

INPE Programa Queimadas

RISCO DE FOGO

Anuário 2019

Registro histórico de todos os mapas de Risco de Fogo de 2019 e sua metodologia.

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RISCO DE FOGO
Anuário 2019

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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 2019.

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

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, 2019.

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

SUMÁRIO

1. Introdução 4
2. Fonte de dados 5
3. Metodologia para o cálculo do Risco de Fogo 9
Mapas Risco de Fogo - Janeiro / 2019 11
Mapas Risco de Fogo - Fevereiro / 2019 19
Mapas Risco de Fogo - Março / 2019 27
Mapas Risco de Fogo - Abril / 2019 37
Mapas Risco de Fogo - Maio / 2019 45
Mapas Risco de Fogo - Junho / 2019 54
Mapas Risco de Fogo - Julho / 2019 63
Mapas Risco de Fogo - Agosto / 2019 71
Mapas Risco de Fogo - Setembro / 2019 81
Mapas Risco de Fogo - Outrubro / 2019 89
Mapas Risco de Fogo - Novembro / 2019 97
Mapas Risco de Fogo - Dezembro / 2019 107
Referências Bibliográficas 117

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.

Precipitação acumulada - IMERG

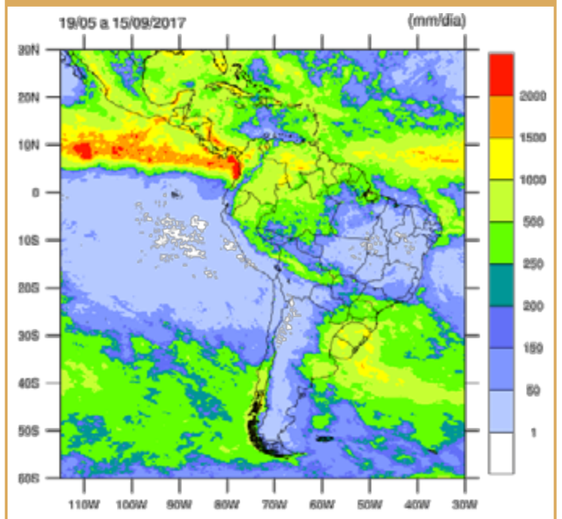
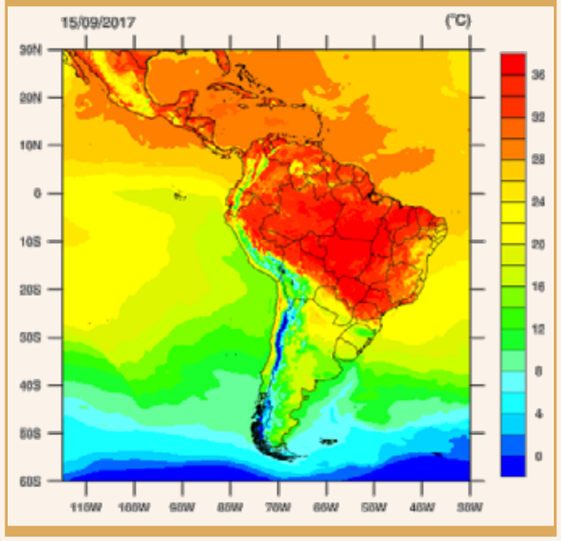


Figura 2.1 - Precipitação acumulada para 120 dias (19 de maio a 15 de setembro de 2017) obtida do IMERG. Estes campos são produzidos diariamente para períodos de 1 a 120 dias anteriores em relação ao dia do cálculo.

2.2 TEMPERATURA E UMIDADE DO AR À SUPERFÍCIE

Os campos de temperatura máxima (ºC) e de umidade relativa mínima do ar (décimos) 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.

Temperatura à superfície - GFS



Umidade relativa à superfície - GFS

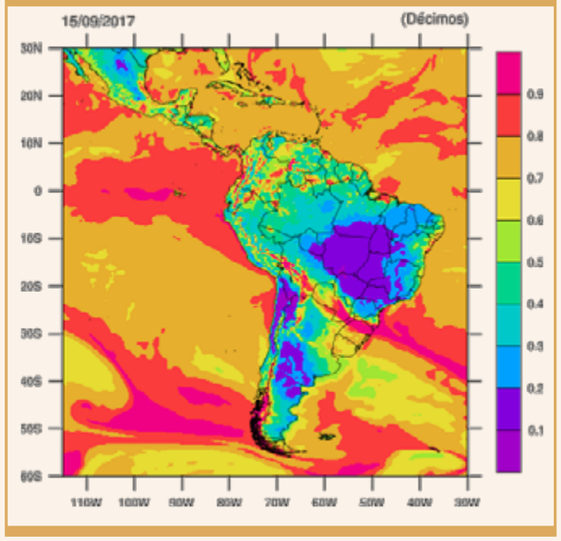


Figura 2.2 - a) Temperatura do Ar à superfície às 18UTC; b) Umidade Relativa do Ar à superfície às 18UTC.

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 (IBGP, 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.

Mapa de vegetação

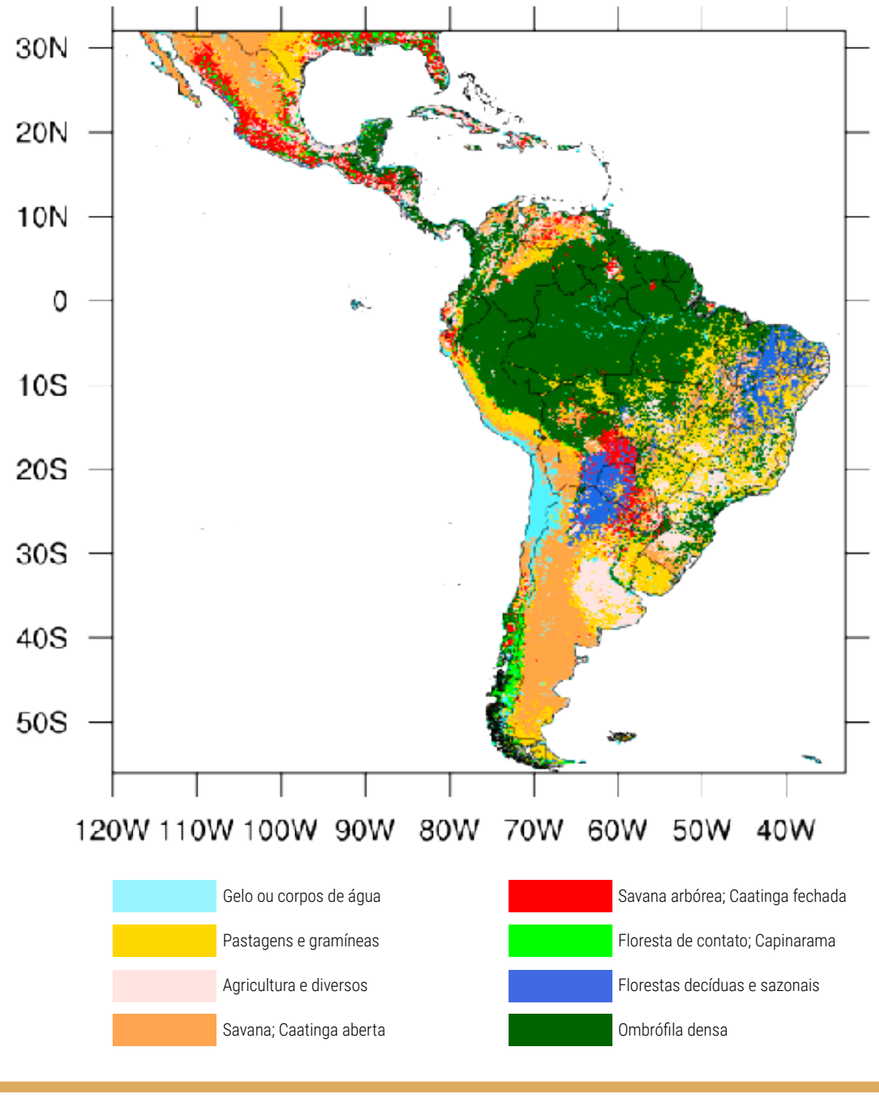


Figura 2.3 - Mapa de vegetação do IGBP combinado com o MapBiomas utilizado no cálculo do Risco de Fogo observado.

