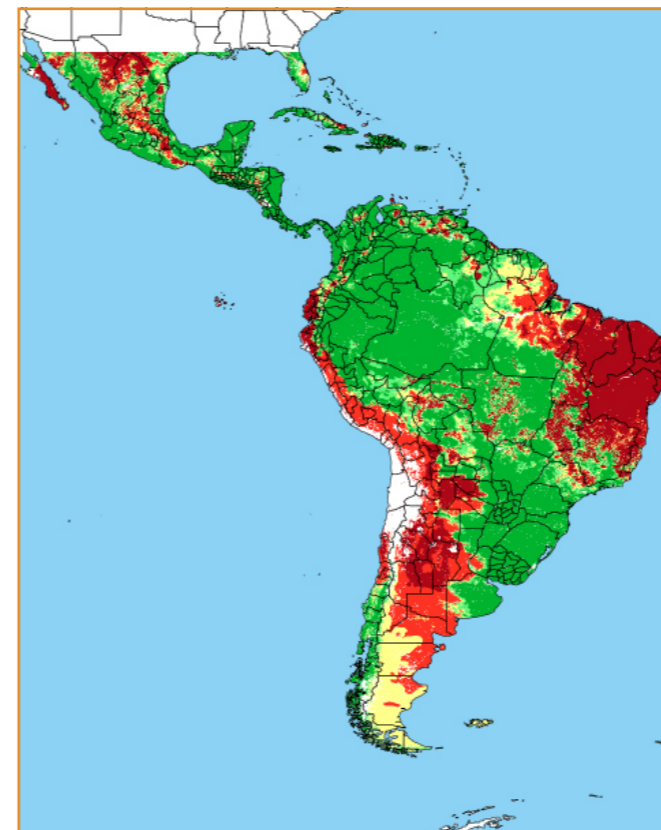
CALENDÁRIO JULIANO



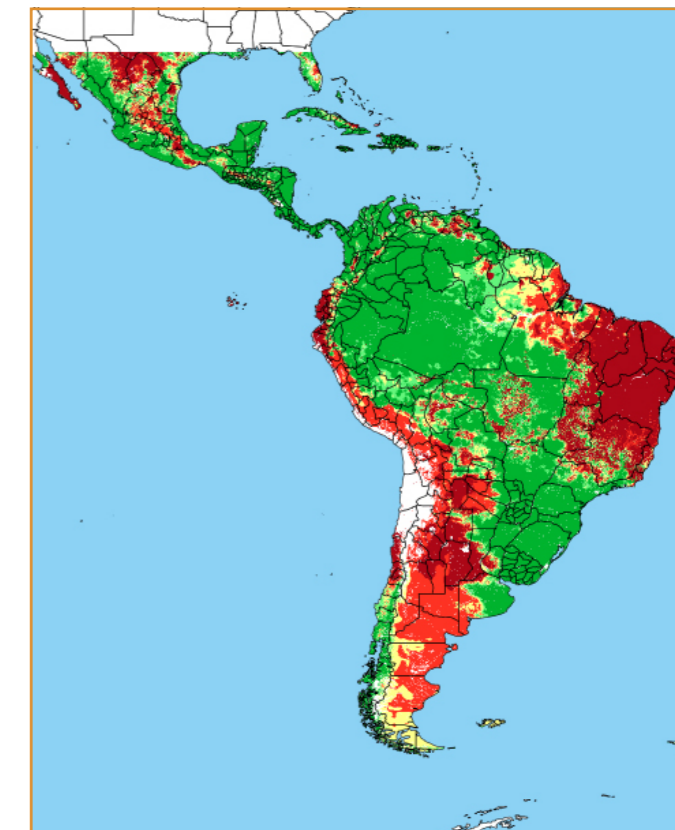
domingo, 30 de setembro



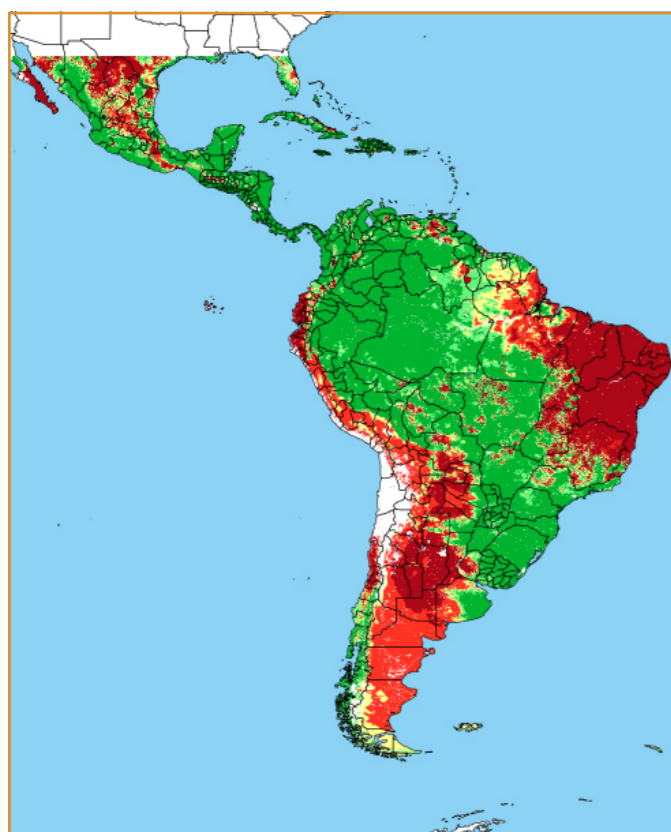
segunda-feira, 1 de outubro



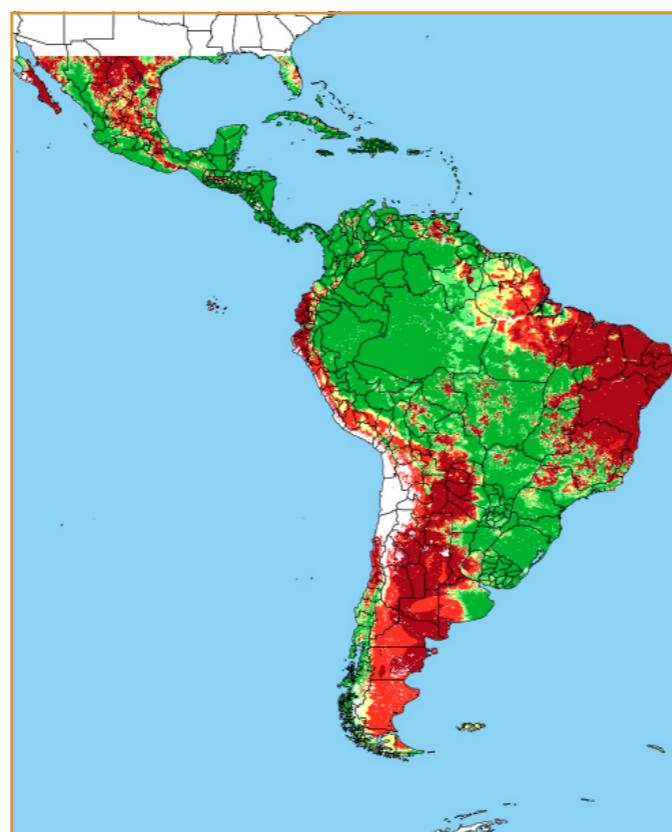
terça-feira, 2 de outubro



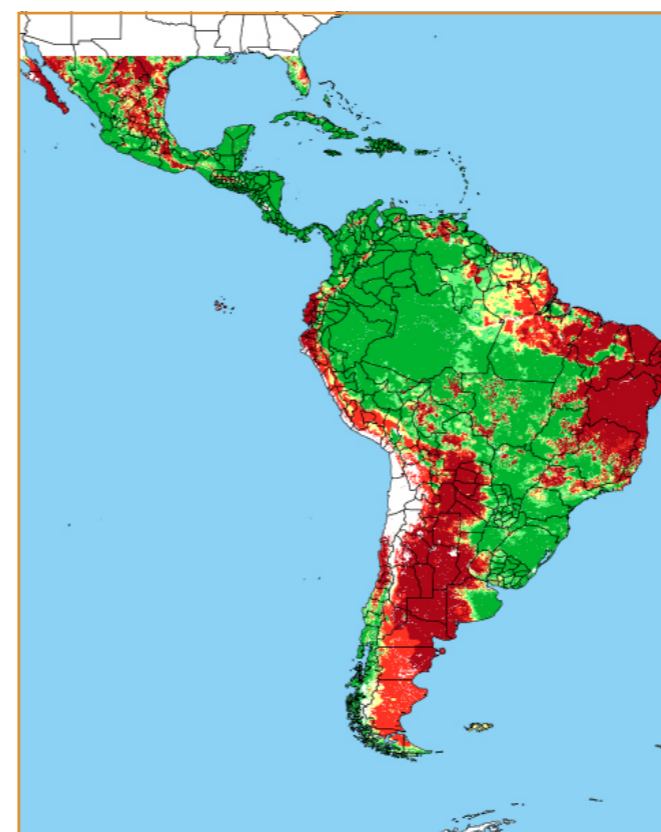
quarta-feira, 3 de outubro



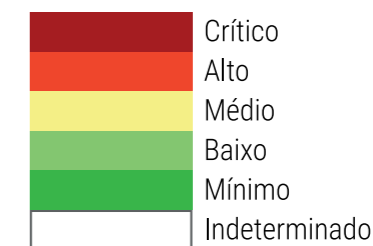
quinta-feira, 4 de outubro



sexta-feira, 5 de outubro



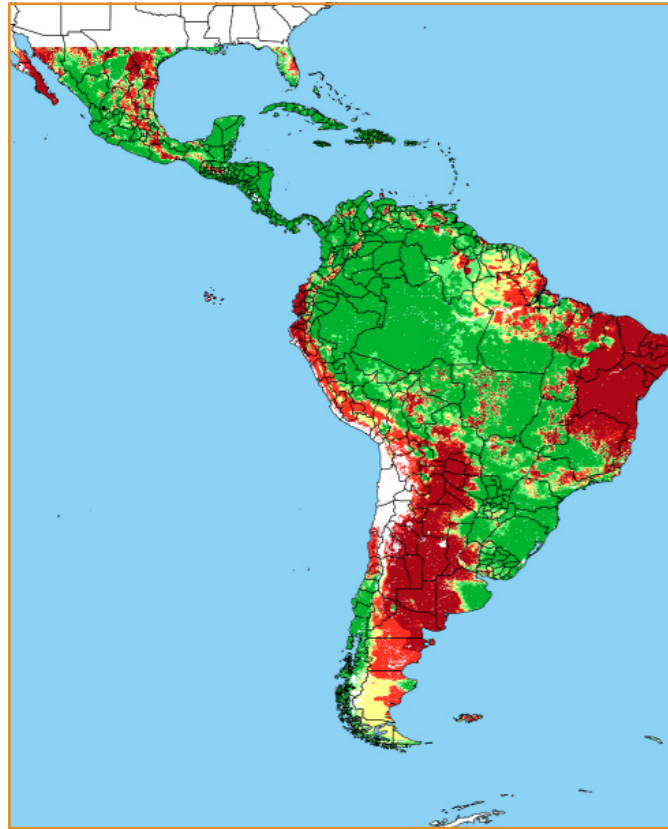
sábado, 6 de outubro



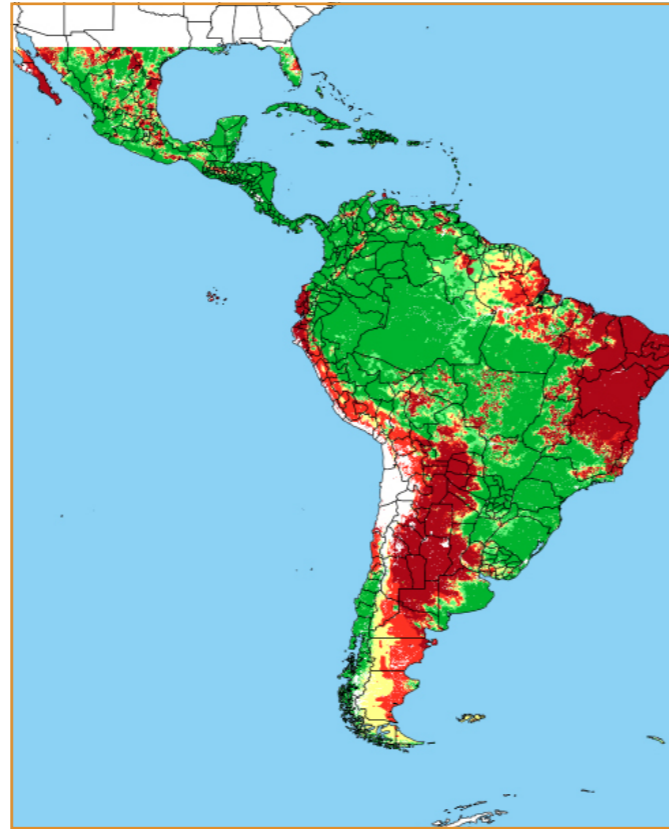
OUTUBRO / 2018

D	S	T	Q	Q	S	S
273	274	275	276	277	278	279
280	281	282	283	284	285	286
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294	295	296	297	298	299	300
301	302	303	304			

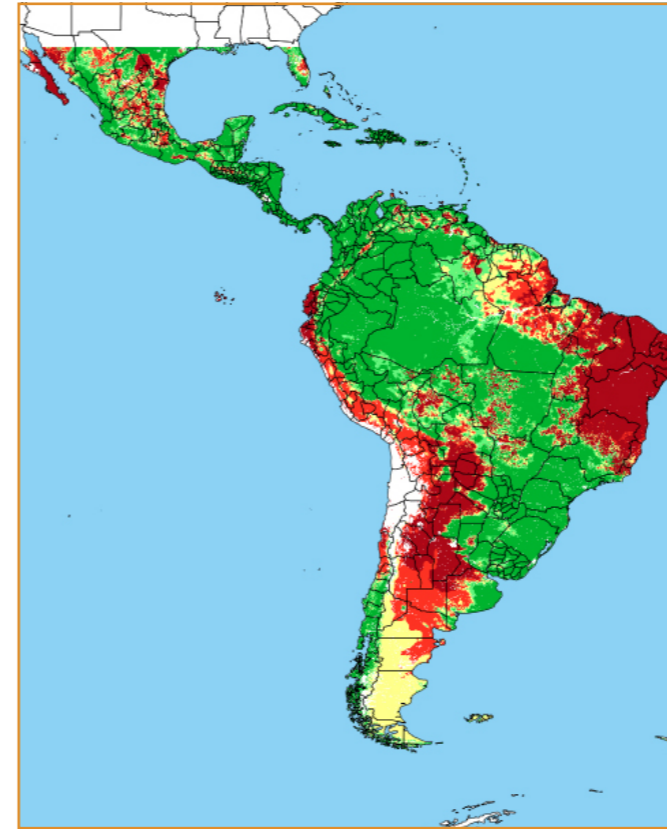
CALENDÁRIO JULIANO



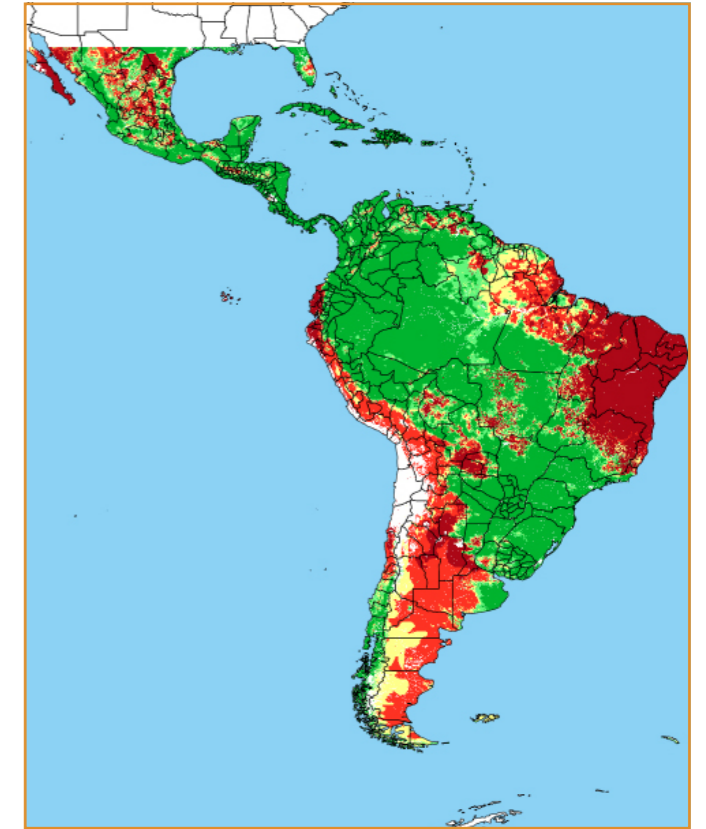
domingo, 7 de outubro



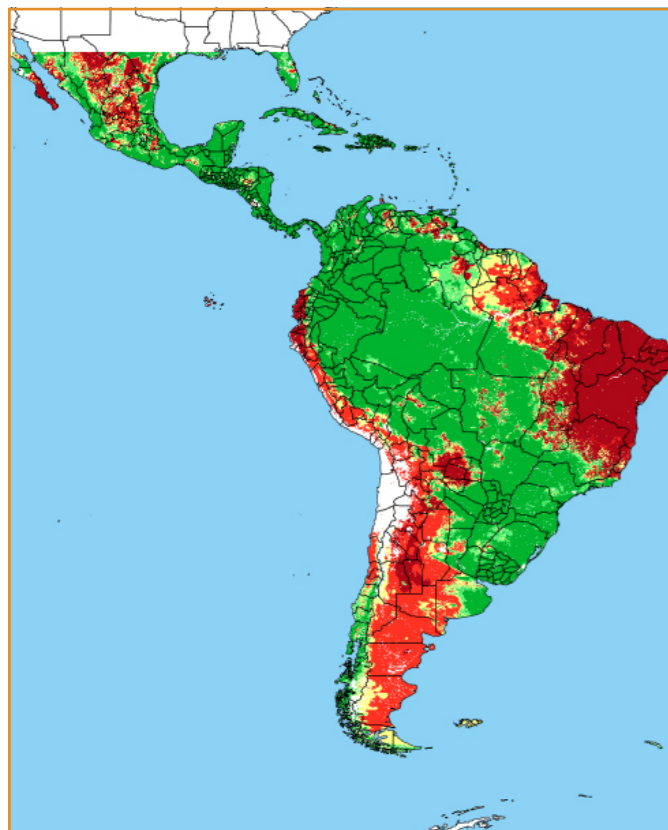
segunda-feira, 8 de outubro



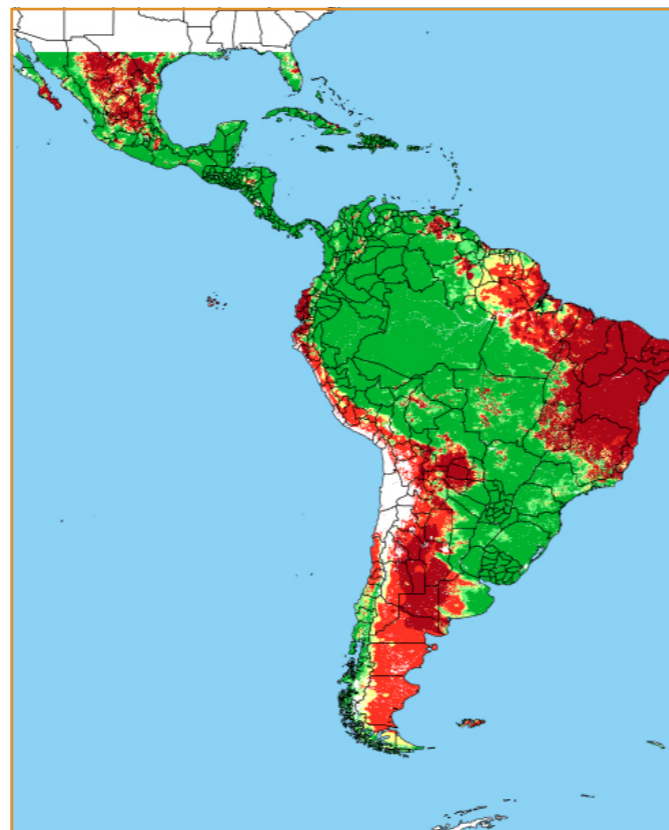
terça-feira, 9 de outubro



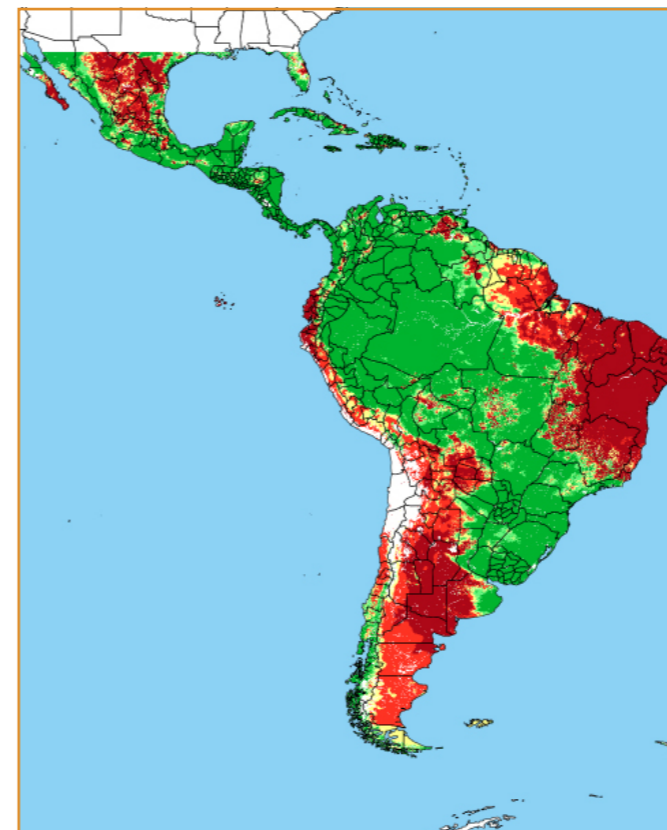
quarta-feira, 10 de outubro



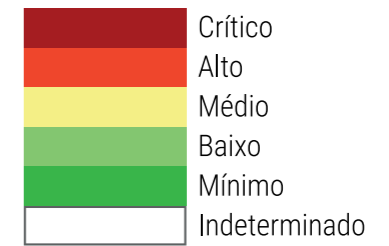
quinta-feira, 11 de outubro



sexta-feira, 12 de outubro

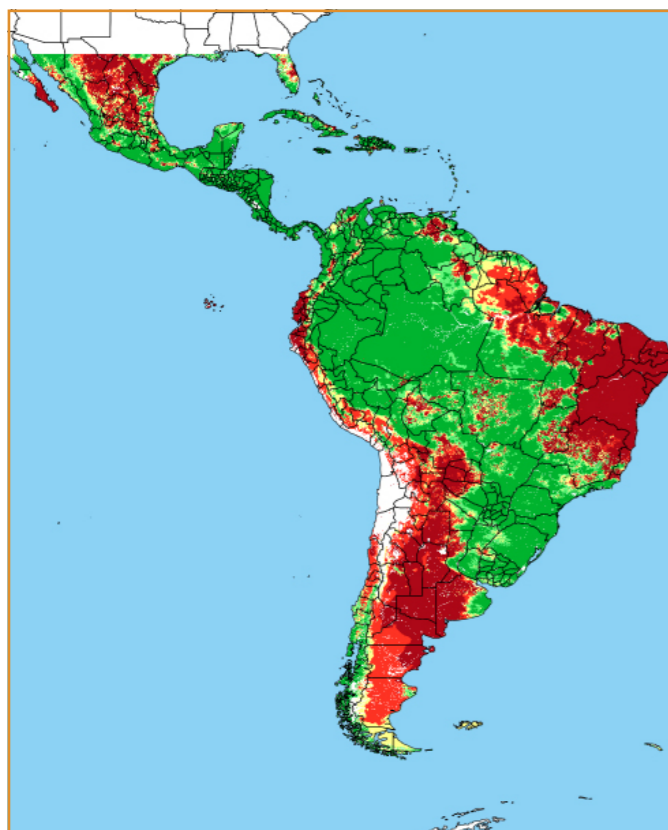


sábado, 13 de outubro

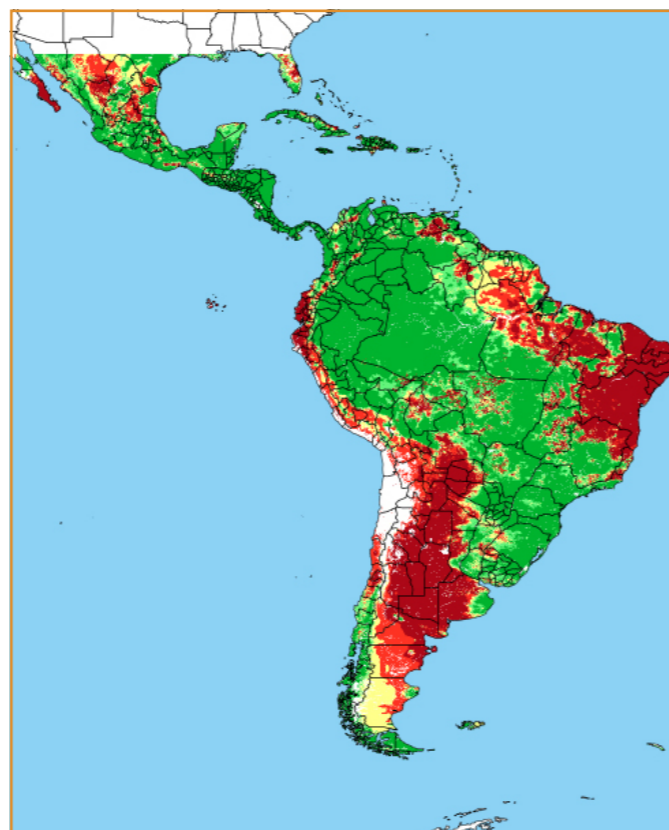


OUTUBRO / 2018							
D	S	T	Q	Q	S	S	
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287	288	289	290	291	292	293	
294	295	296	297	298	299	300	
301	302	303	304				

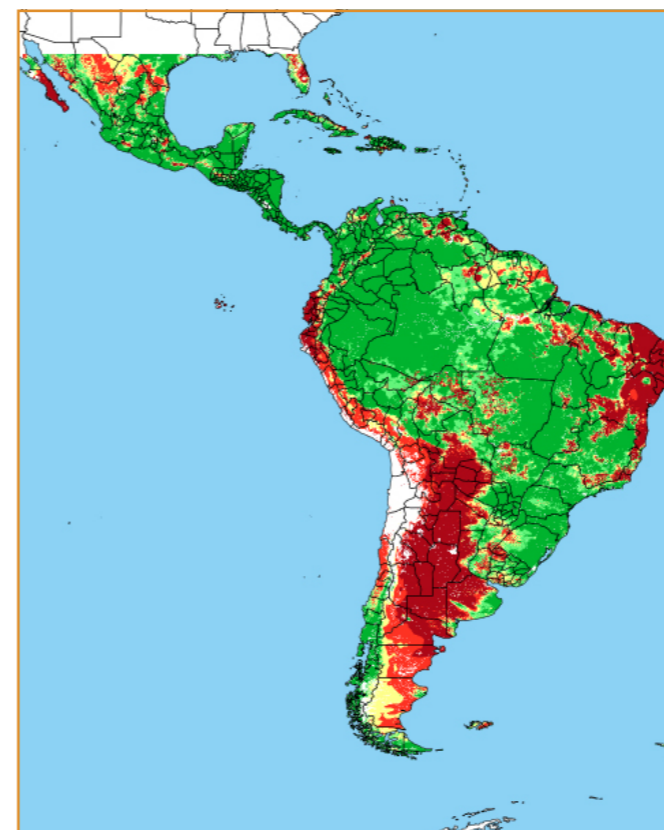
CALENDÁRIO JULIANO



domingo, 14 de outubro



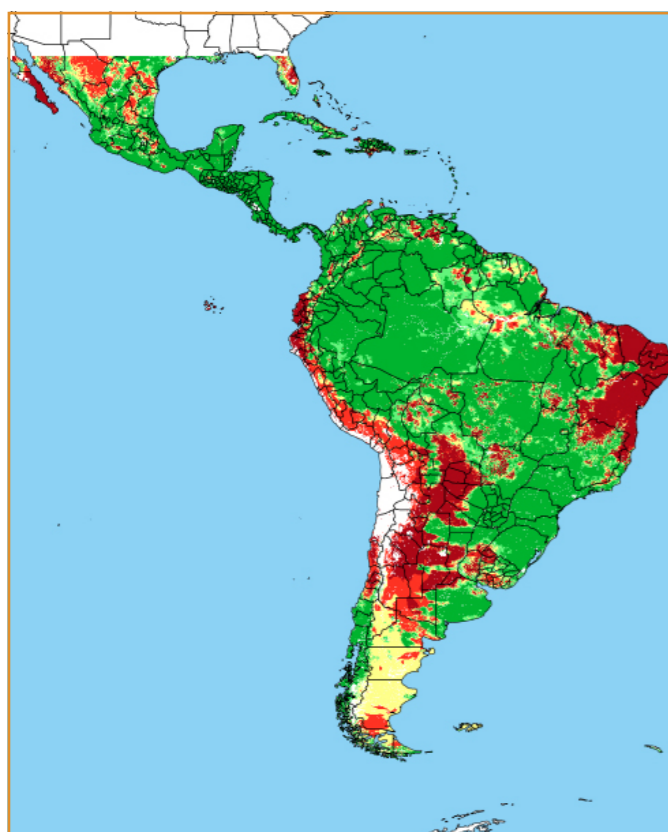
segunda-feira, 15 de outubro



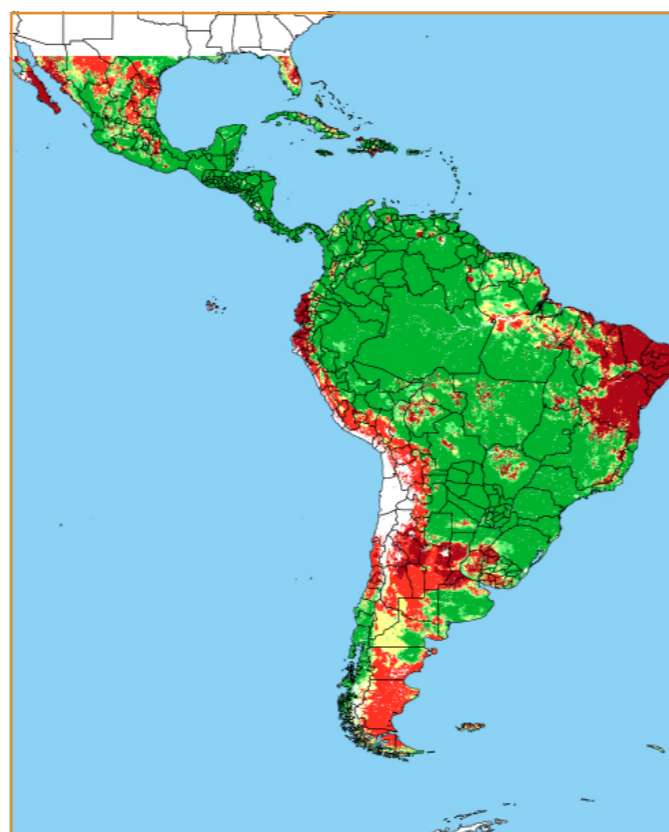
terça-feira, 16 de outubro



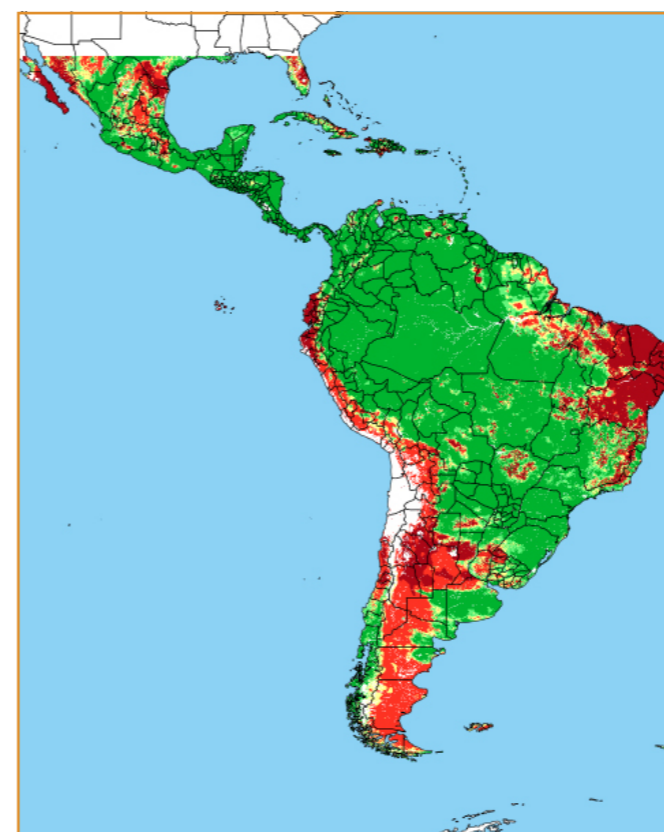
quarta-feira, 17 de outubro



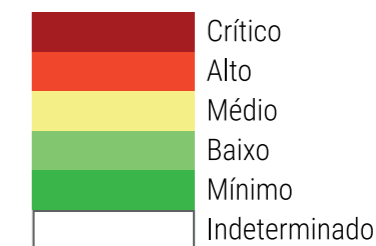
quinta-feira, 18 de outubro



sexta-feira, 19 de outubro



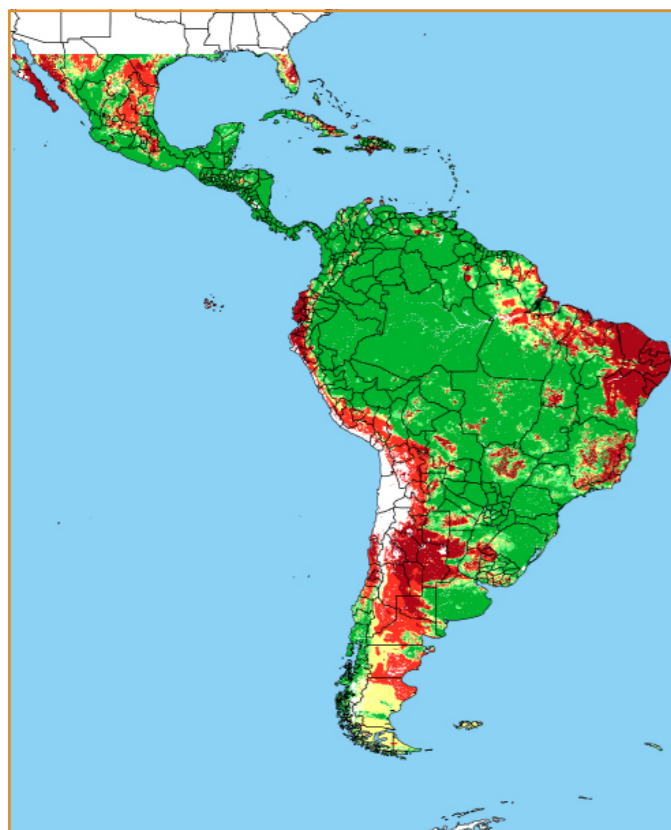
sábado, 20 de outubro



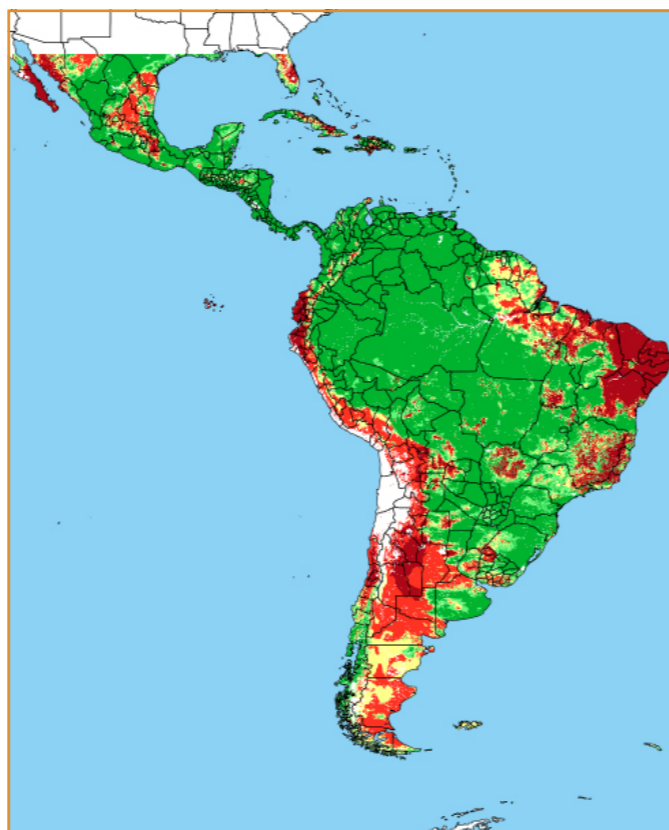
OUTUBRO / 2018						
D	S	T	Q	Q	S	S
274	275	276	277	278	279	
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294	295	296	297	298	299	300
301	302	303	304			