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.

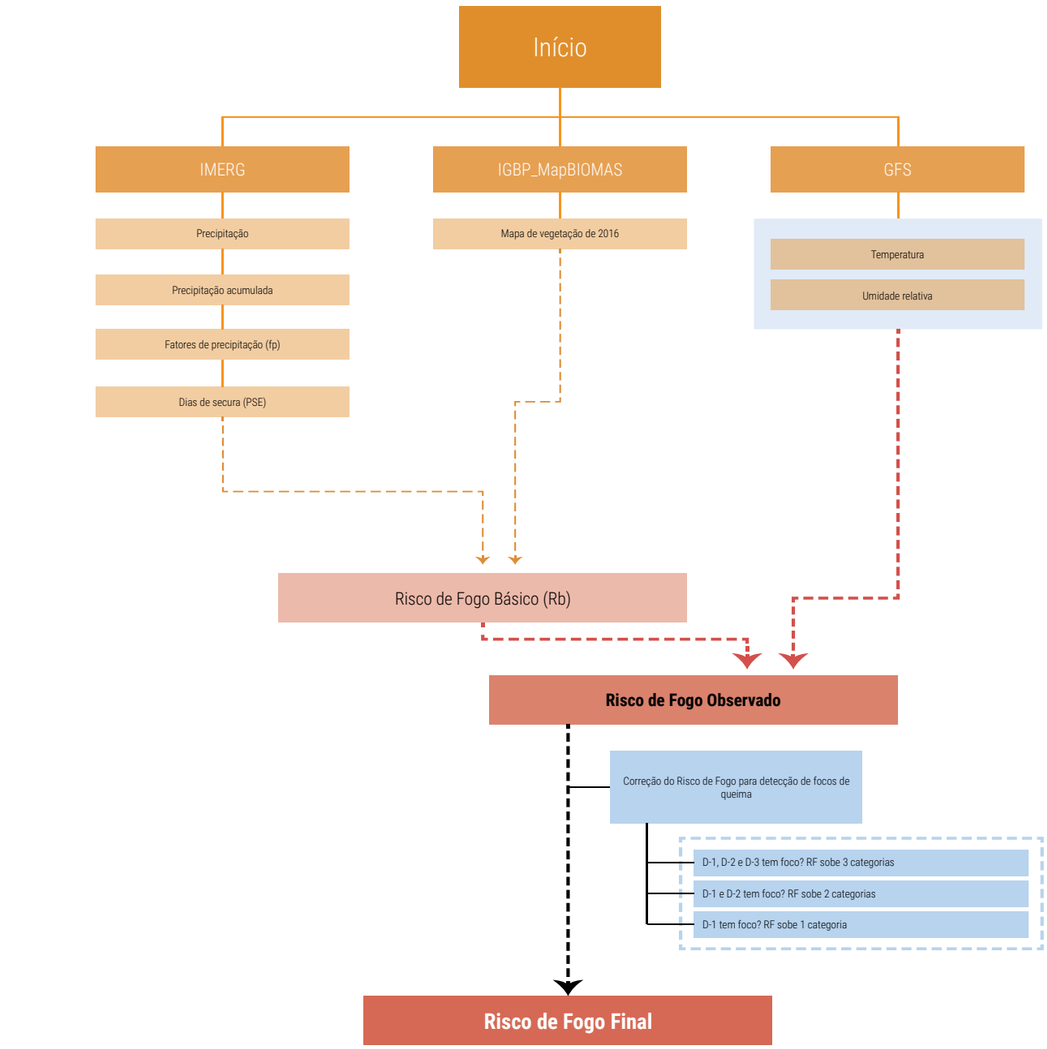
Tabela 2.1 - Classes de Vegetação, Classes principais e valores da constante "A".

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 secura (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

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	
Baixo	0,15 < RF ≤ 0,40	
Médio	0,40 < RF ≤ 0,70	
Alto	0,70 < RF ≤ 0,95	
Crítico	RF > 0,95	

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.

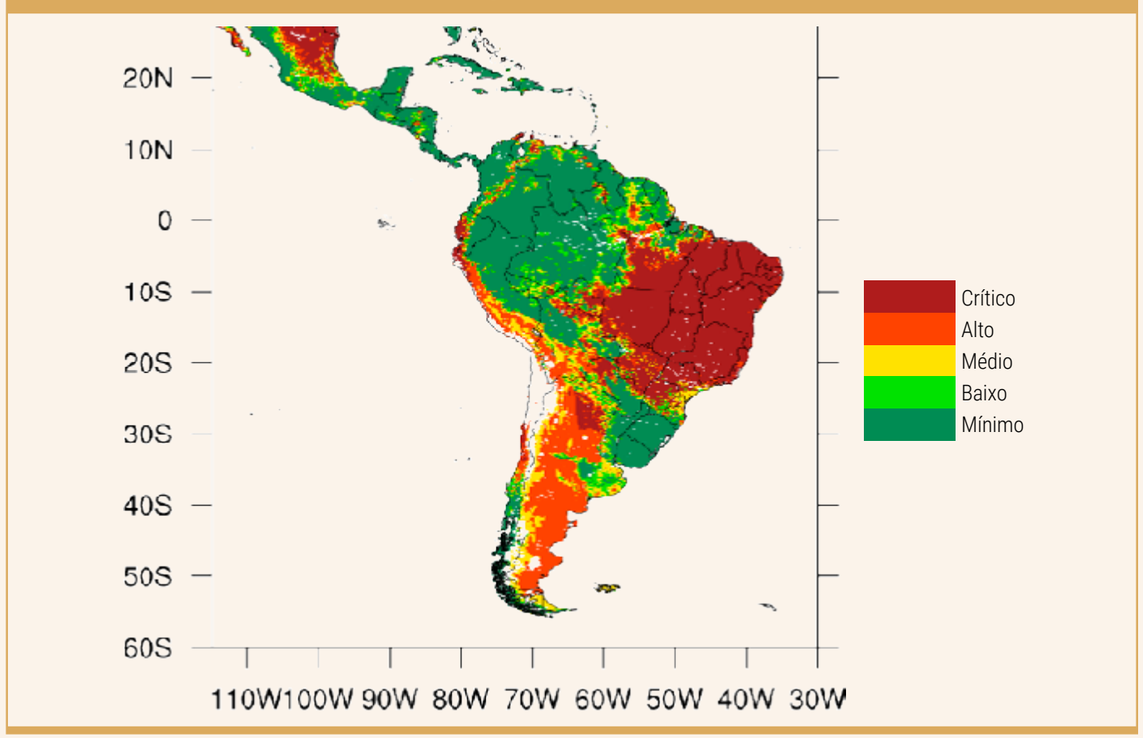
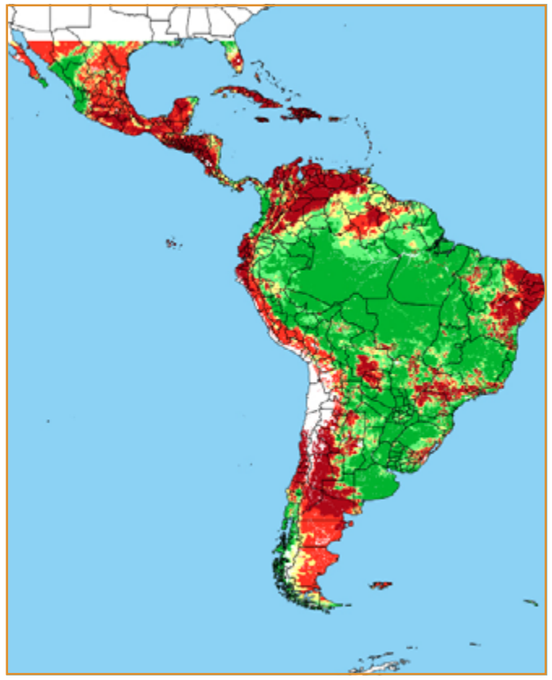
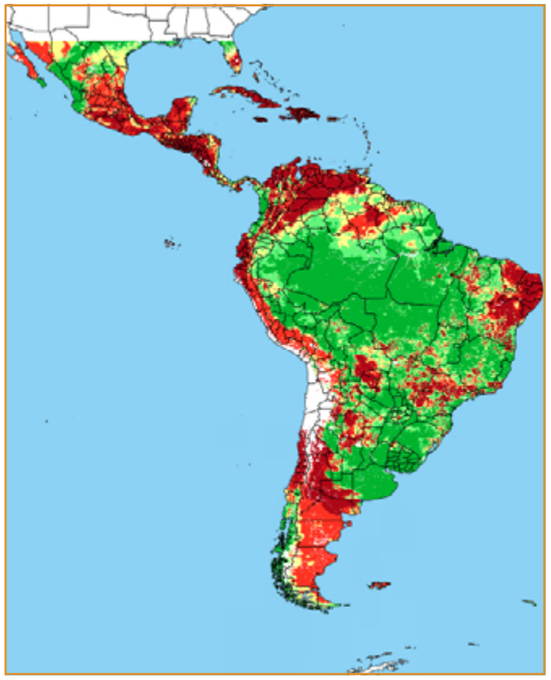