CALENDÁRIO JULIANO

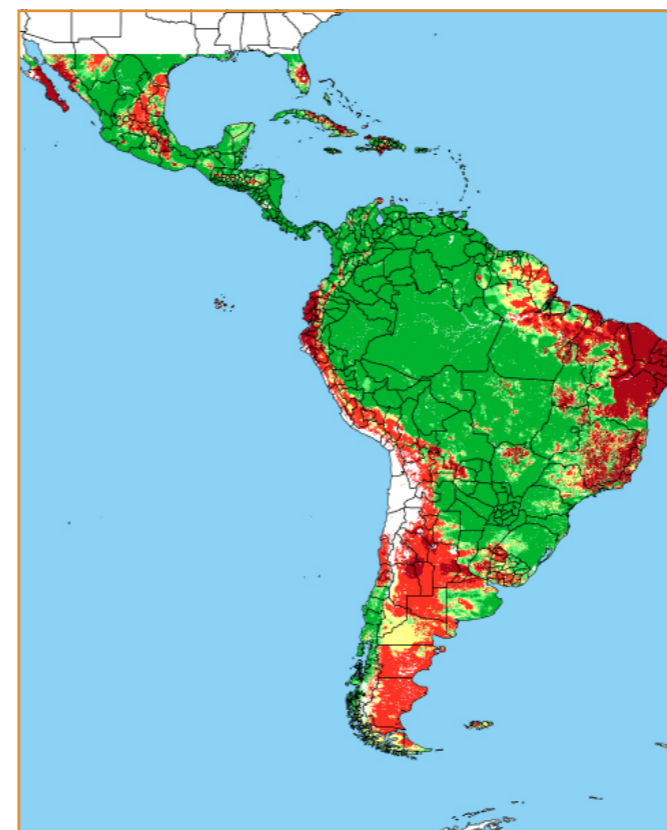




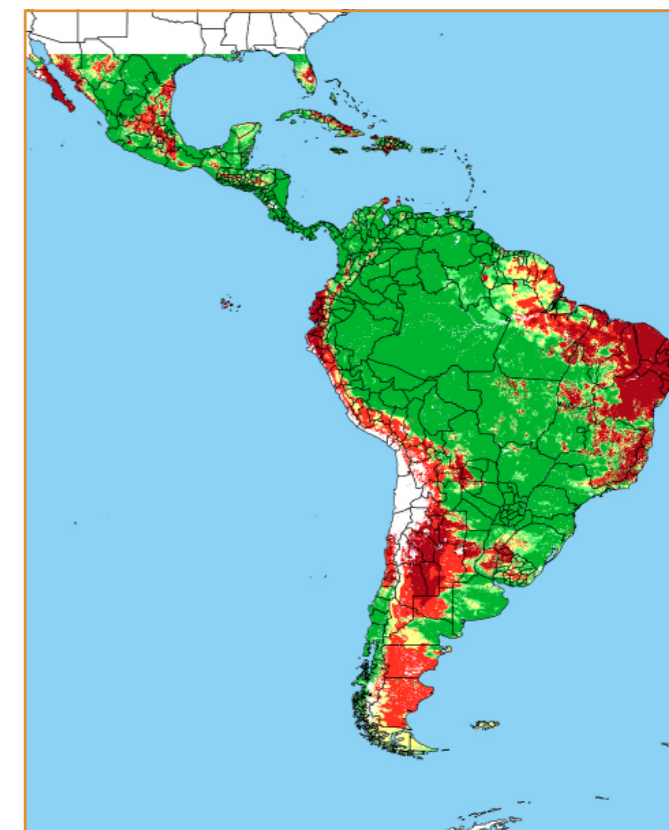
domingo, 21 de outubro



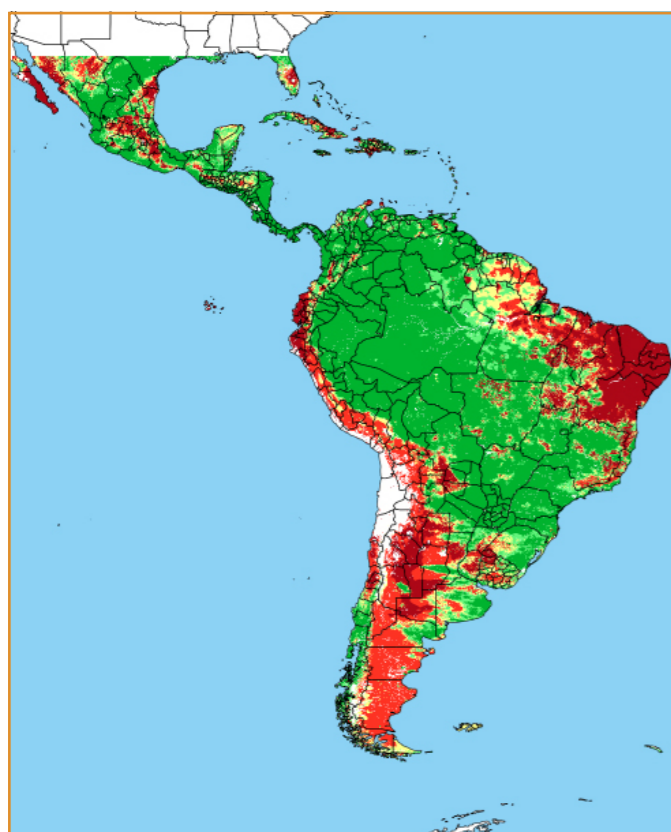
segunda-feira, 22 de outubro



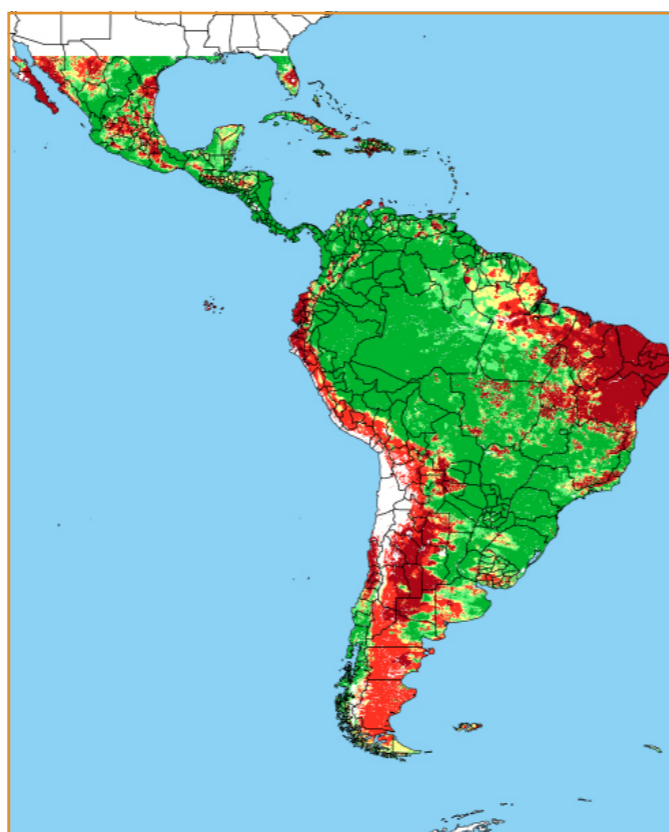
terça-feira, 23 de outubro



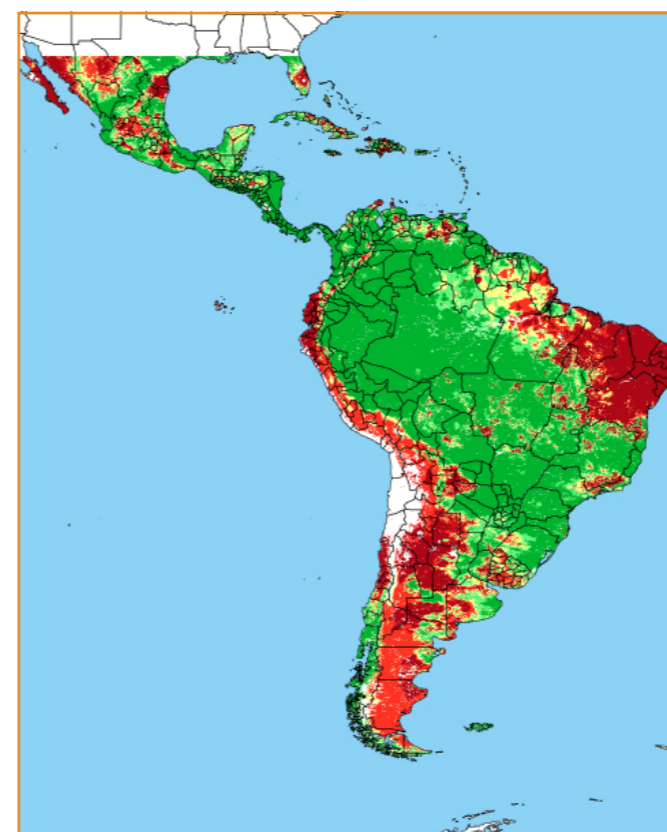
quarta-feira, 24 de outubro



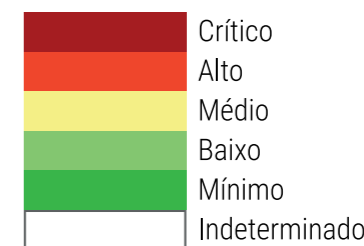
quinta-feira, 25 de outubro



sexta-feira, 26 de outubro

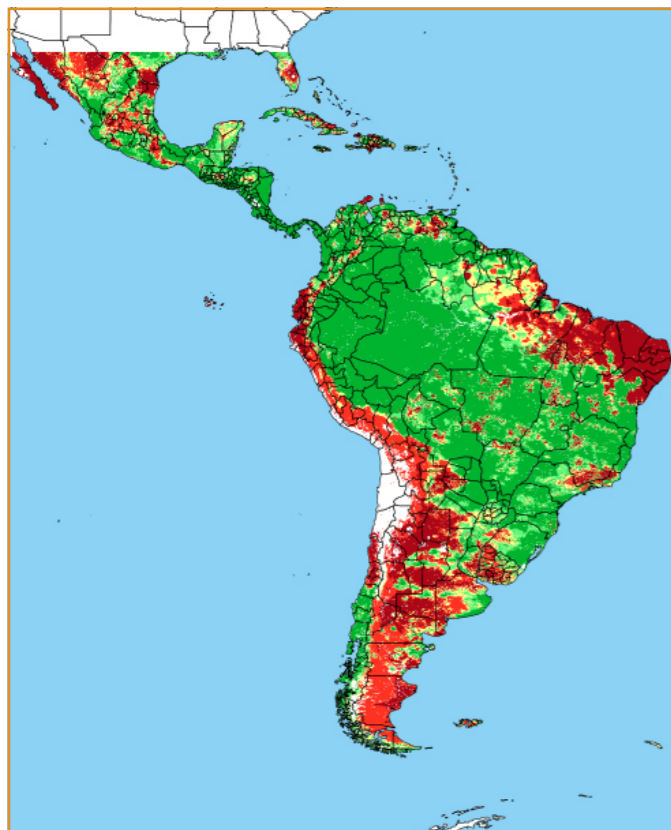


sábado, 27 de outubro

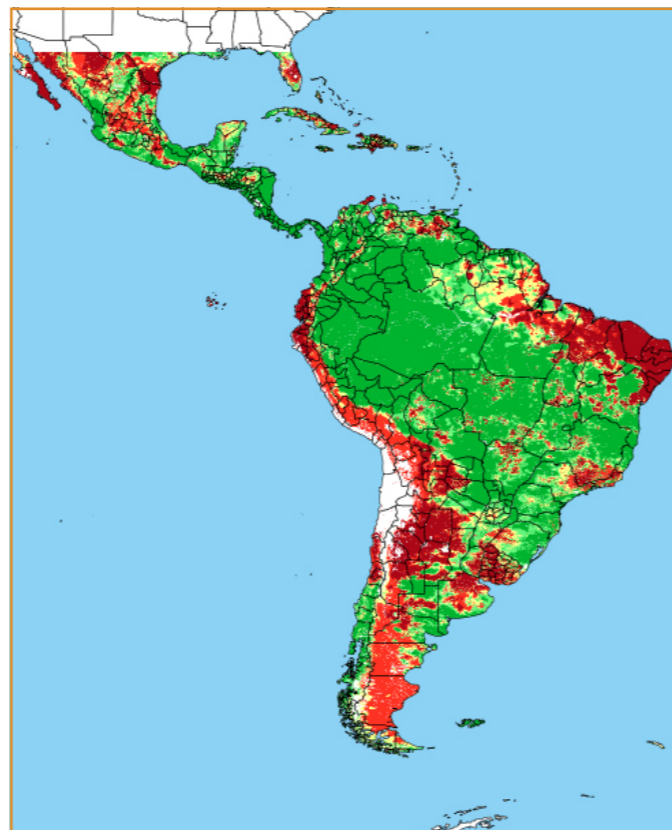


OUTUBRO / 2018						
D	S	T	Q	Q	S	S
274	275	276	277	278	279	
280	281	282	283	284	285	286
287	288	289	290	291	292	293
294	295	296	297	298	299	300
301	302	303	304			

CALENDÁRIO JULIANO



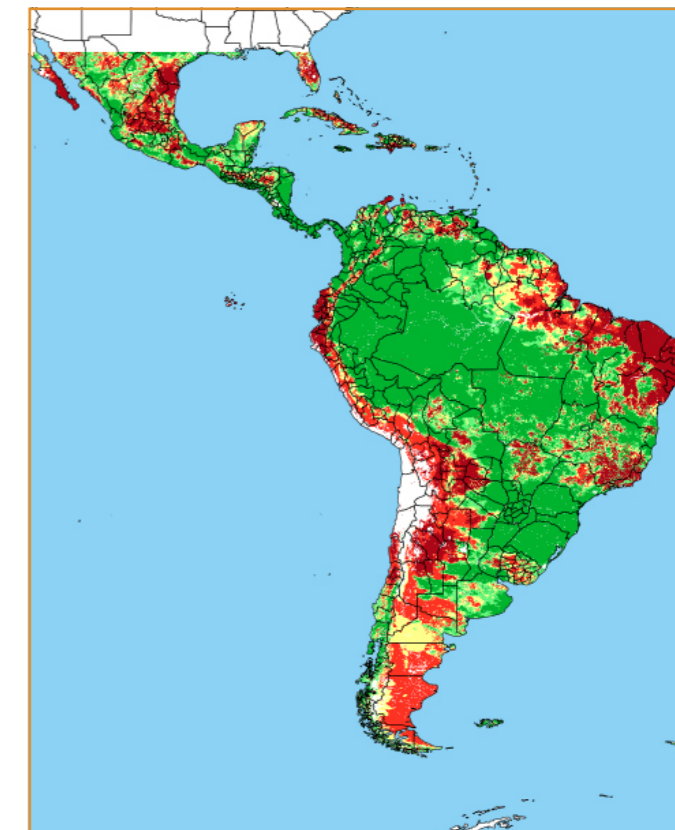
domingo, 28 de outubro



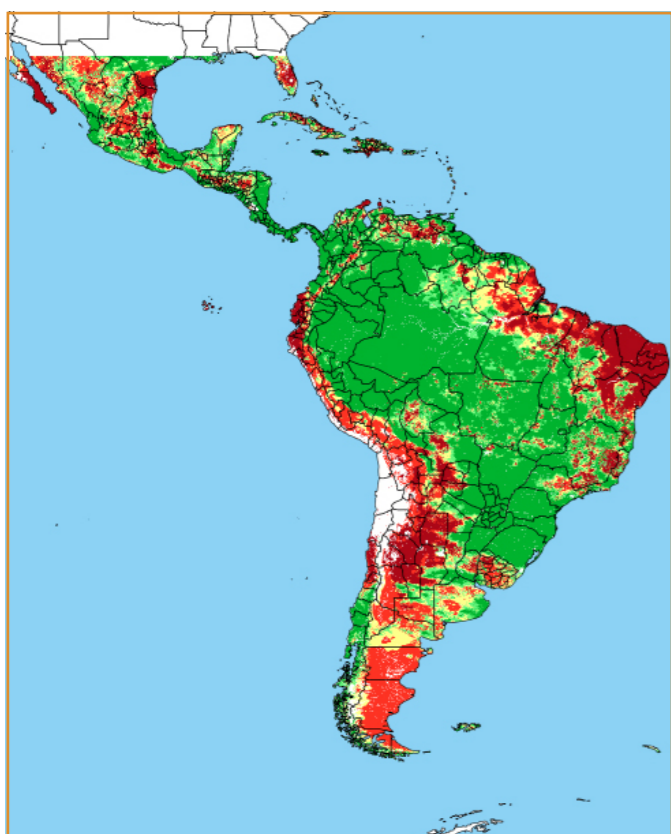
segunda-feira, 29 de outubro



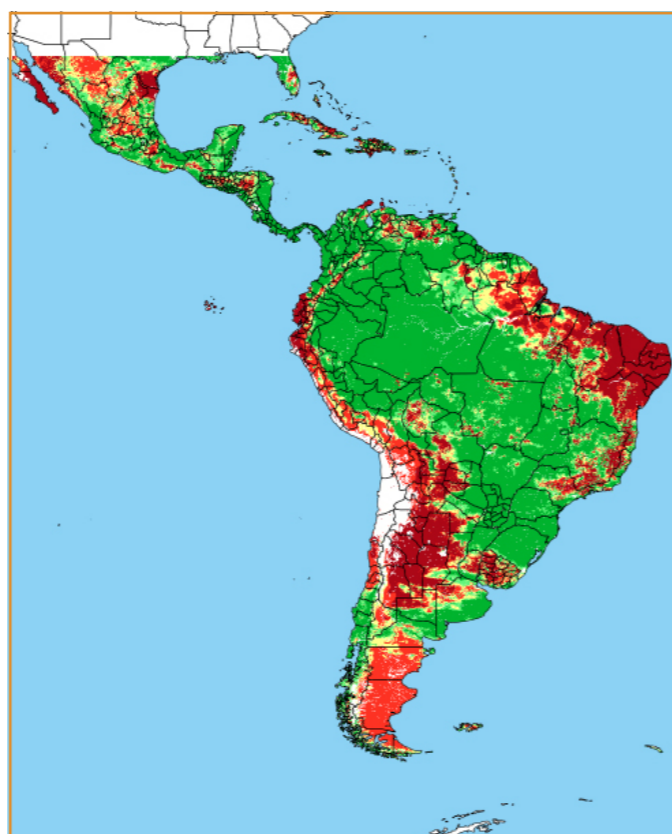
terça-feira, 30 de outubro



quarta-feira, 31 de outubro



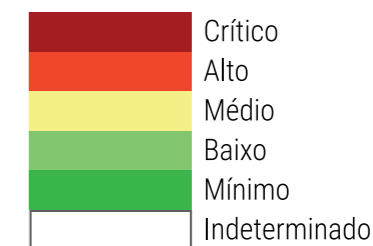
quinta-feira, 1 de novembro



sexta-feira, 2 de novembro



sábado, 3 de novembro



OUTUBRO / 2018							
<b>D</b>	<b>S</b>	<b>T</b>	<b>Q</b>	<b>Q</b>	<b>S</b>	<b>S</b>	
	274	275	276	277	278	279	
280	281	282	283	284	285	286	
287	288	289	290	291	292	293	
294	295	296	297	298	299	300	
301	302	303	304	305	306	307	