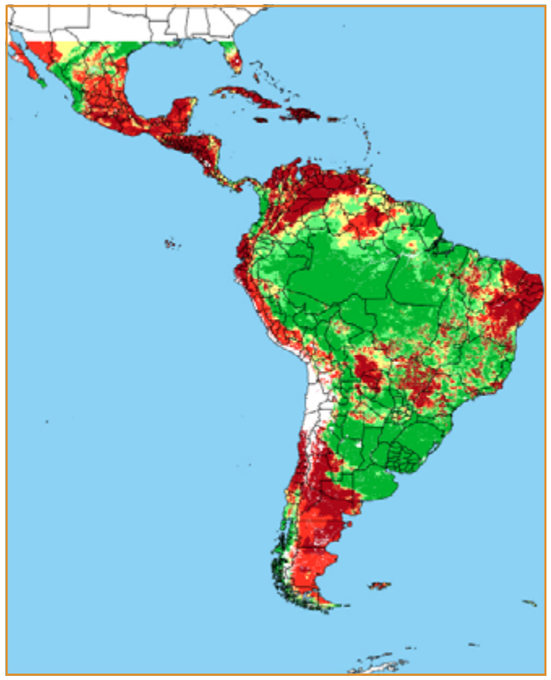
Figura 3.2 - Risco de Fogo Observado para o dia 15 de setembro de 2017 e classificado em 5 categorias que variam de mínimo (verde = 0) a crítico (marrom = 1).



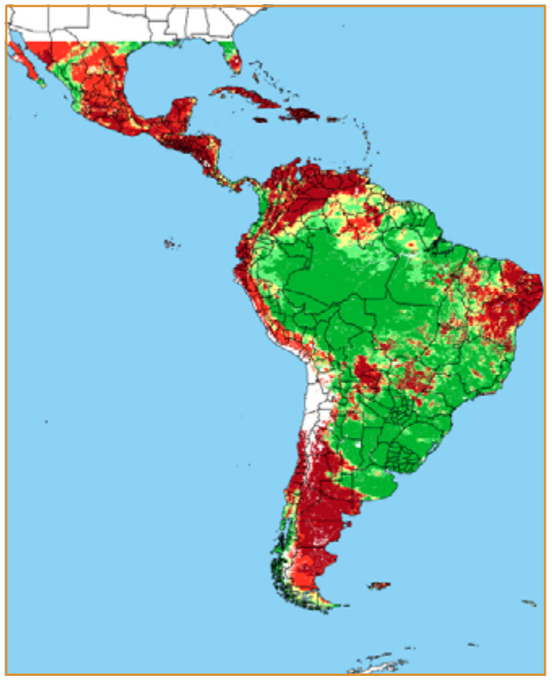
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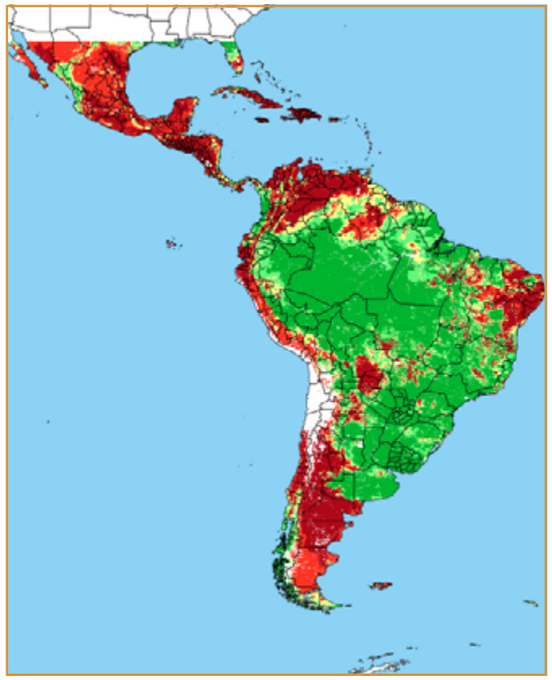
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quinta-feira, 3 de janeiro



sexta-feira, 4 de janeiro



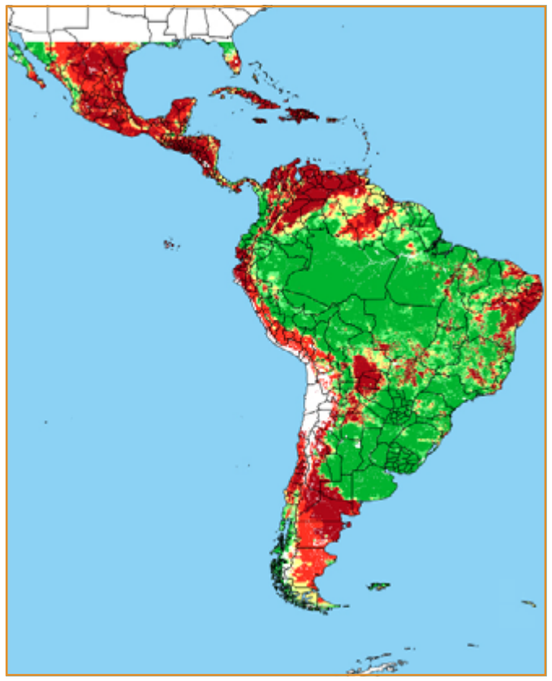
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Crítico
Alto
Médio
Baixo
Mínimo
Indeterminado

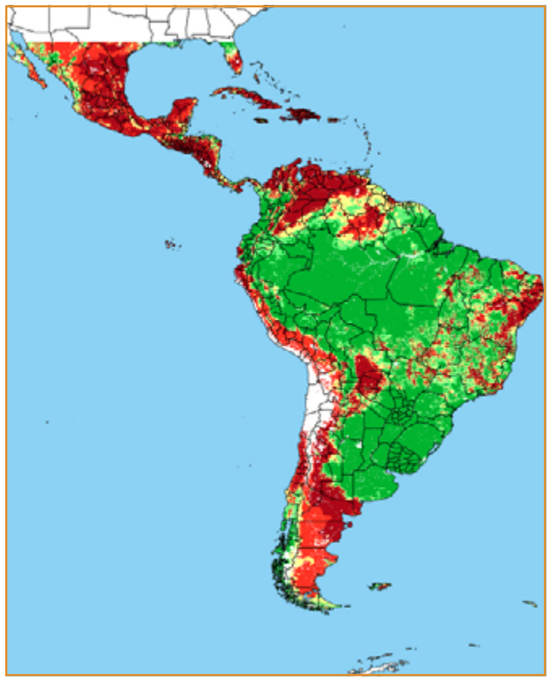
JANEIRO / 2019

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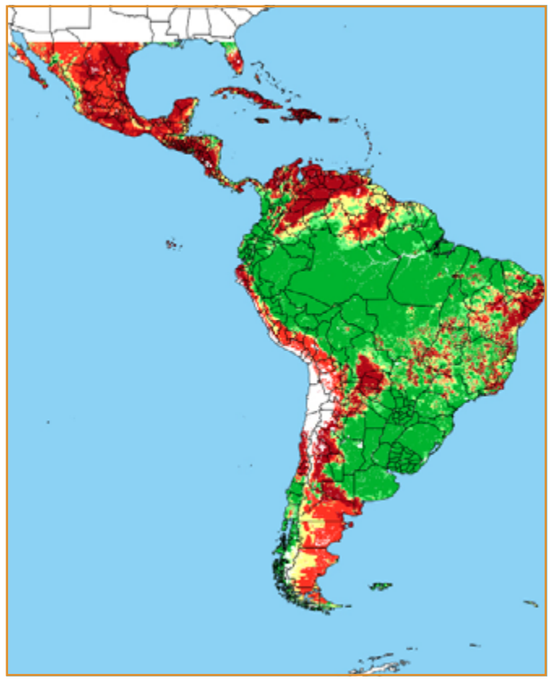
CALENDÁRIO JULIANO