CALENDÁRIO JULIANO



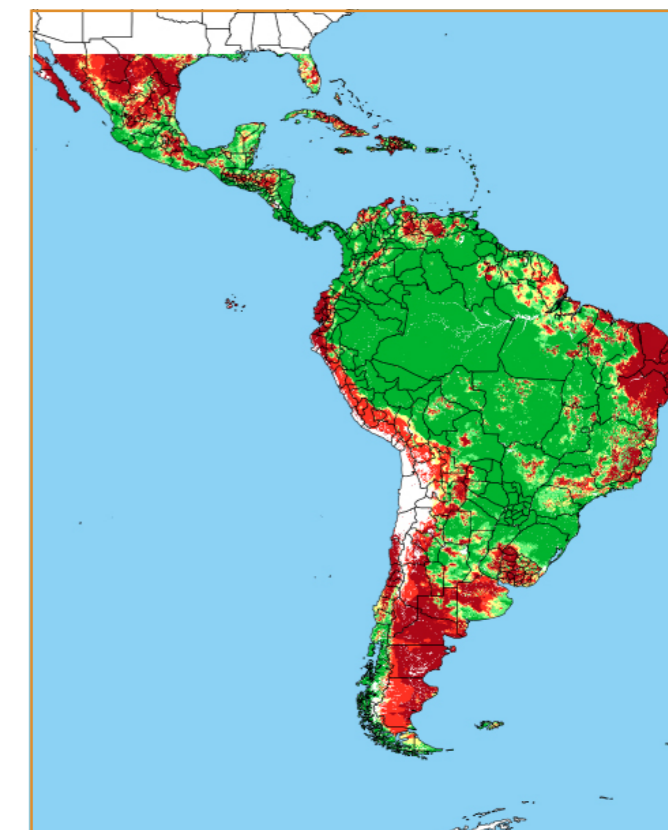
domingo, 4 de novembro



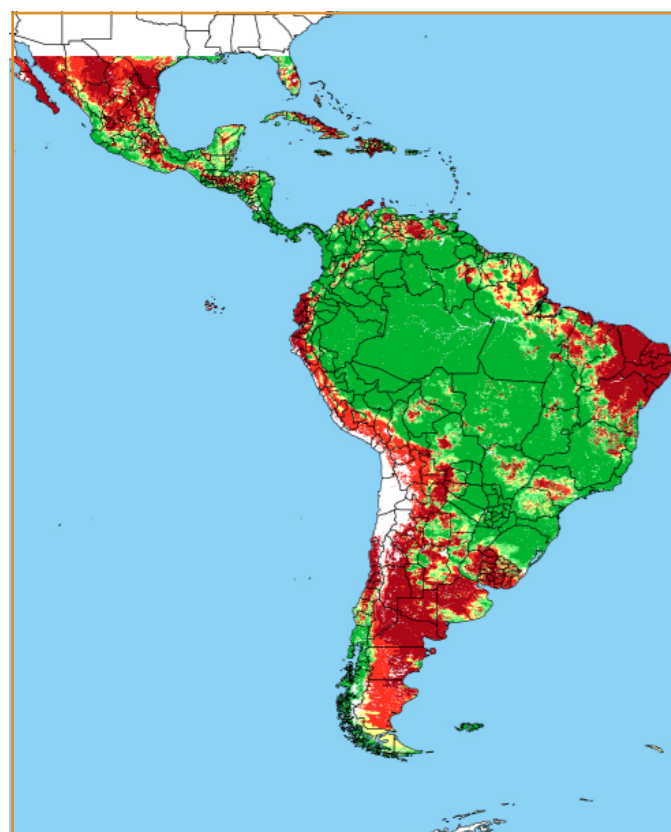
segunda-feira, 5 de novembro



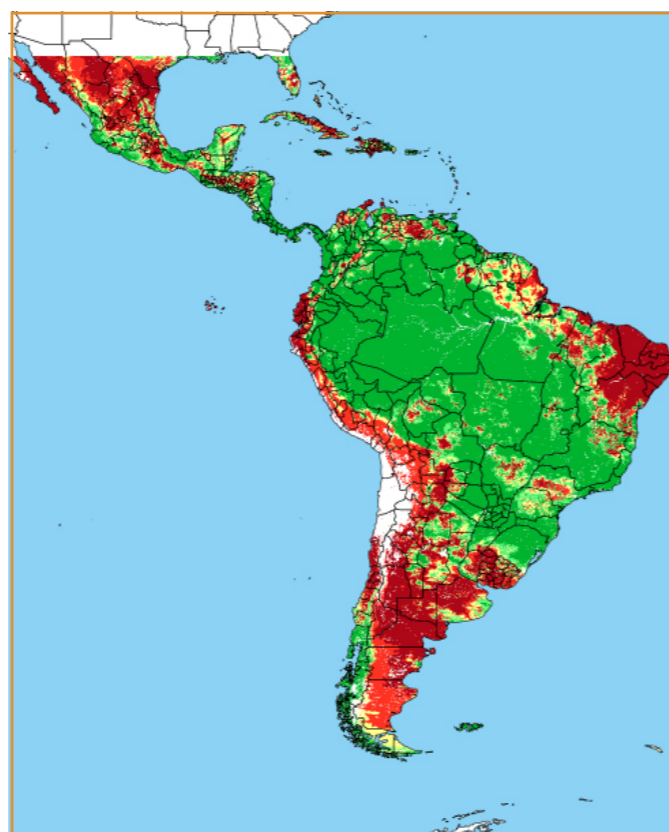
terça-feira, 6 de novembro



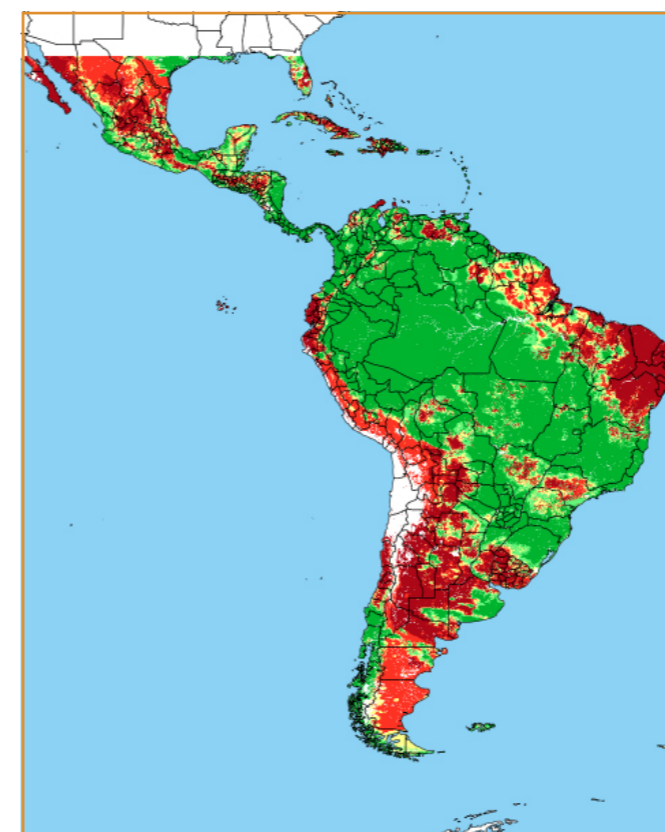
quarta-feira, 7 de novembro



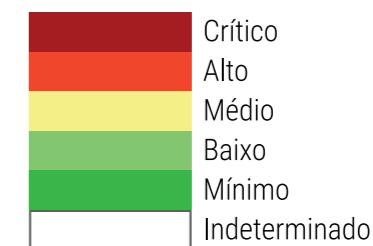
quinta-feira, 8 de novembro



sexta-feira, 9 de novembro



sábado, 10 de novembro



NOVEMBRO / 2018						
D	S	T	Q	Q	S	S
				305	306	307
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329	330	331	332	333	334	

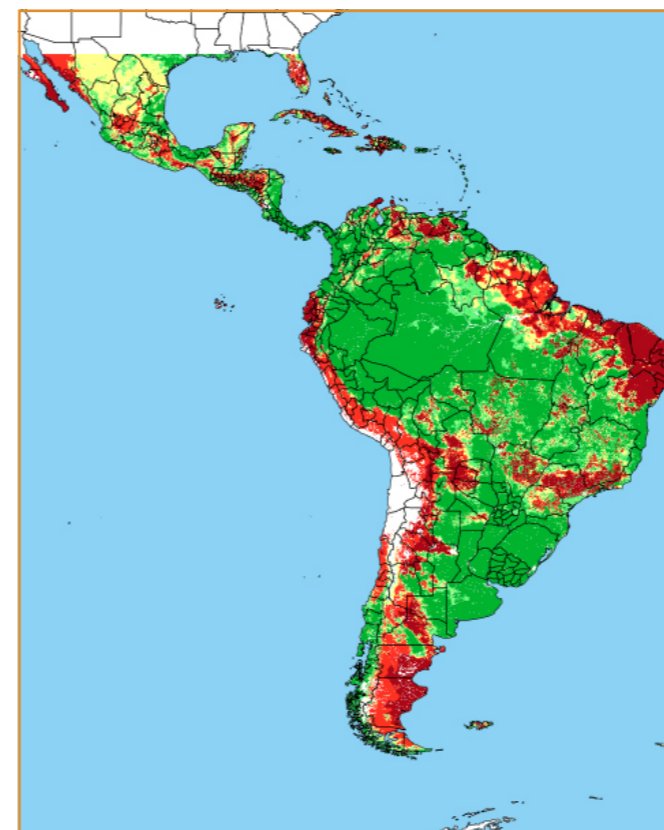
CALENDÁRIO JULIANO



domingo, 11 de novembro



segunda-feira, 12 de novembro



terça-feira, 13 de novembro



quarta-feira, 14 de novembro



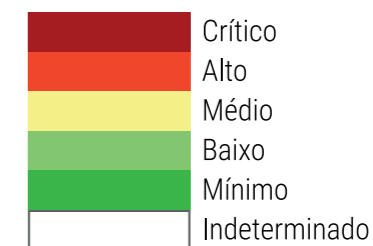
quinta-feira, 15 de novembro



sexta-feira, 16 de novembro

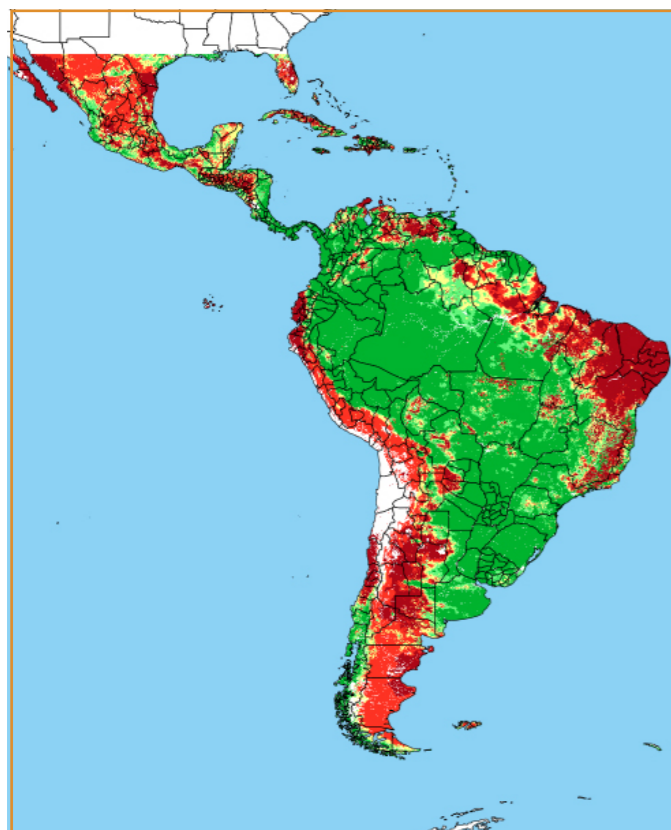


sábado, 17 de novembro



NOVEMBRO / 2018						
D	S	T	Q	Q	S	S
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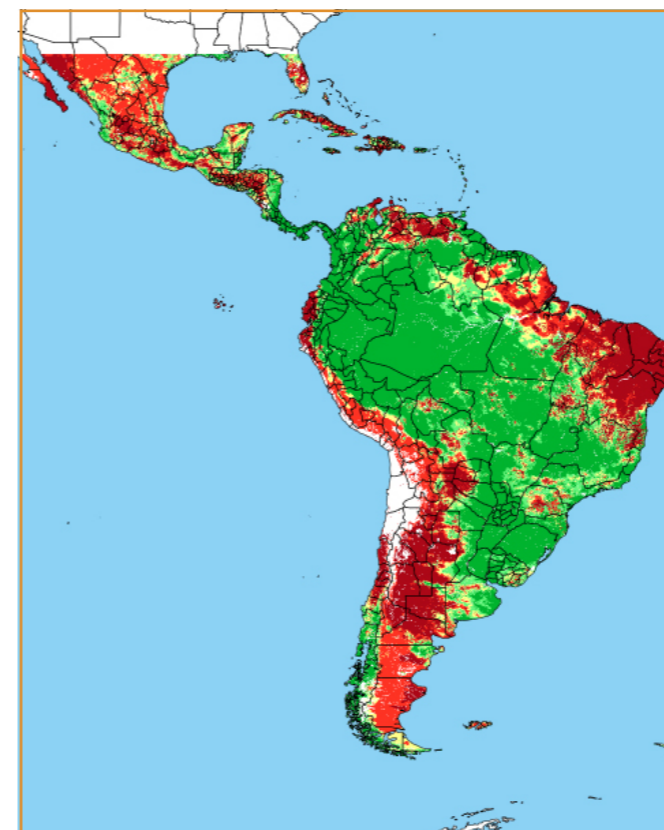
CALENDÁRIO JULIANO



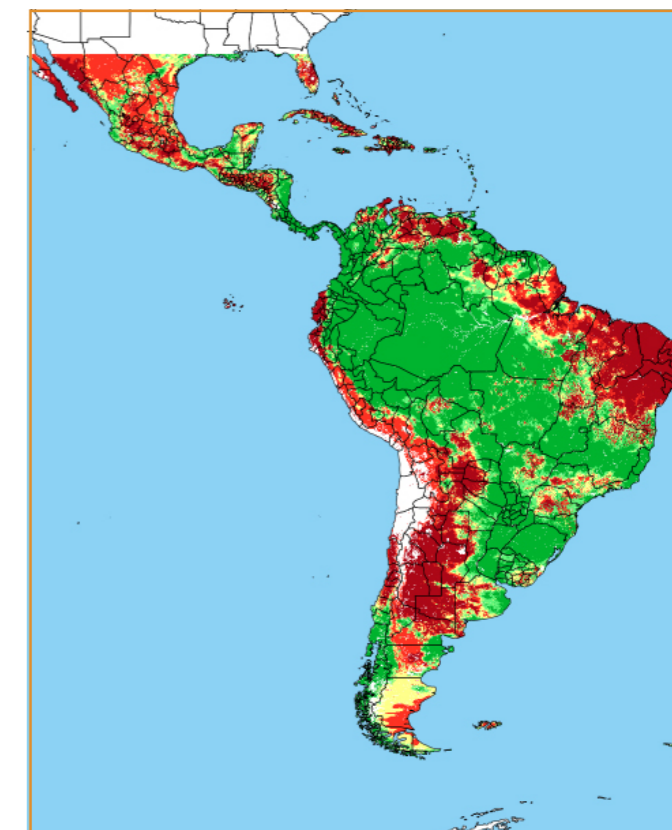
domingo, 18 de novembro



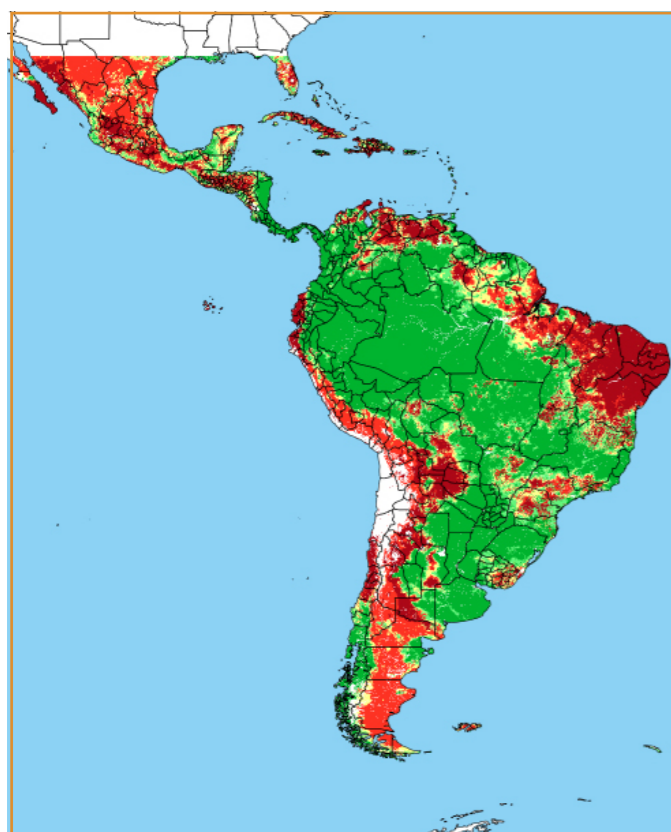
segunda-feira, 19 de novembro



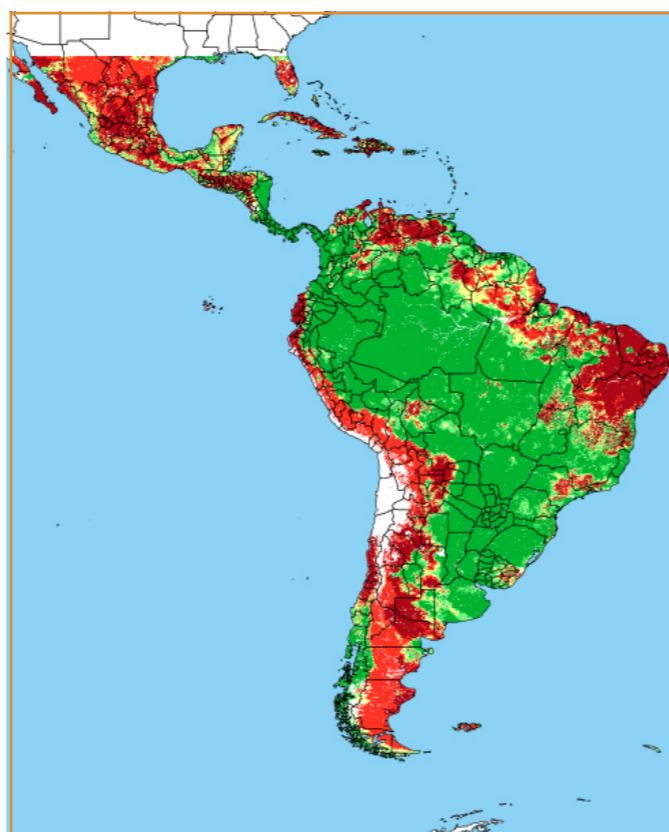
terça-feira, 20 de novembro



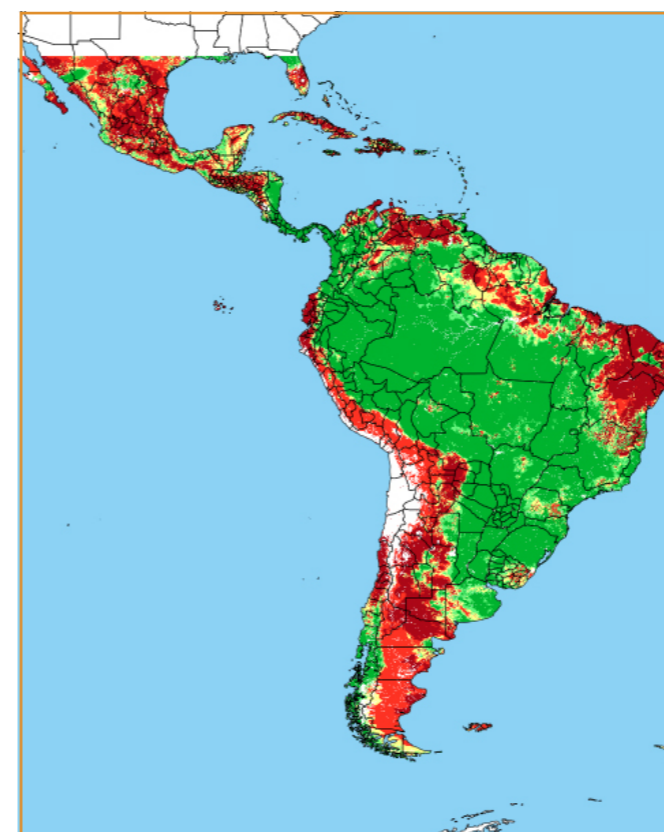
quarta-feira, 21 de novembro



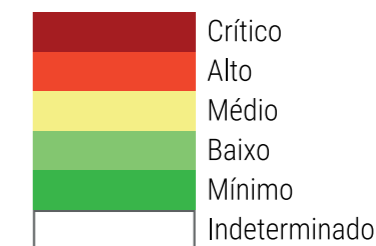
quinta-feira, 22 de novembro



sexta-feira, 23 de novembro

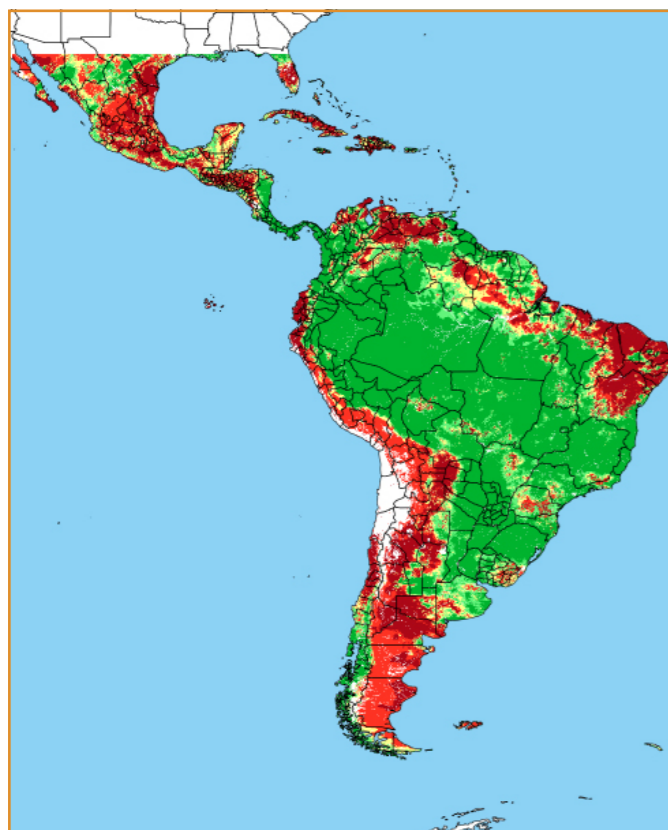


sábado, 24 de novembro



NOVEMBRO / 2018						
D	S	T	Q	Q	S	S
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329	330	331	332	333	334	

CALENDÁRIO JULIANO



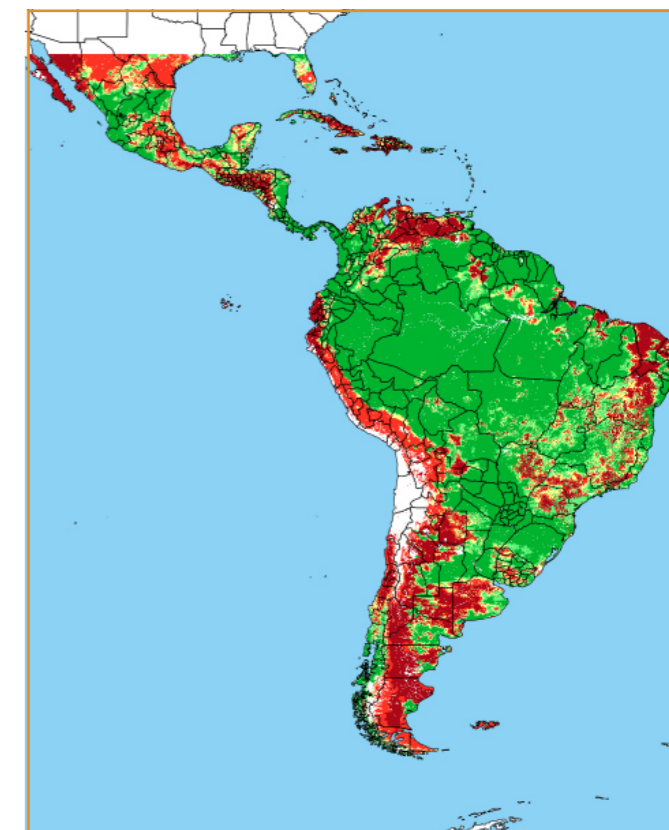
domingo, 25 de novembro



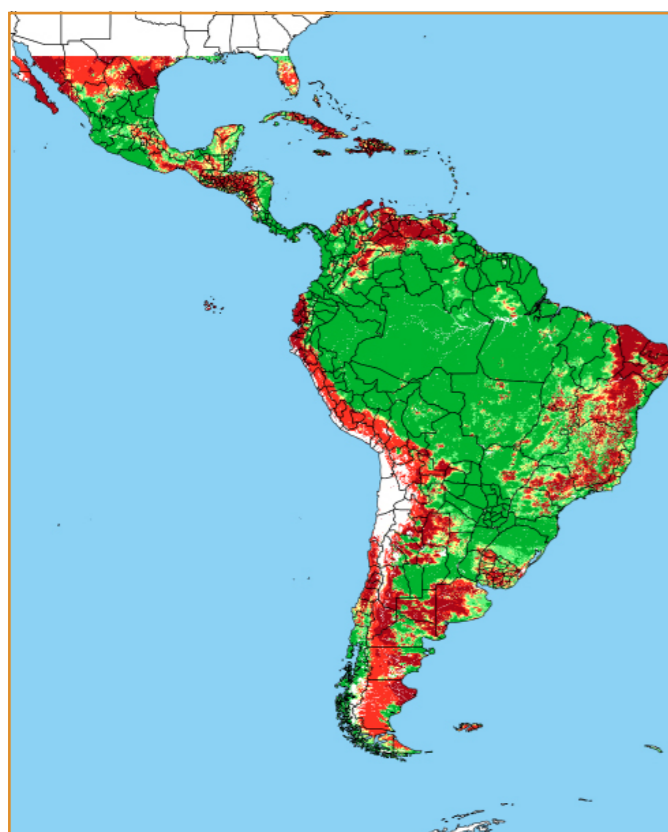
segunda-feira, 26 de novembro



terça-feira, 27 de novembro



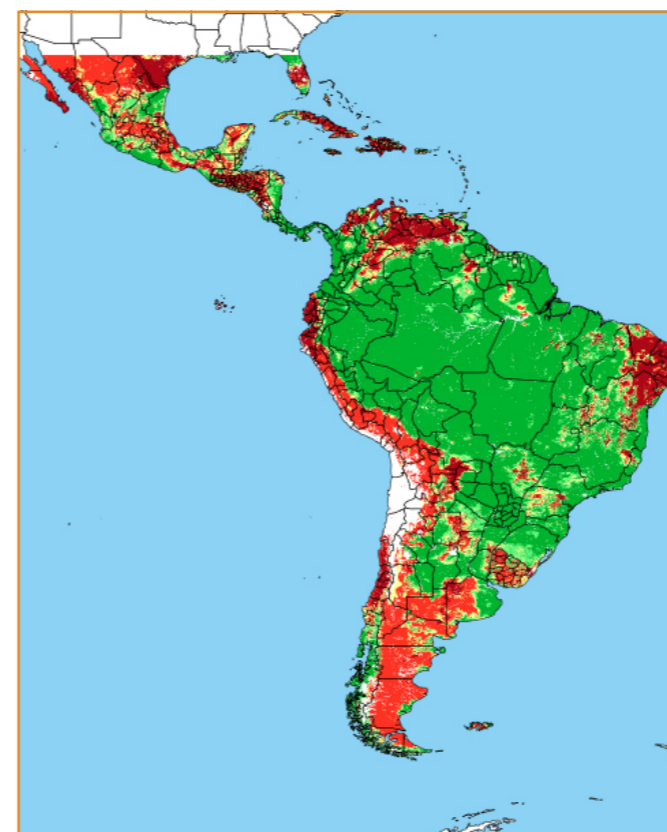
quarta-feira, 28 de novembro



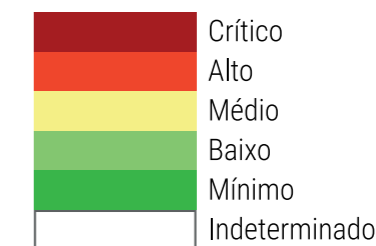
quinta-feira, 29 de novembro



sexta-feira, 30 de novembro

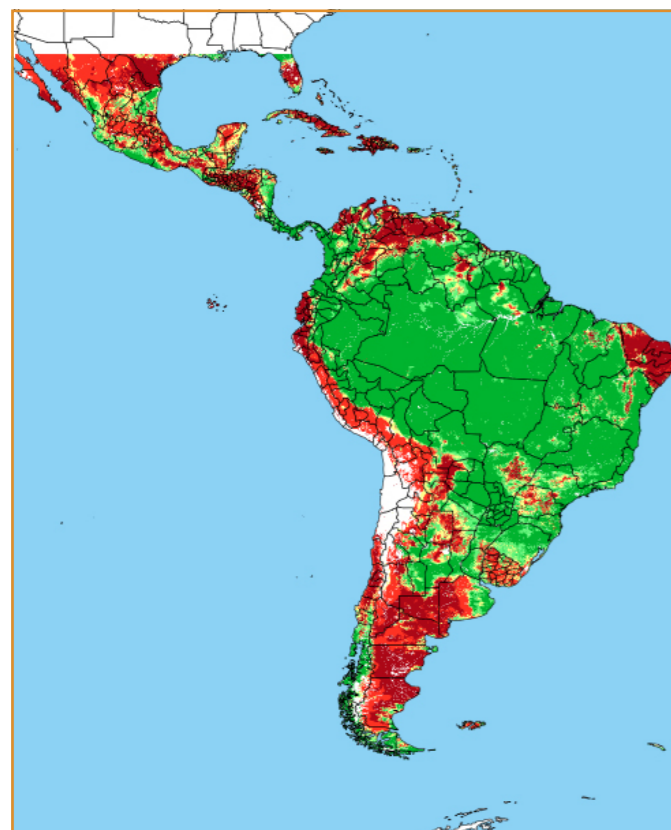


sábado, 1 de dezembro

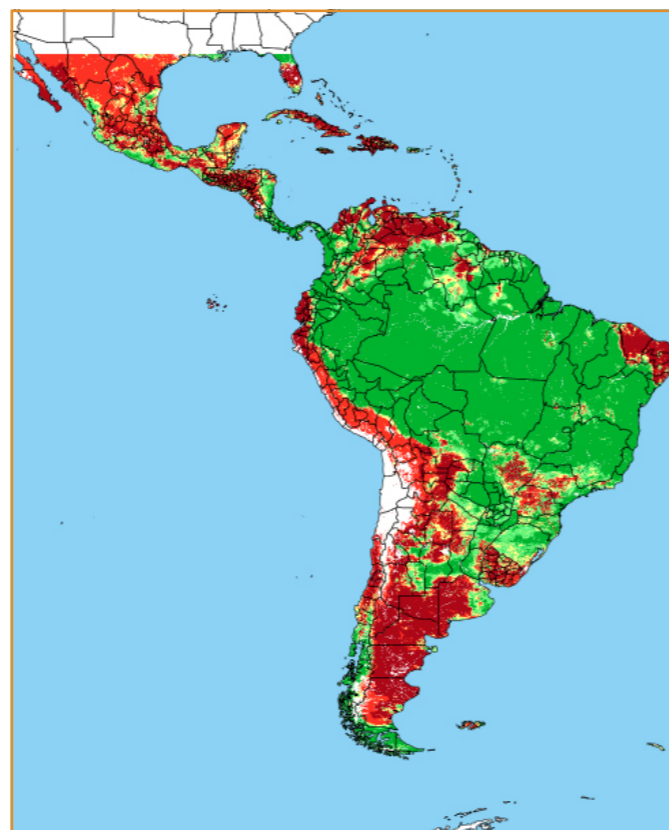


NOVEMBRO / 2018						
D	S	T	Q	Q	S	S
				305	306	307
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322	323	324	325	326	327	328
329	330	331	332	333	334	335