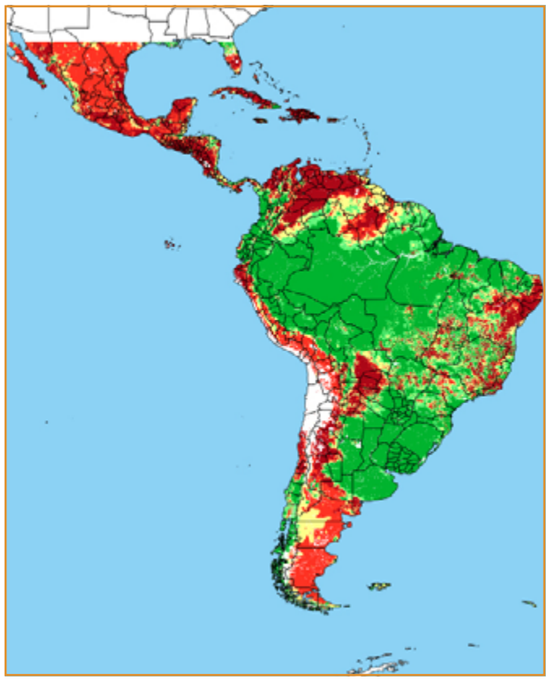
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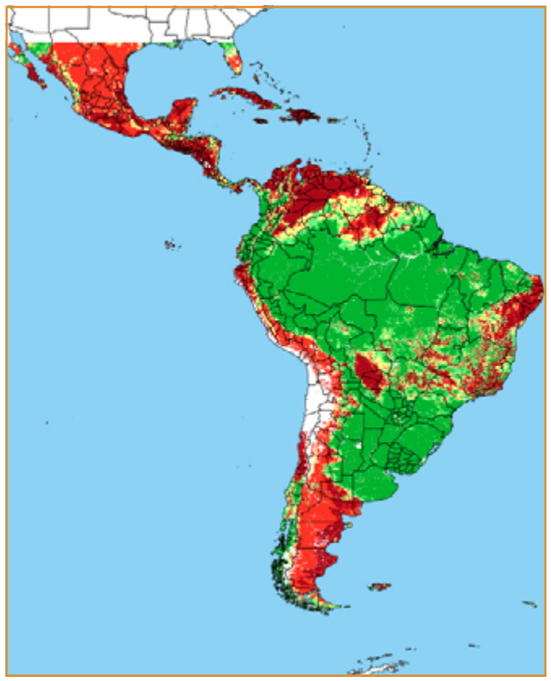
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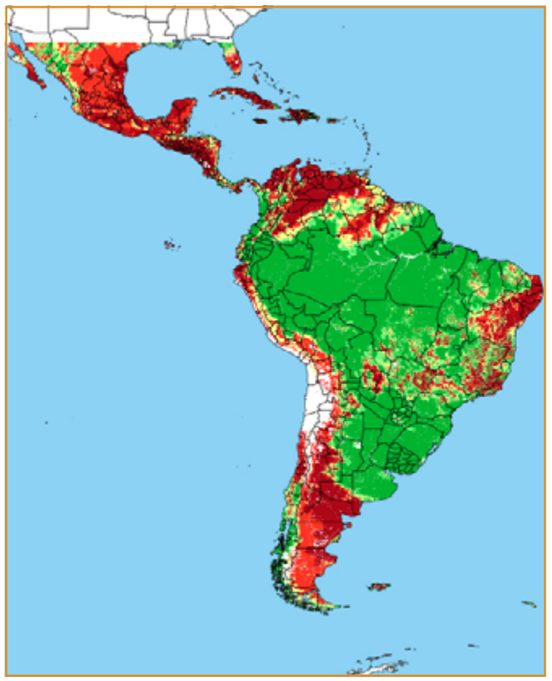
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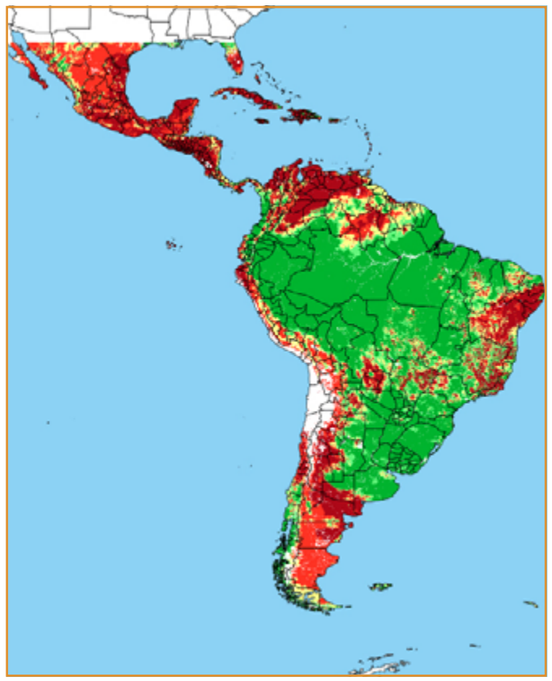
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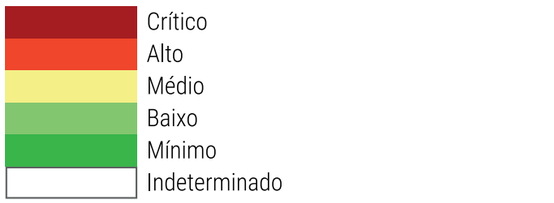
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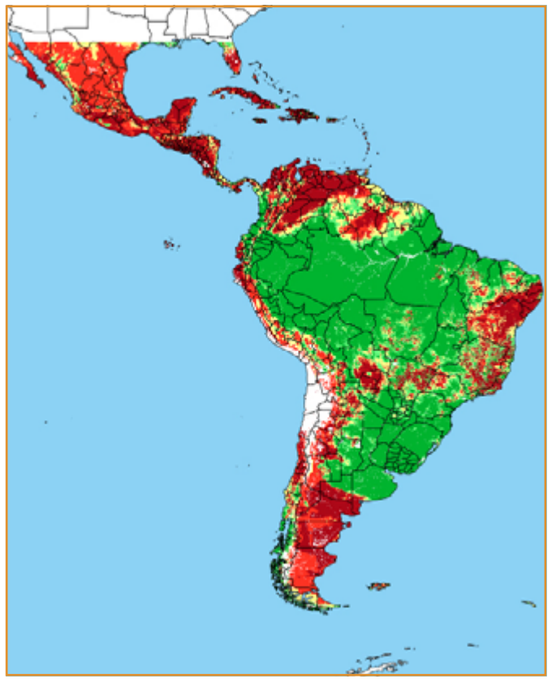
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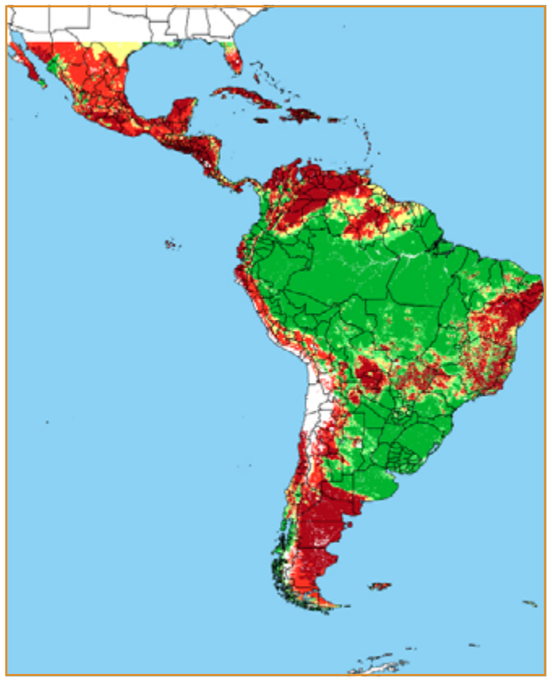
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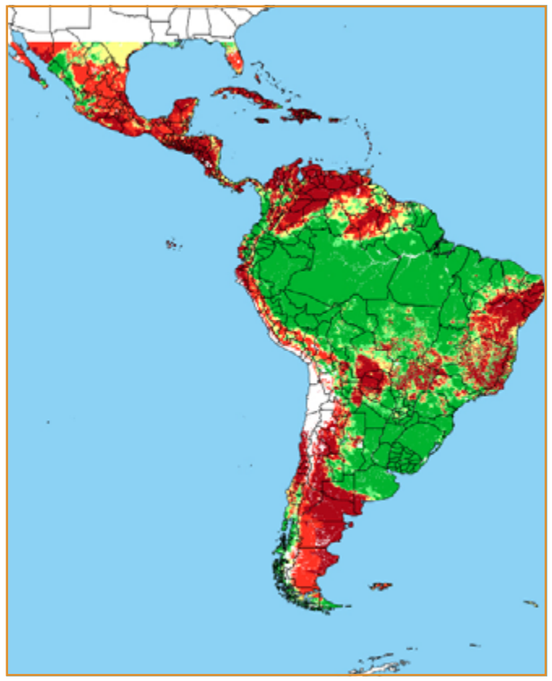
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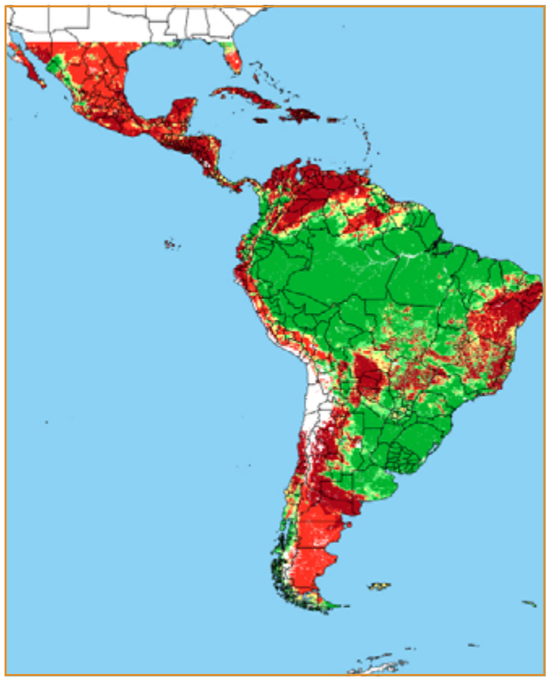
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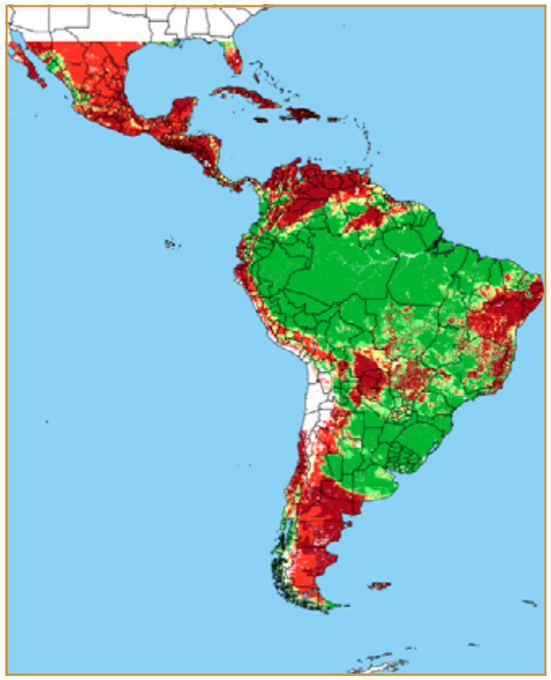
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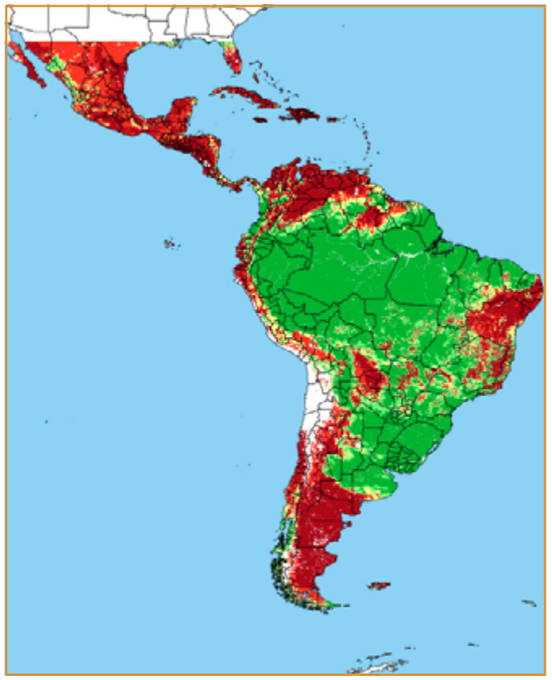
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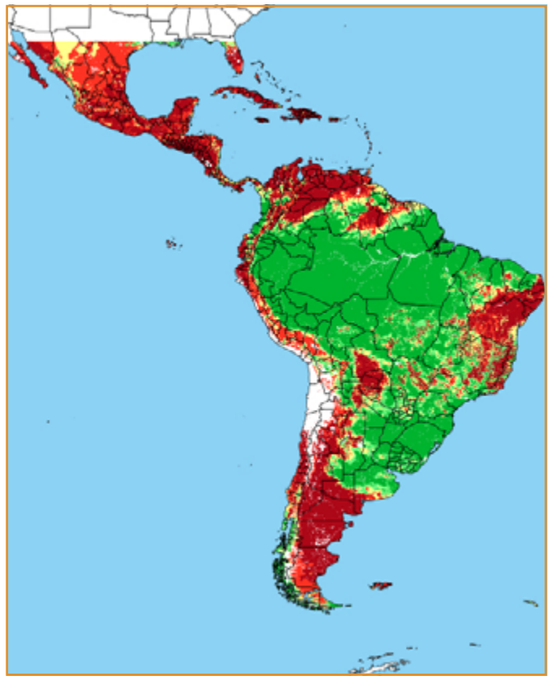
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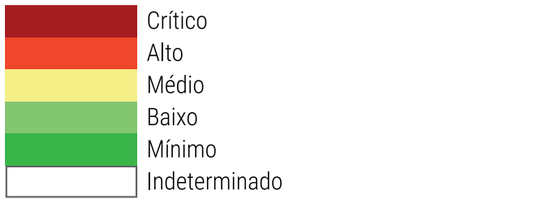
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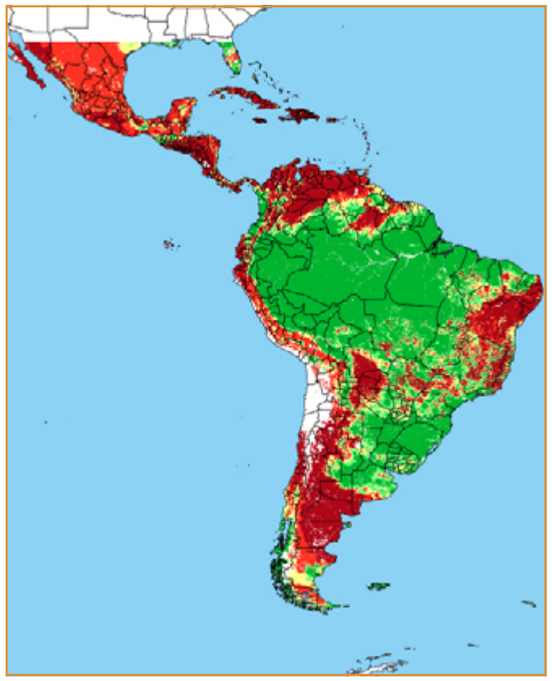
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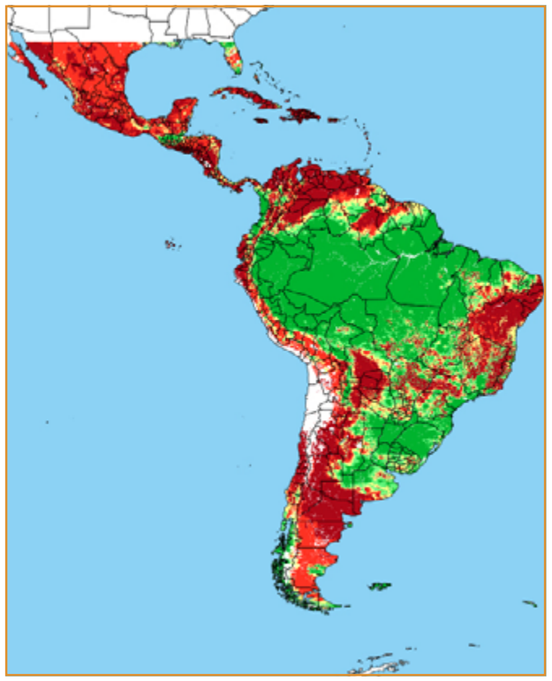
JANEIRO / 2019