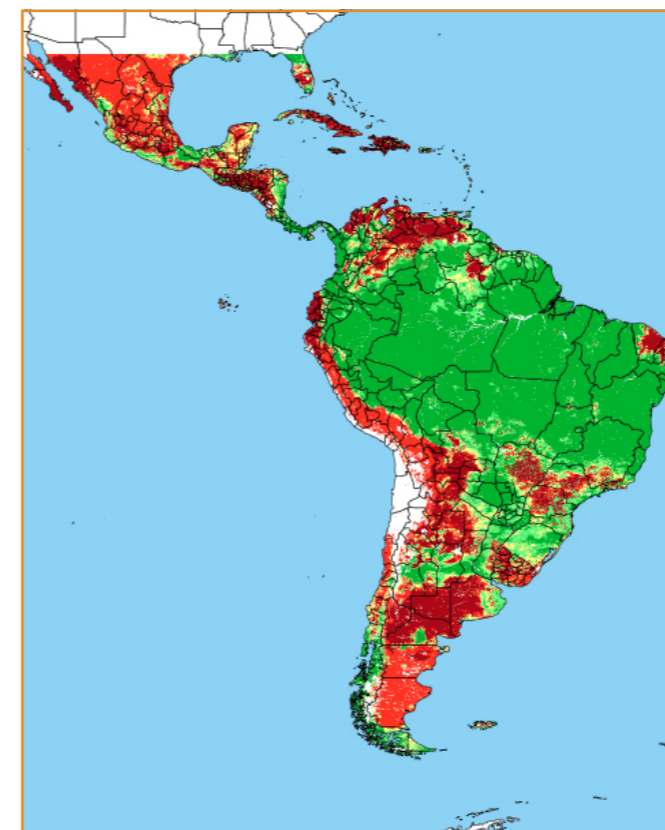
CALENDÁRIO JULIANO



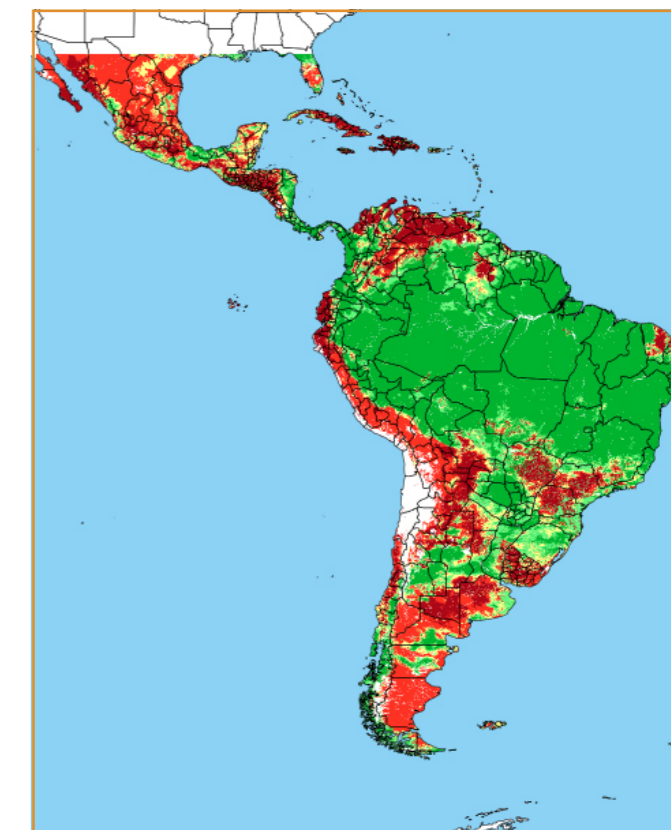
domingo, 2 de dezembro



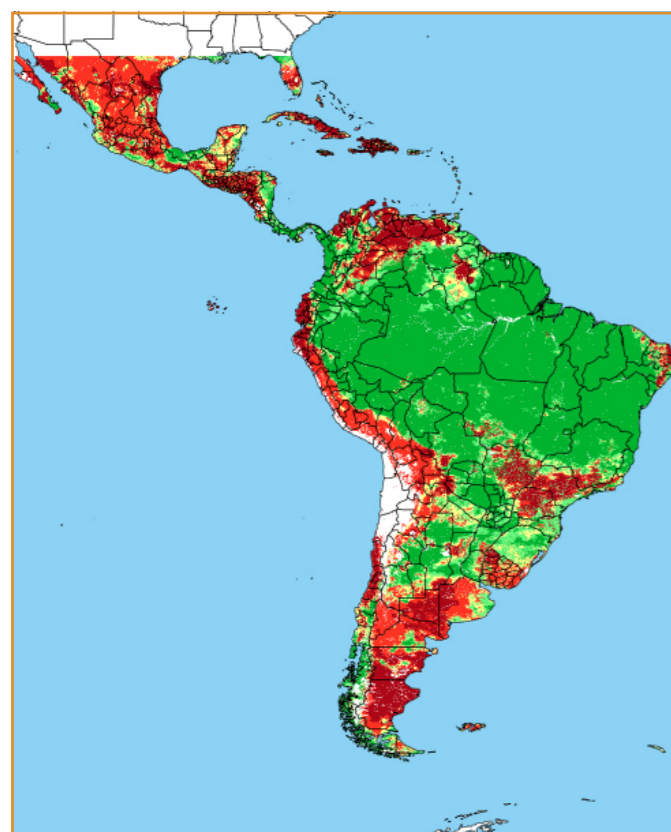
segunda-feira, 3 de dezembro



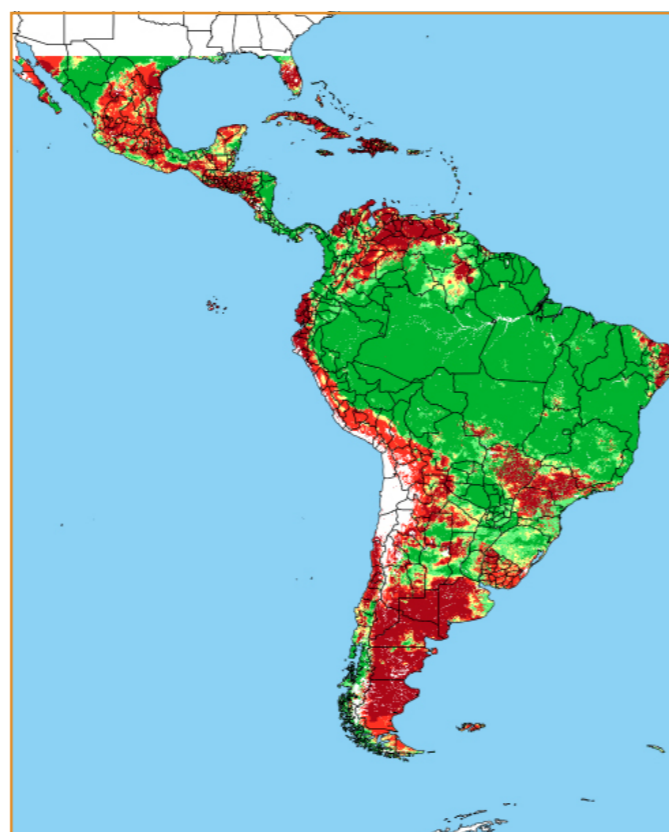
terça-feira, 4 de dezembro



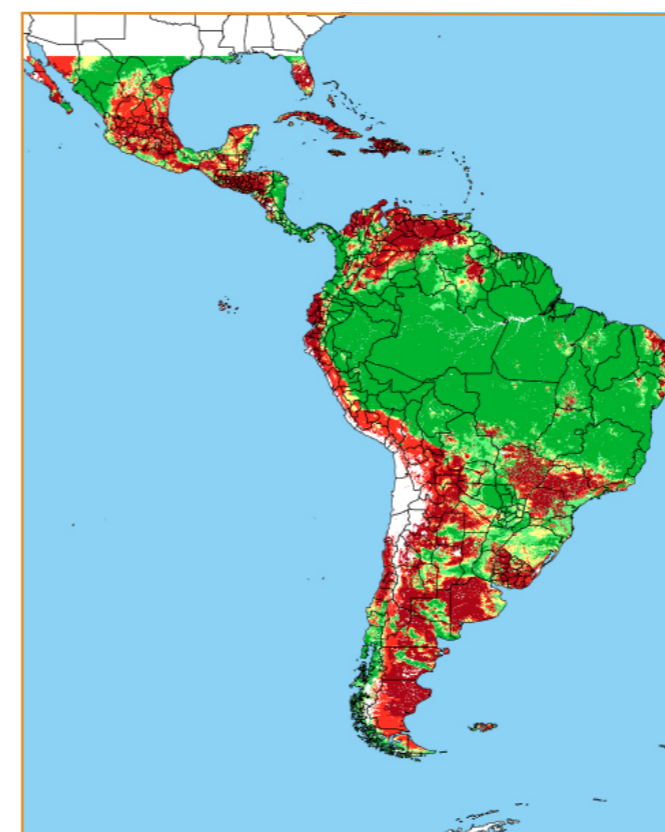
quarta-feira, 5 de dezembro



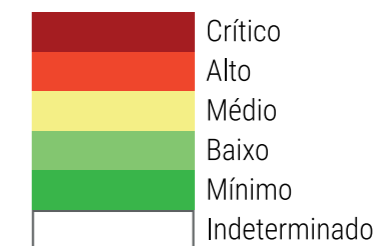
quinta-feira, 6 de dezembro



sexta-feira, 7 de dezembro

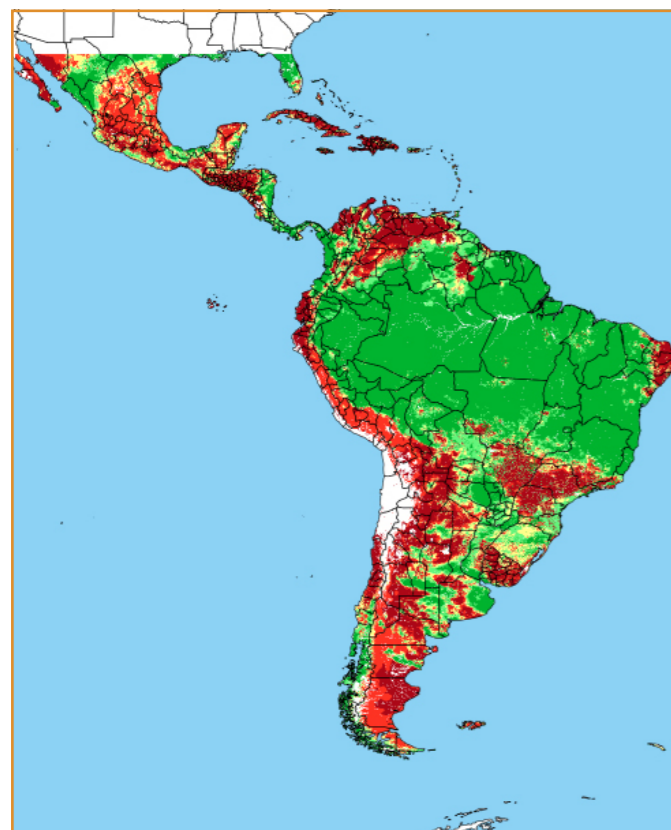


sábado, 8 de dezembro

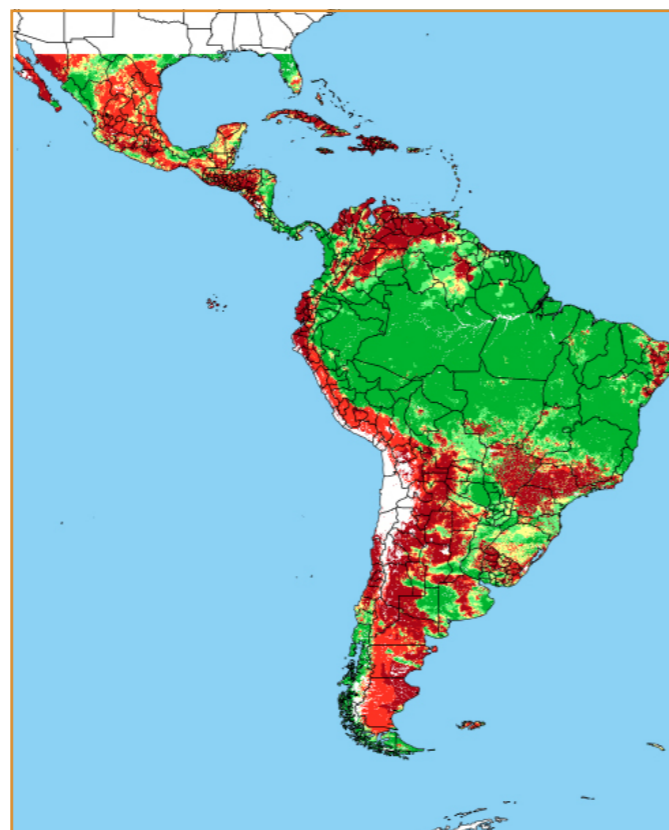


DEZEMBRO / 2018						
D	S	T	Q	Q	S	S
						335
336	337	338	339	340	341	342
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357	358	359	360	361	362	363
364	365					

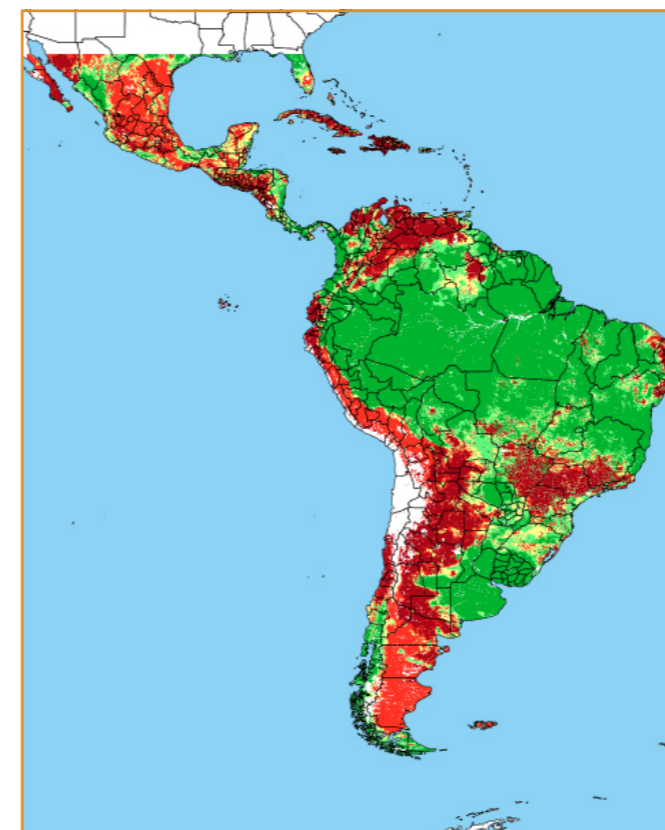
CALENDÁRIO JULIANO



domingo, 9 de dezembro



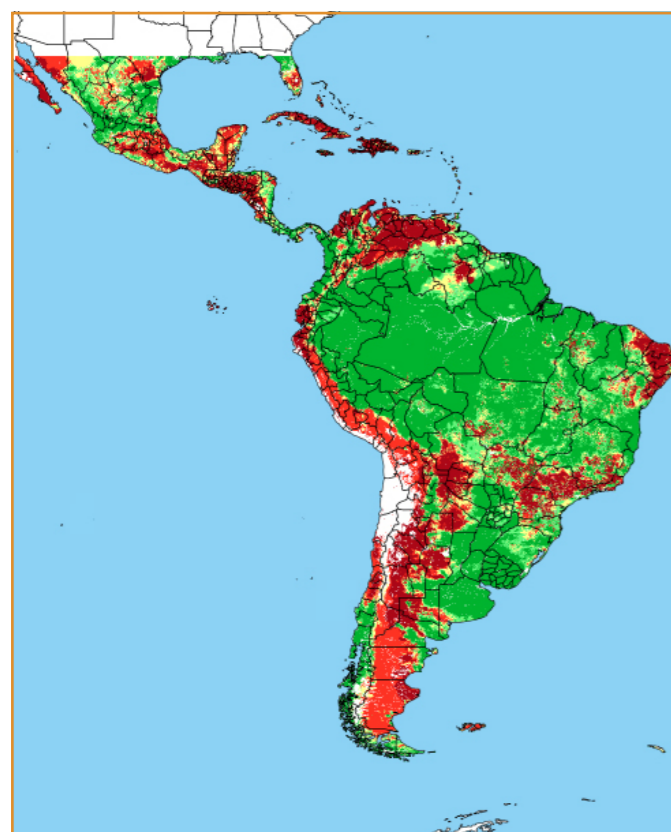
segunda-feira, 10 de dezembro



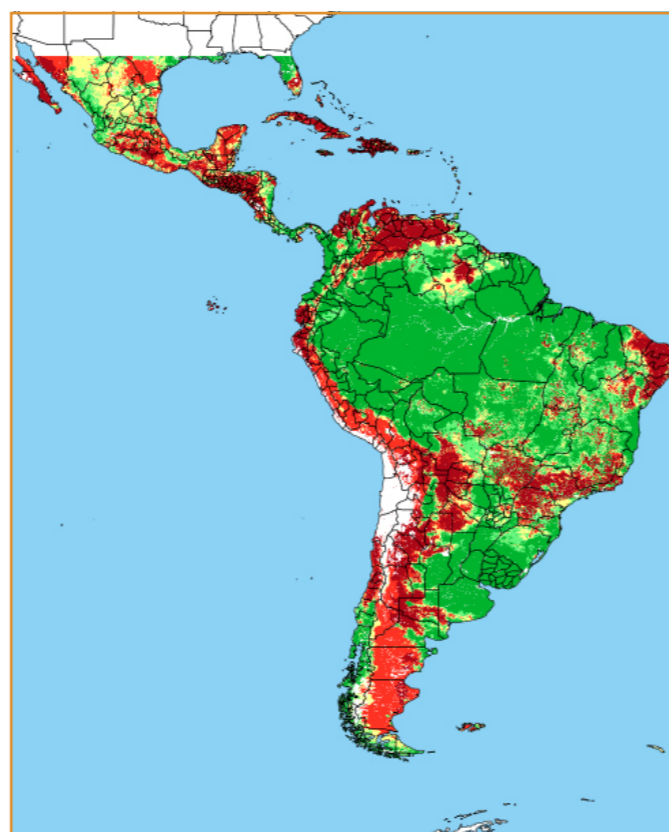
terça-feira, 11 de dezembro



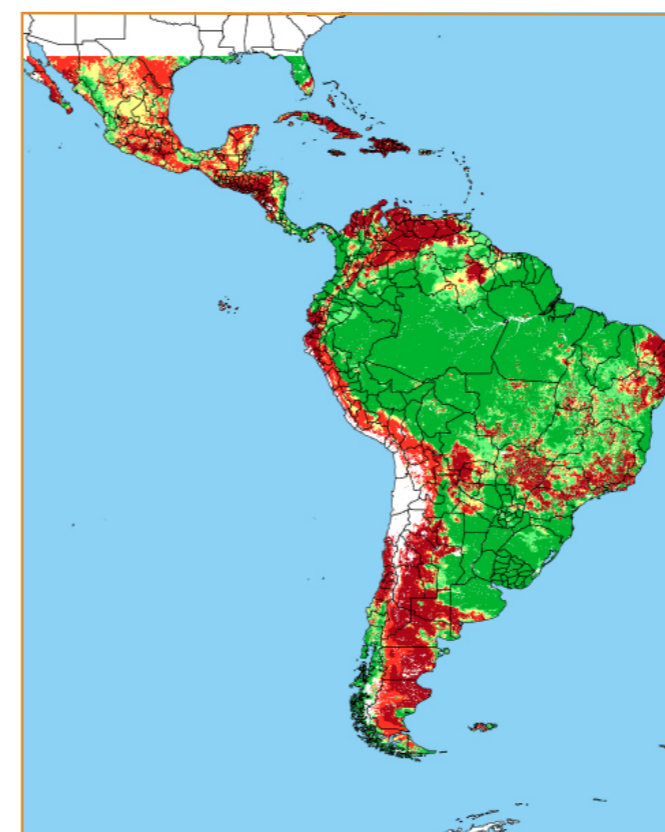
quarta-feira, 12 de dezembro



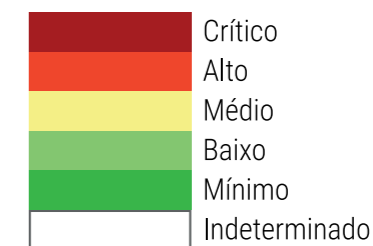
quinta-feira, 13 de dezembro



sexta-feira, 14 de dezembro



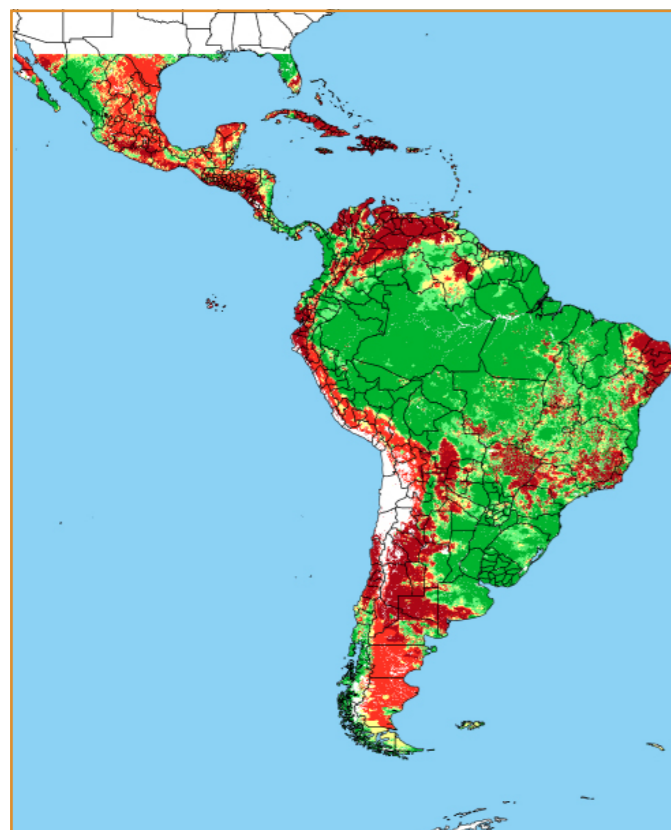
sábado, 15 de dezembro



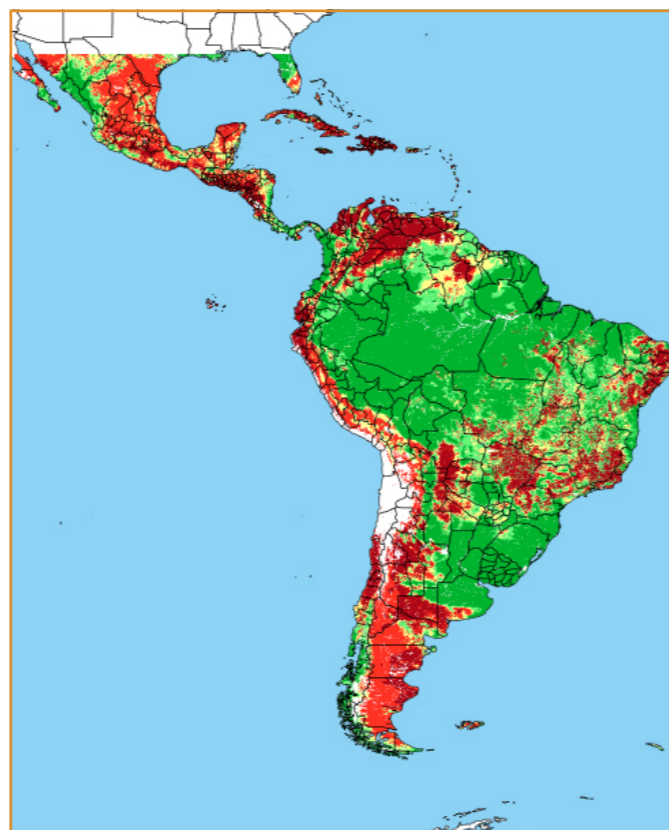
DEZEMBRO / 2018							
D	S	T	Q	Q	S	S	
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343	344	345	346	347	348	349	
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357	358	359	360	361	362	363	
364	365						