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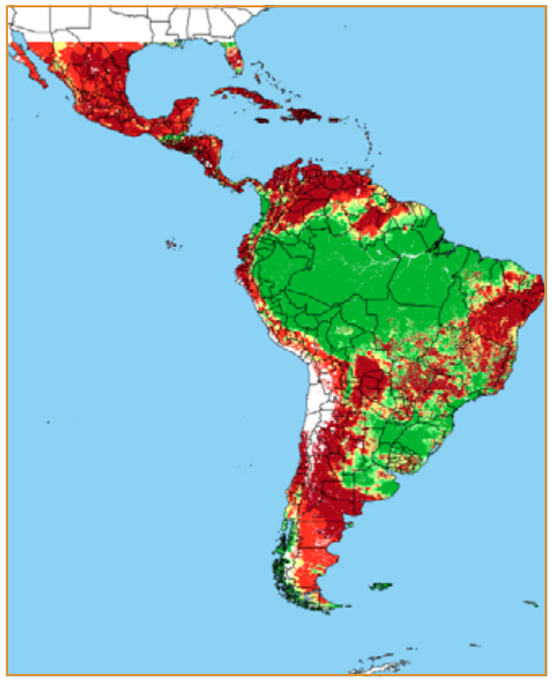
CALENDÁRIO JULIANO



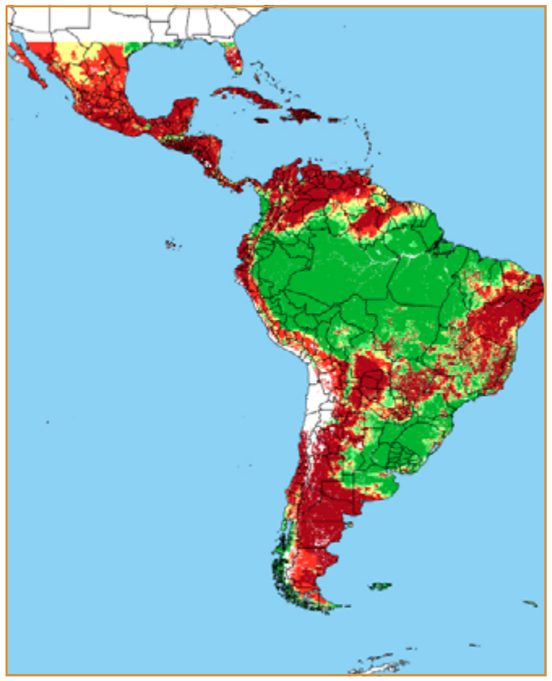
domingo, 20 de janeiro



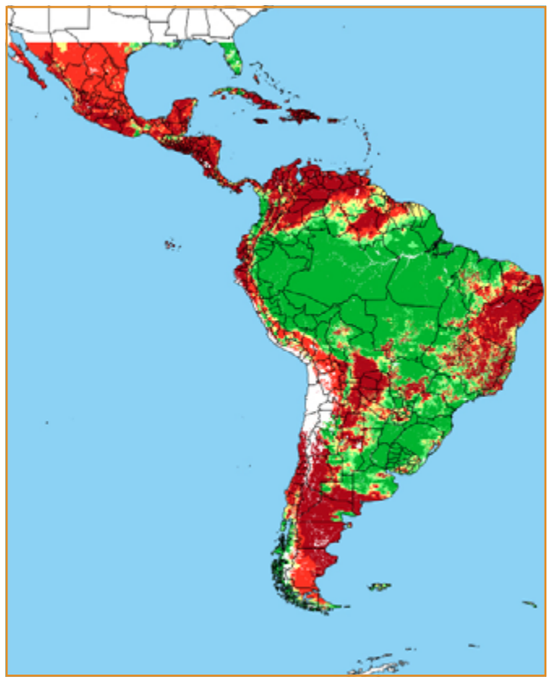
segunda-feira, 21 de janeiro



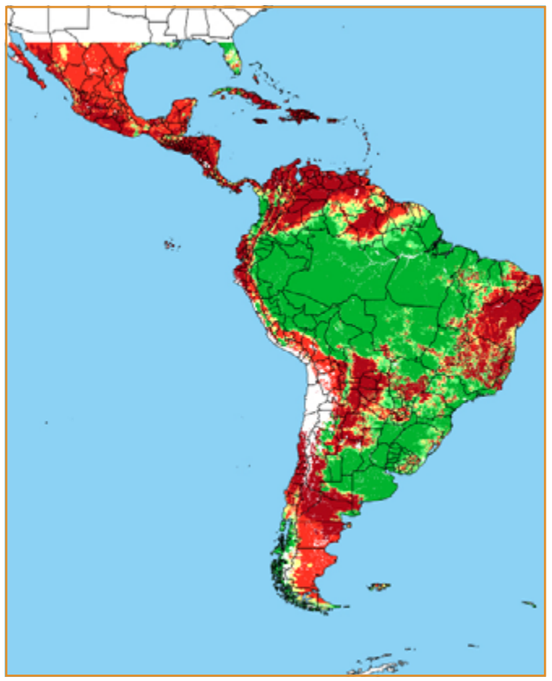
terça-feira, 22 de janeiro



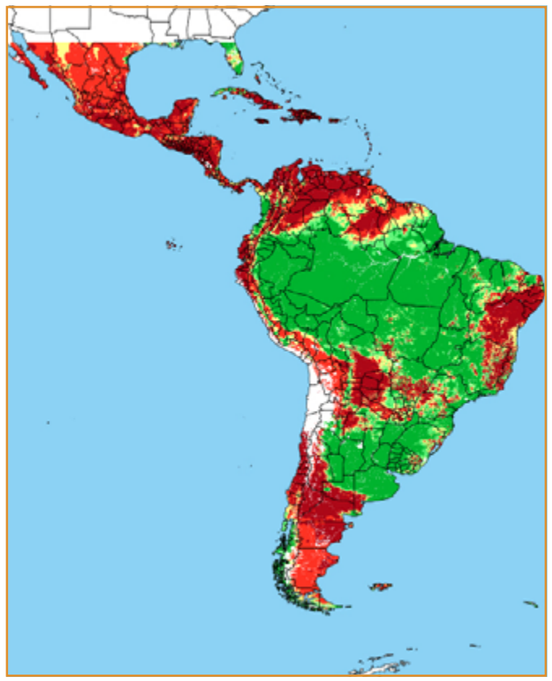
quarta-feira, 23 de janeiro



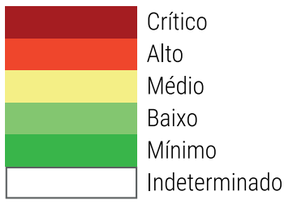
quinta-feira, 24 de janeiro



sexta-feira, 25 de janeiro



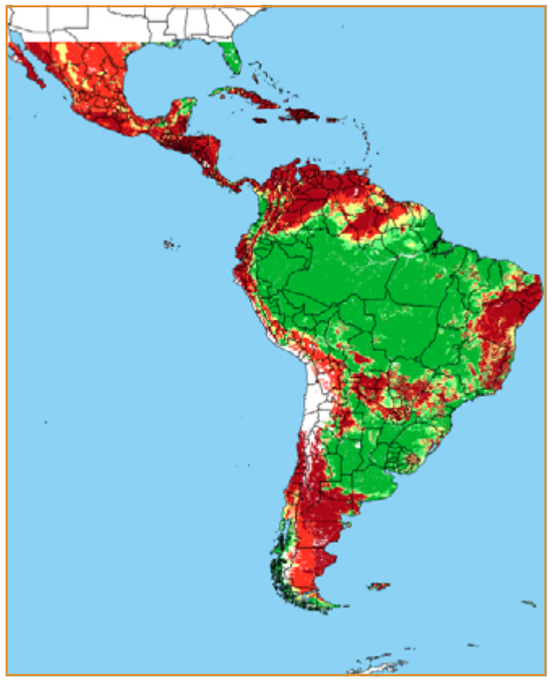
sábado, 26 de janeiro



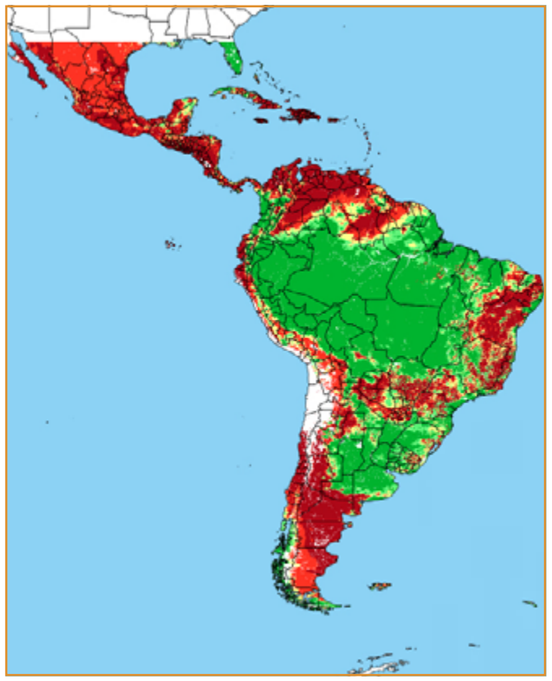
JANEIRO / 2019

D	S	T	Q	Q	S	S
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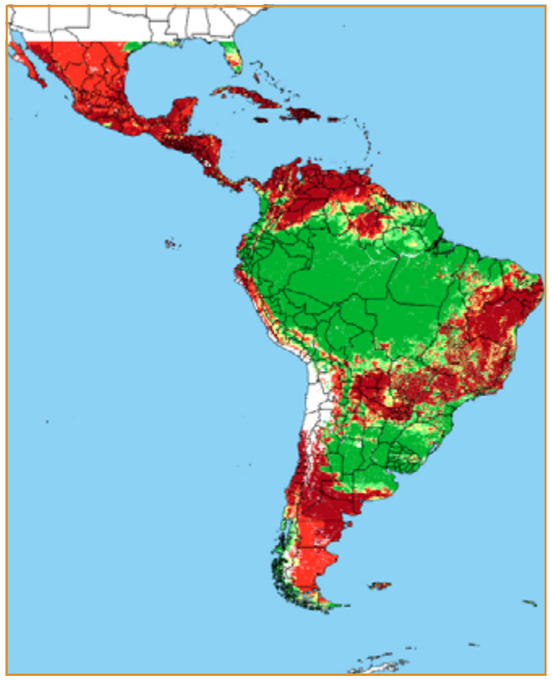
CALENDÁRIO JULIANO