CALENDÁRIO JULIANO

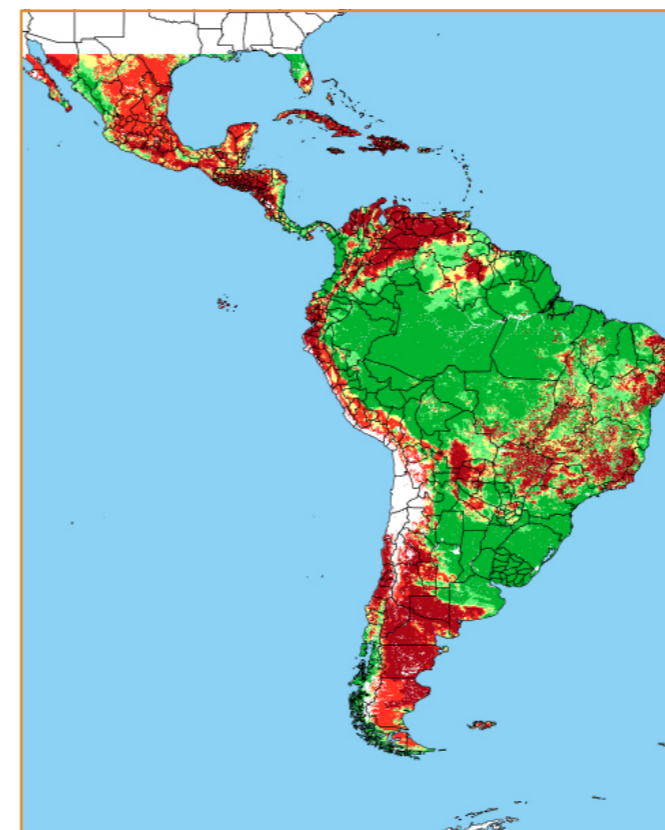




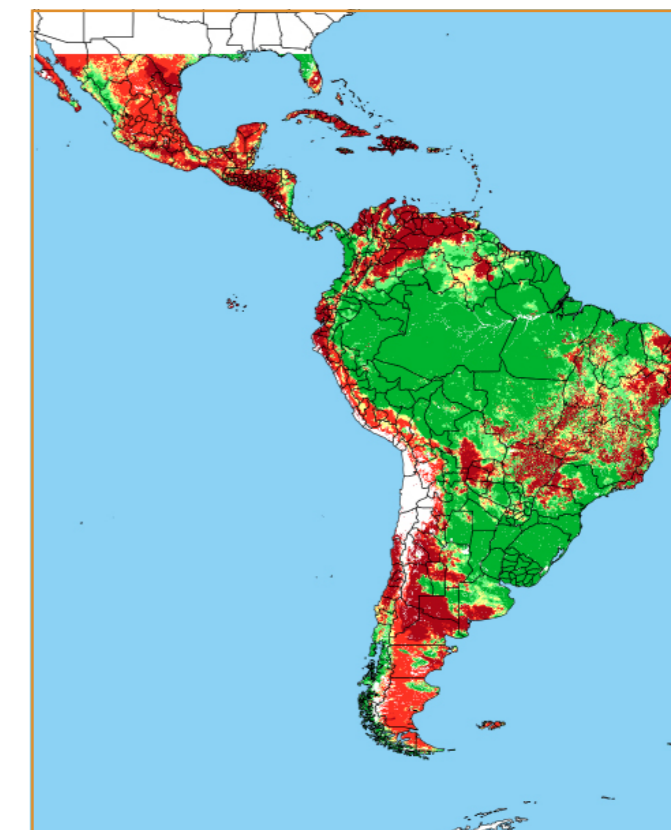
domingo, 16 de dezembro



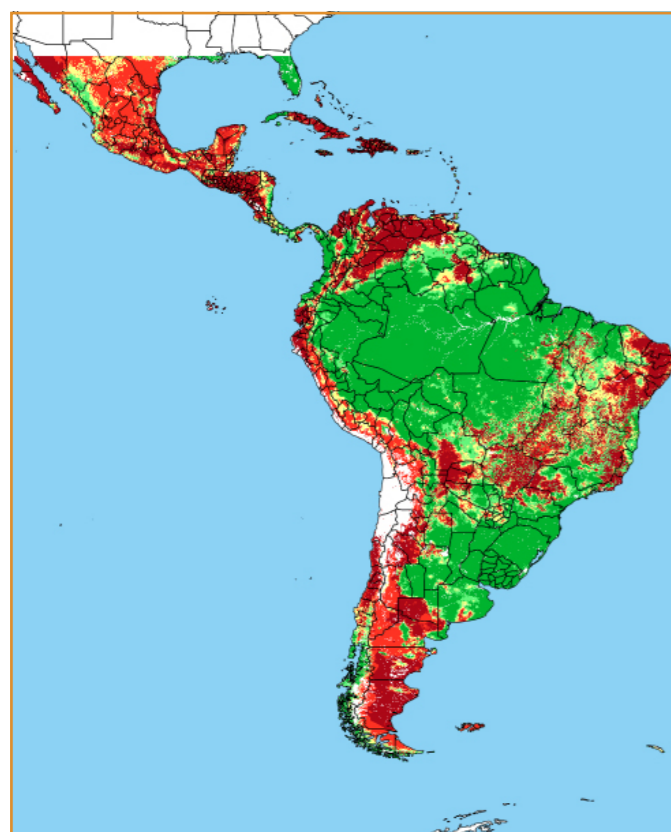
segunda-feira, 17 de dezembro



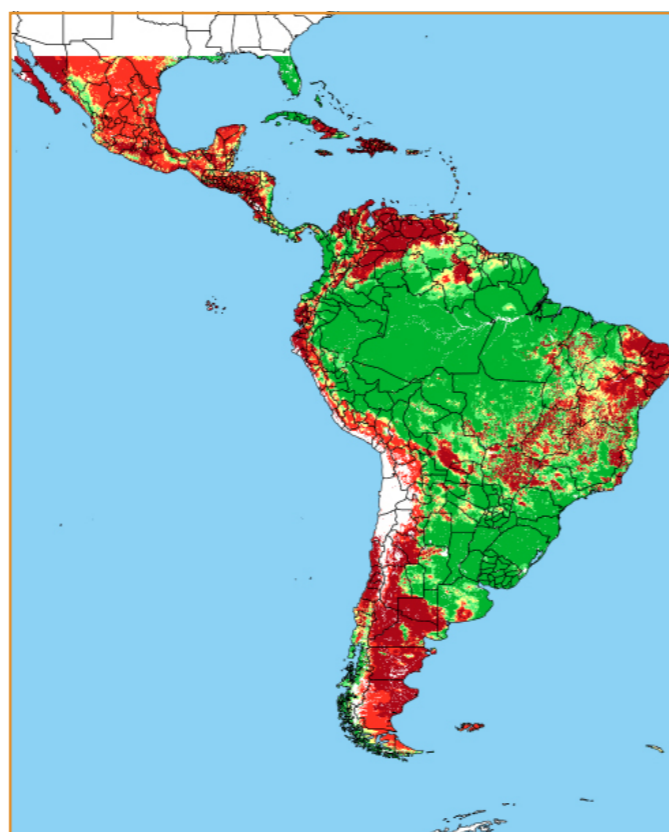
terça-feira, 18 de dezembro



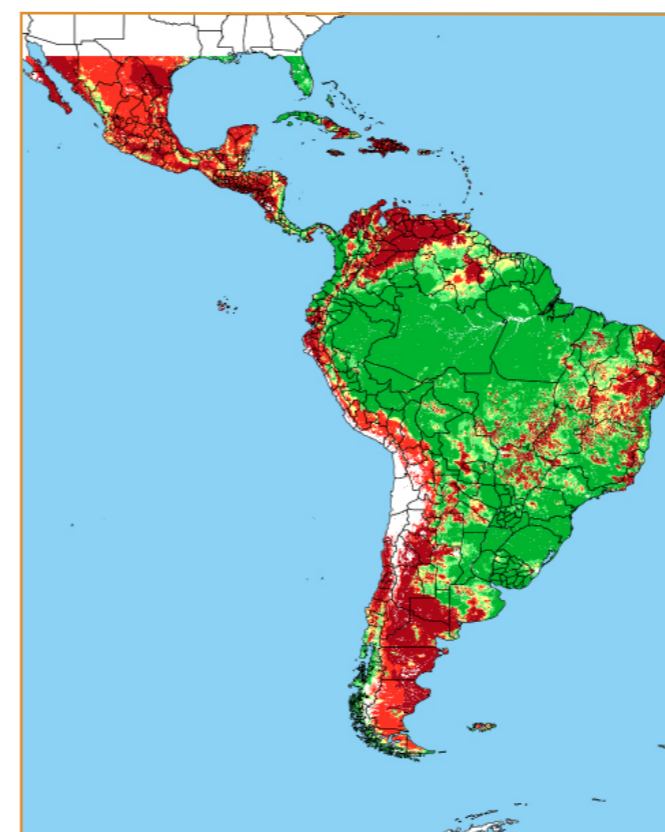
quarta-feira, 19 de dezembro



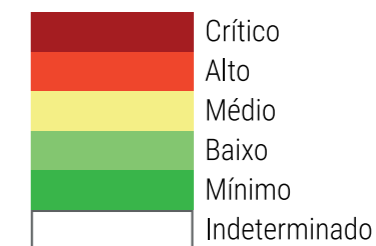
quinta-feira, 20 de dezembro



sexta-feira, 21 de dezembro

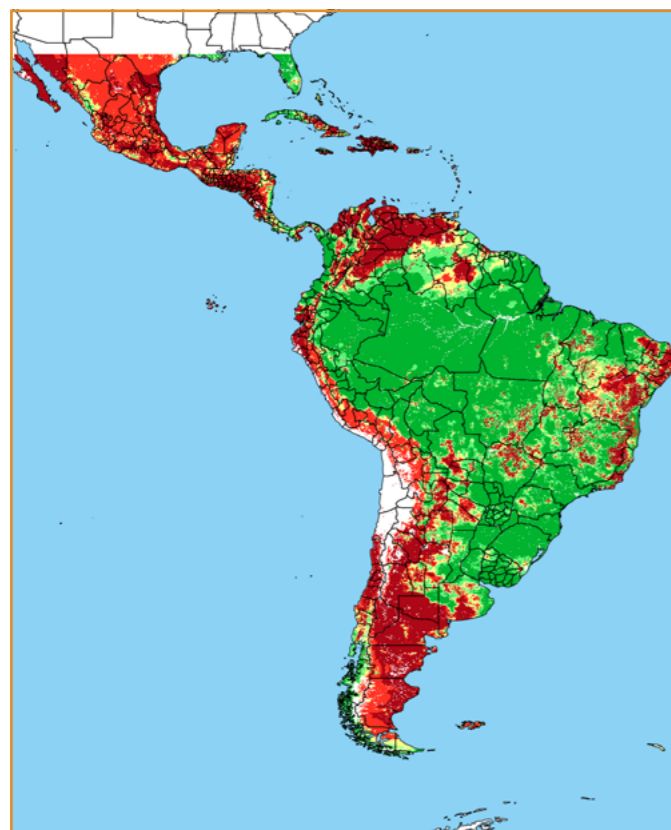


sábado, 22 de dezembro

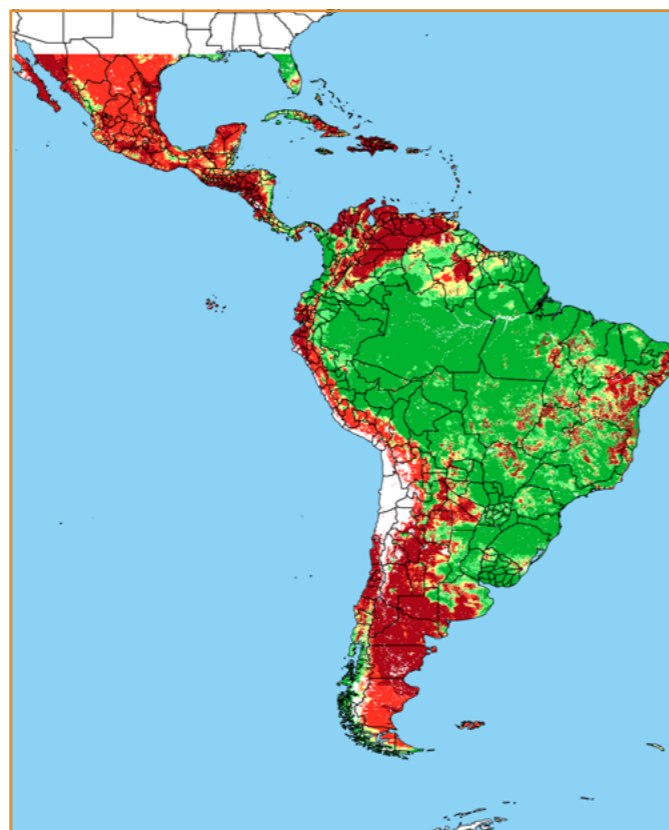


DEZEMBRO / 2018						
D	S	T	Q	Q	S	S
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364	365					

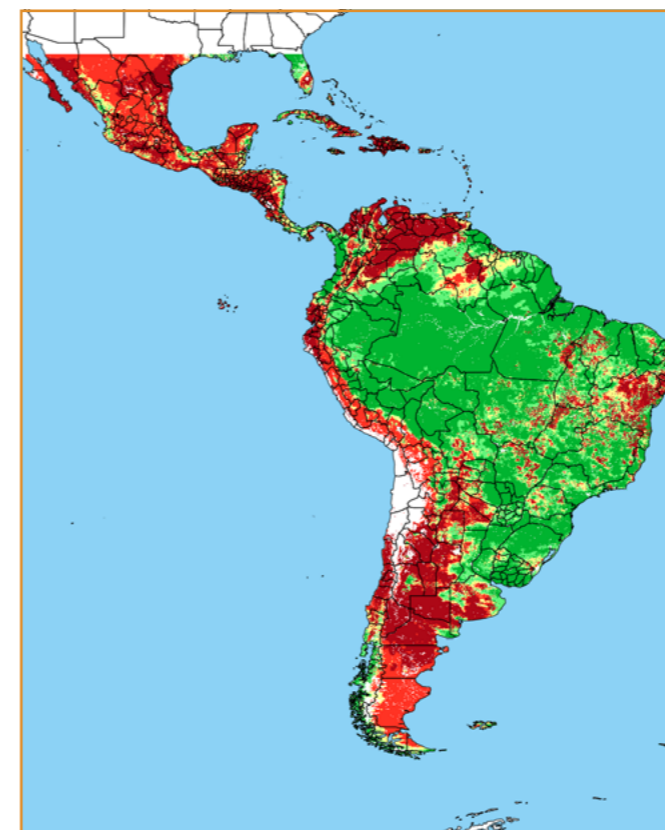
CALENDÁRIO JULIANO



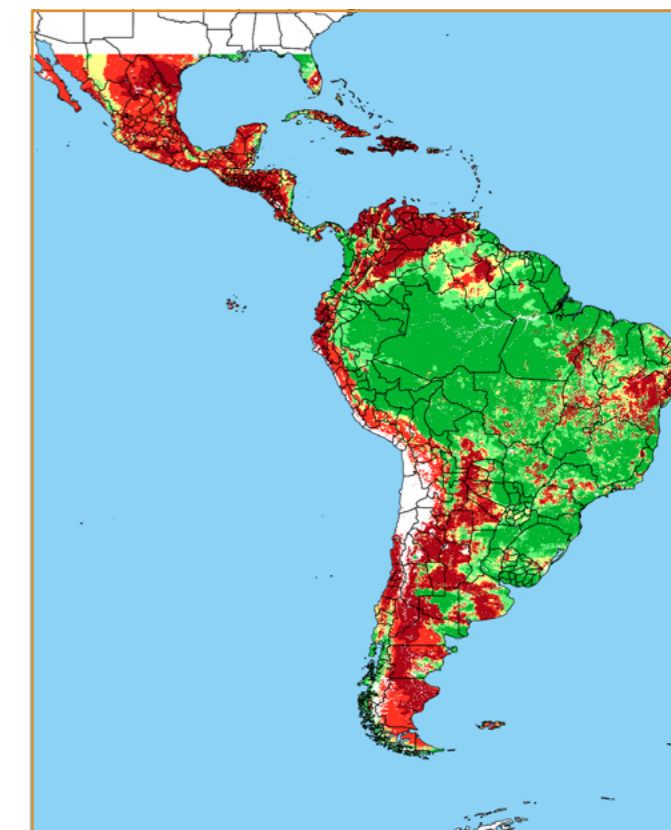
domingo, 23 de dezembro



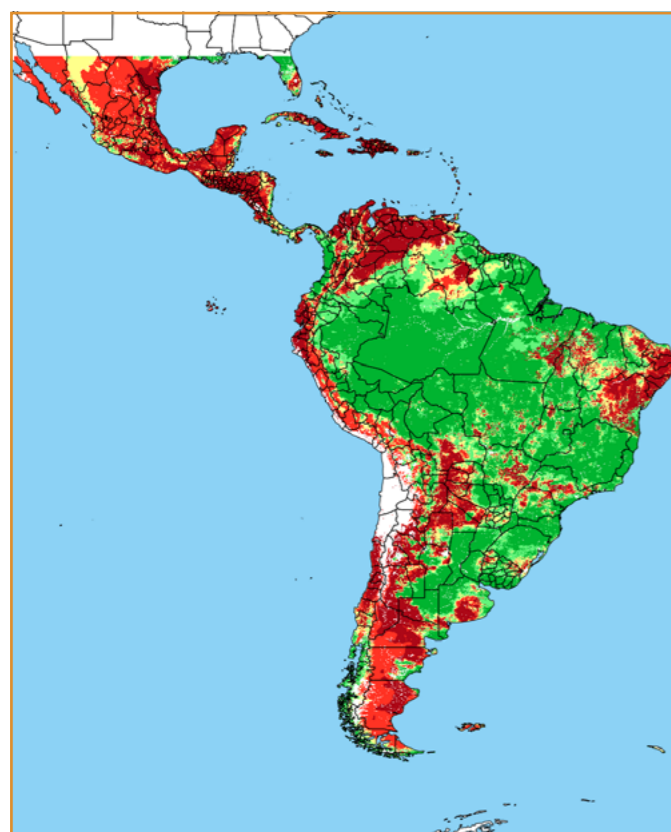
segunda-feira, 24 de dezembro



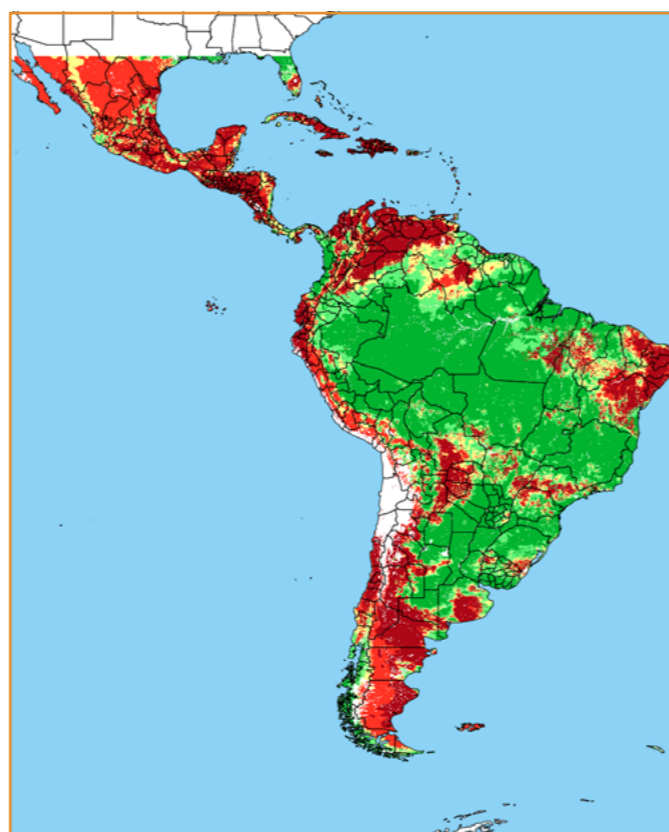
terça-feira, 25 de dezembro



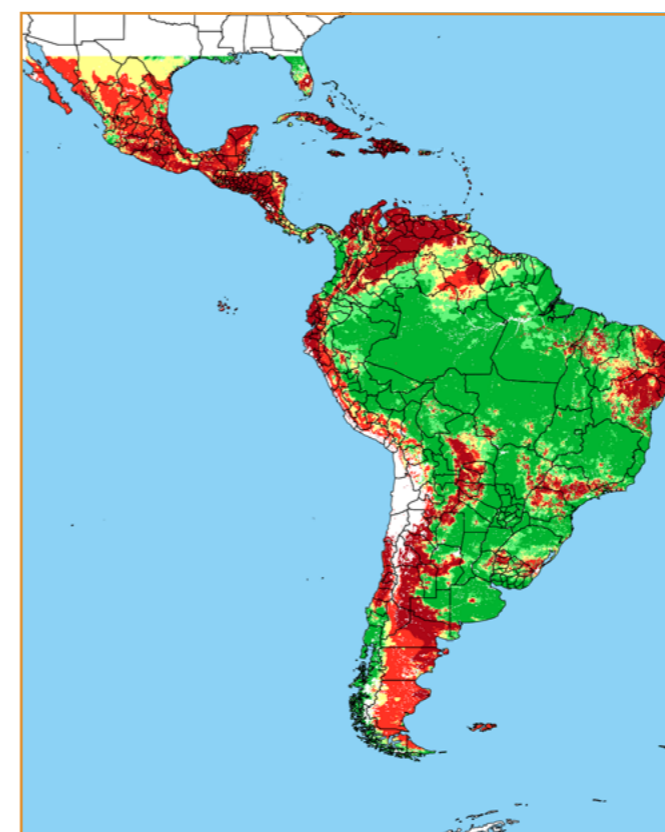
quarta-feira, 26 de dezembro



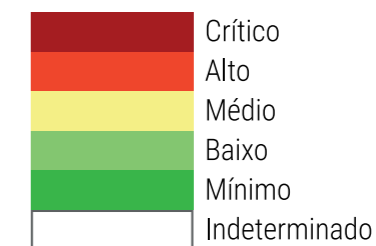
quinta-feira, 27 de dezembro



sexta-feira, 28 de dezembro

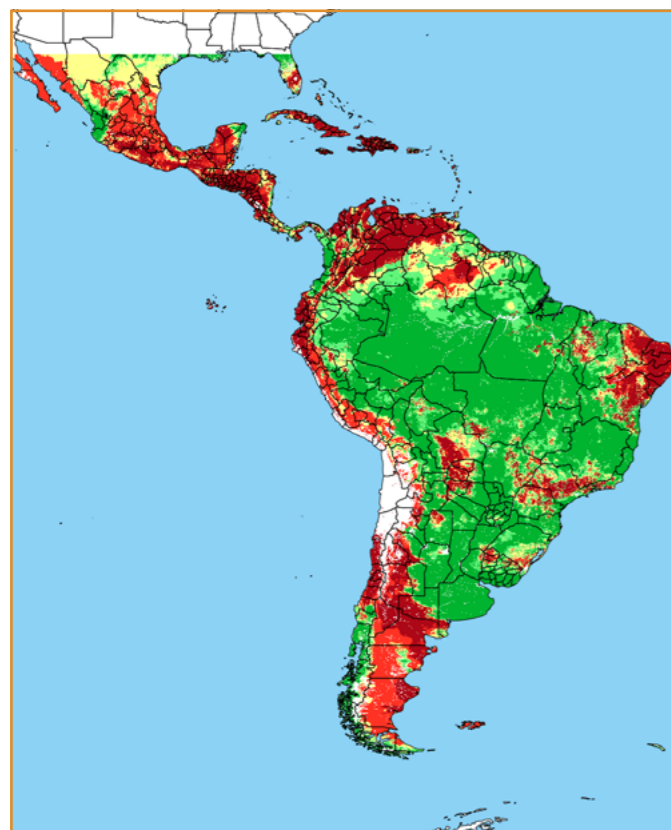


sábado, 29 de dezembro

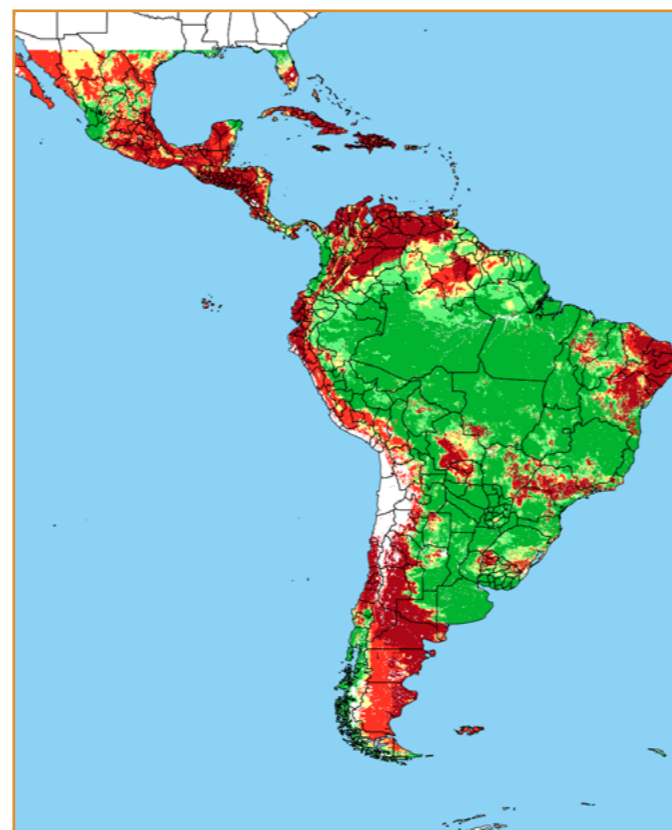


DEZEMBRO / 2018						
D	S	T	Q	Q	S	S
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336	337	338	339	340	341	342
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357	358	359	360	361	362	363
364	365					

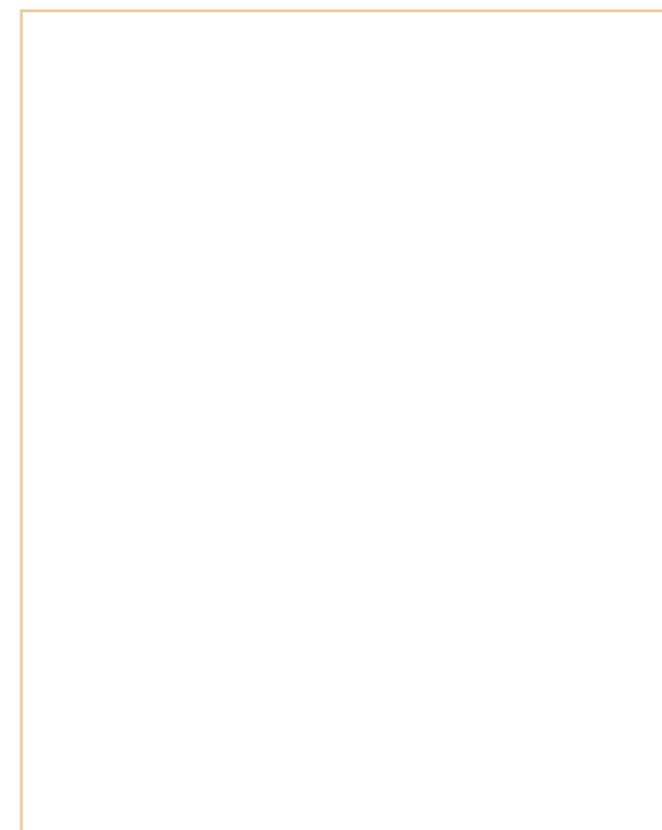
CALENDÁRIO JULIANO



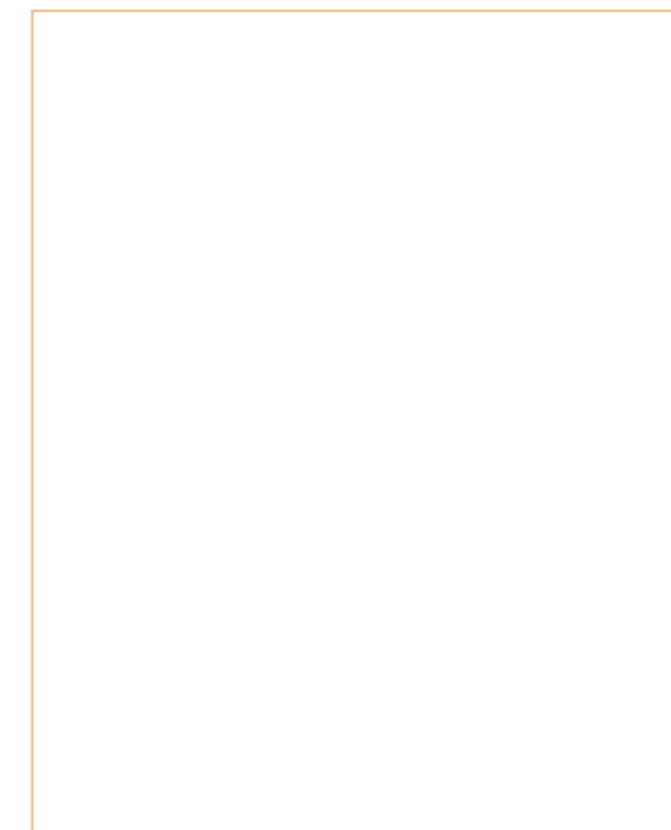
domingo, 30 de dezembro



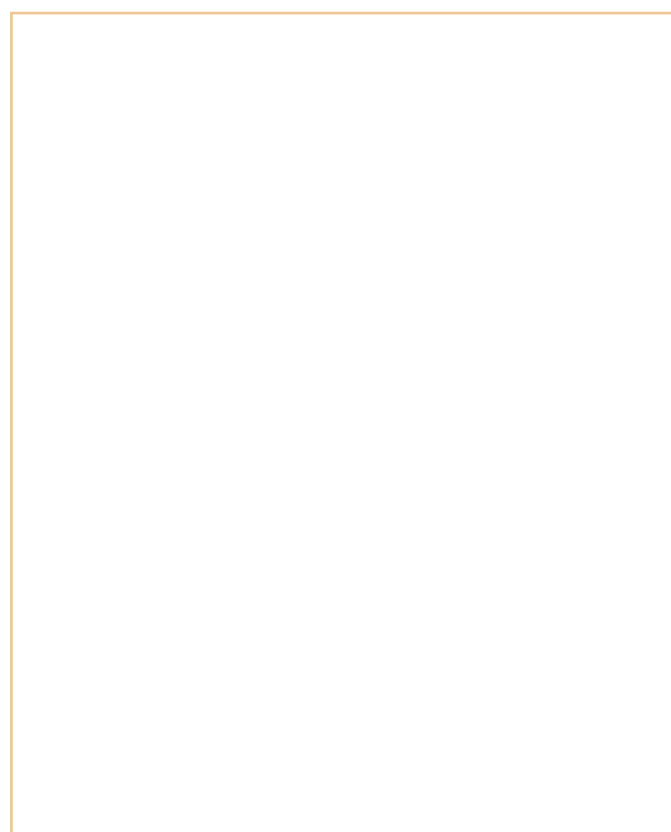
segunda-feira, 31 de dezembro



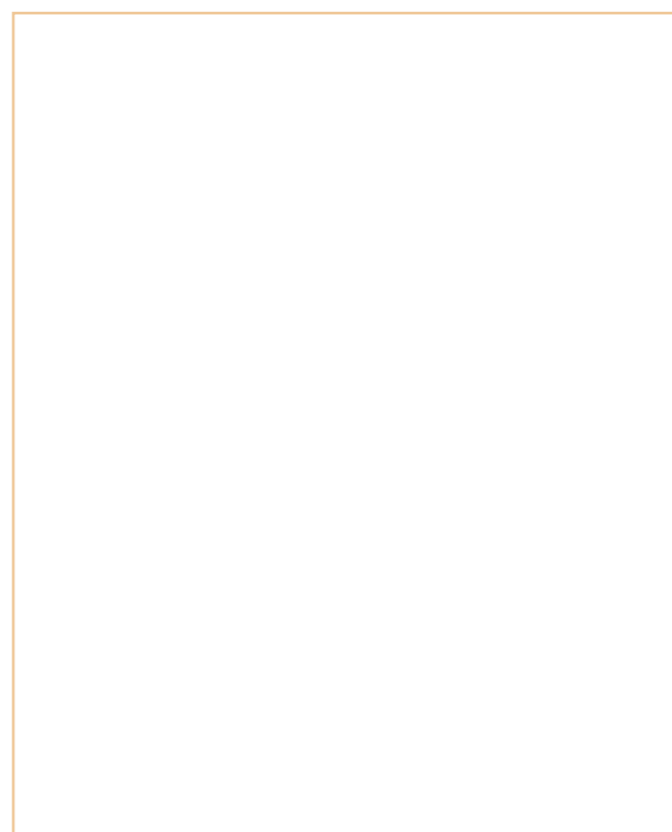
terça-feira, 2 de janeiro



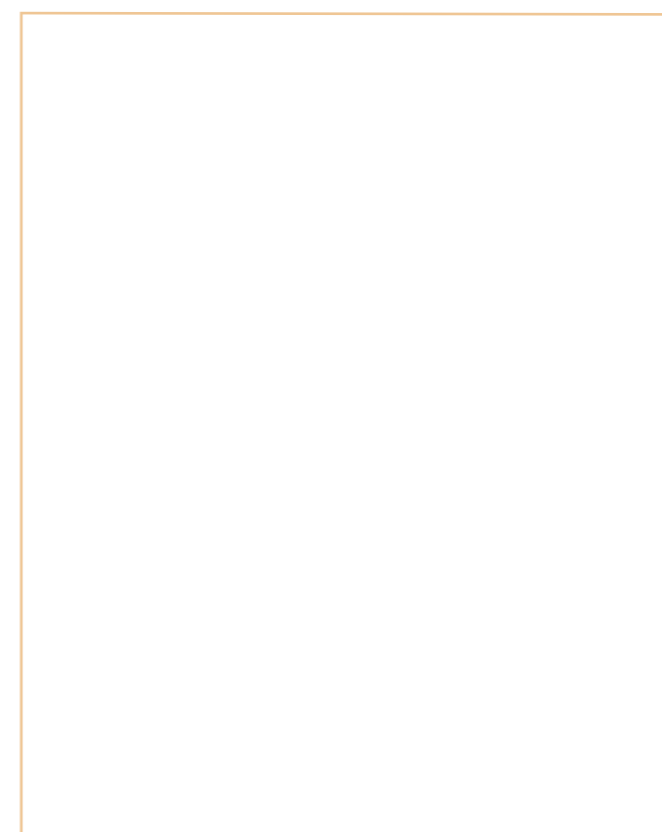
quarta-feira, 3 de janeiro



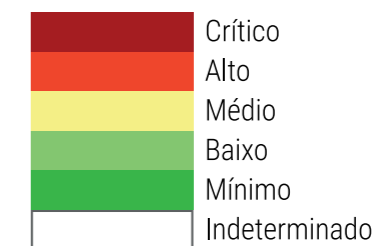
quinta-feira, 4 de janeiro



sexta-feira, 5 de janeiro



sábado, 6 de janeiro



DEZEMBRO / 2018						
D	S	T	Q	Q	S	S
						335
336	337	338	339	340	341	342
343	344	345	346	347	348	349
350	351	352	353	354	355	356
357	358	359	360	361	362	363
364	365					

CALENDÁRIO JULIANO

## Referência bibliográfica

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SETZER, A.; PEREIRA, M. C.; PEREIRA, J. R. O uso de satélites NOAA na detecção de queimadas no Brasil. Climanálise, v. 7, n. 8, p. 40-53, 1992.

SISMANOGLU, R.; SETZER, A. Risco de fogo para a vegetação da América do Sul: comparação de duas versões para 2003. In: CONGRESSO BRASILEIRO DE METEOROLOGIA, 13., 2004, Fortaleza. Anais... Fortaleza: SBMET, 2004. Disponível em: [http://sigma.cptec.inpe.br/queimadas/documentos/200409\\_sismanoglu&setzer\\_cbmet8\\_fortaleza\\_636.pdf](http://sigma.cptec.inpe.br/queimadas/documentos/200409_sismanoglu&setzer_cbmet8_fortaleza_636.pdf). Acesso em: 08 junho 2018.

VILA, D.; GONCALVES, L.; TOLL, D.; ROZANTE, J. Statistical evaluation of combined daily gauge observations and rainfall satellite estimations over continental South America. Journal of Hydrometeorology, v. 10, n. 2, p. 533-543, 2008.

Projeto Monitoramento Ambiental por Satélites no Bioma Amazônia

**FUNDO  
AMAZÔNIA**



MINISTÉRIO DO  
PLANEJAMENTO,  
DESENVOLVIMENTO E GESTÃO

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GOVERNO  
FEDERAL