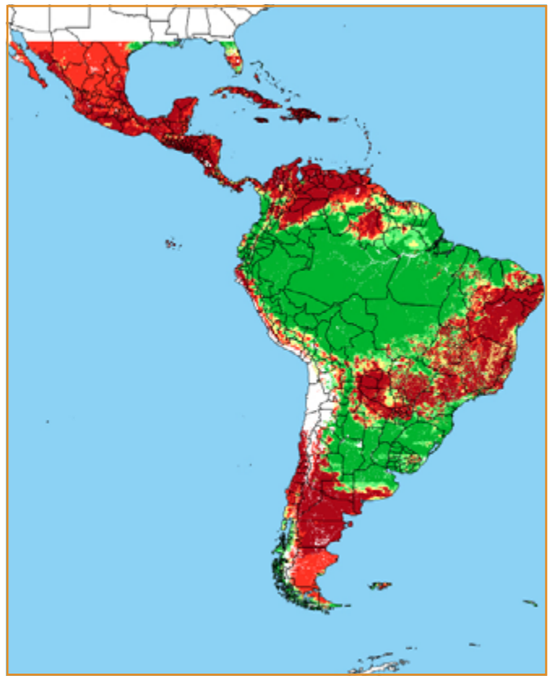
domingo, 27 de janeiro



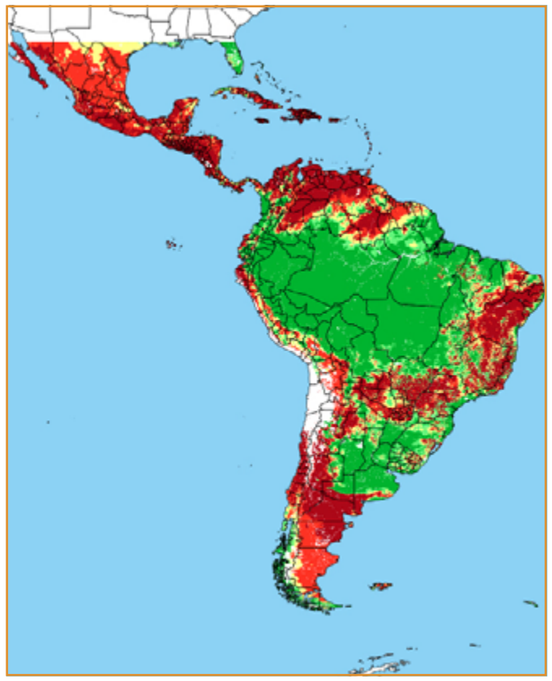
segunda-feira, 28 de janeiro



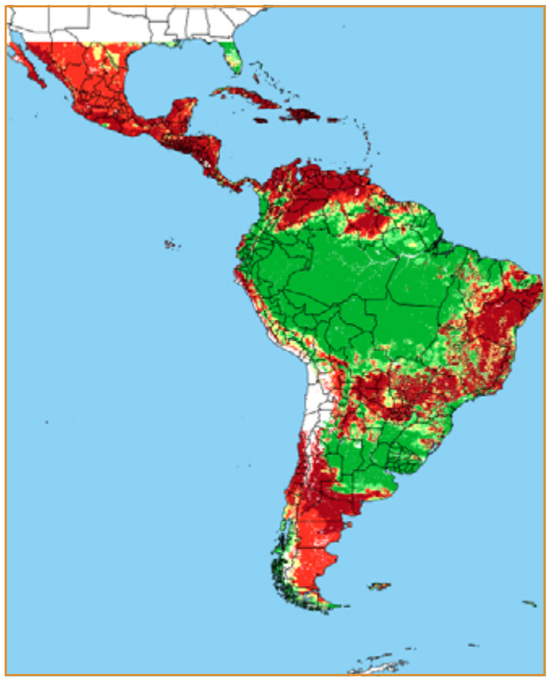
quinta-feira, 31 de janeiro



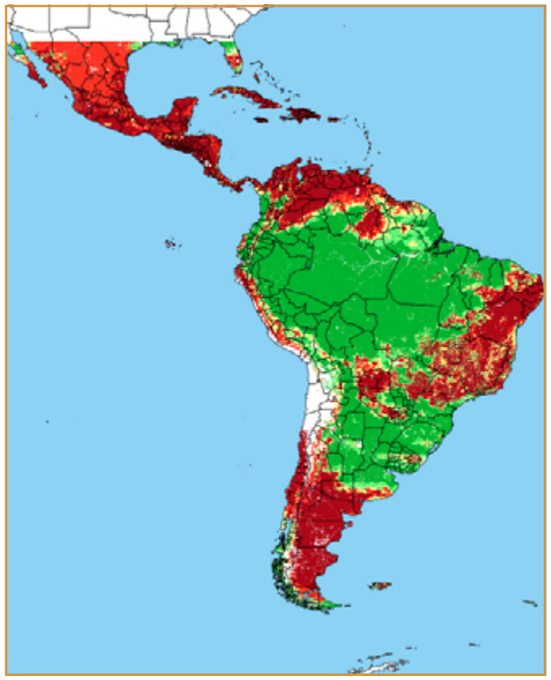
sexta-feira, 1 de fevereiro



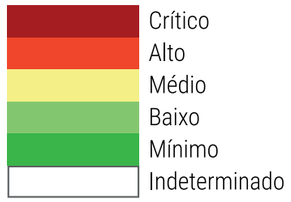
terça-feira, 29 de janeiro



quarta-feira, 30 de janeiro



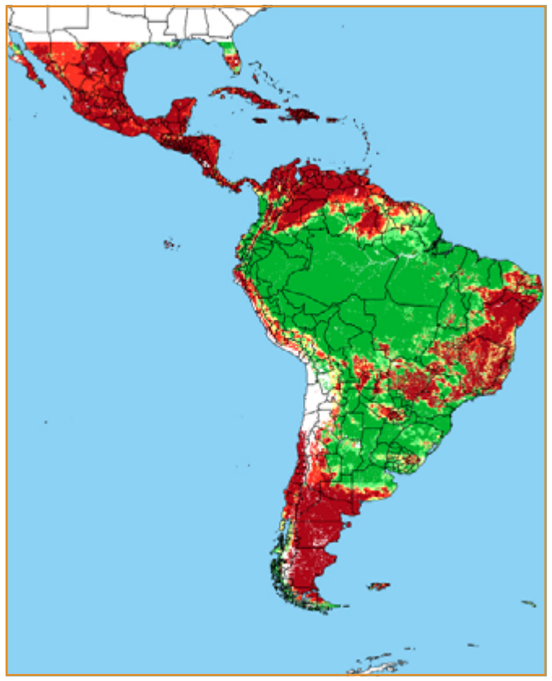
sábado, 2 de fevereiro



JANEIRO 2019

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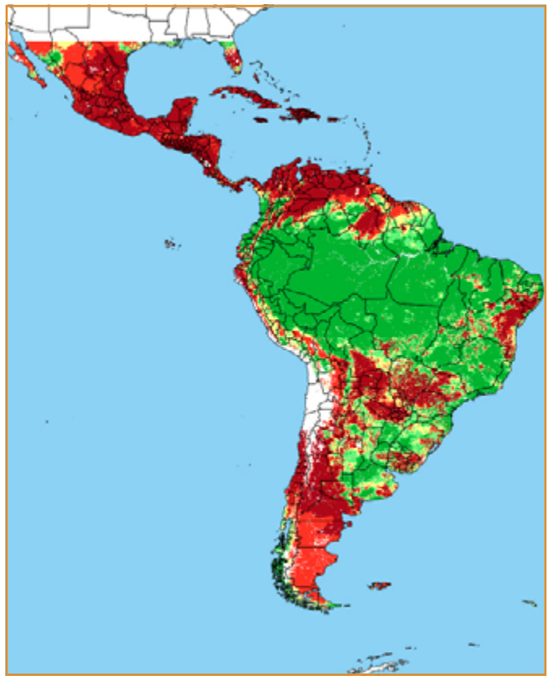
CALENDÁRIO JULIANO



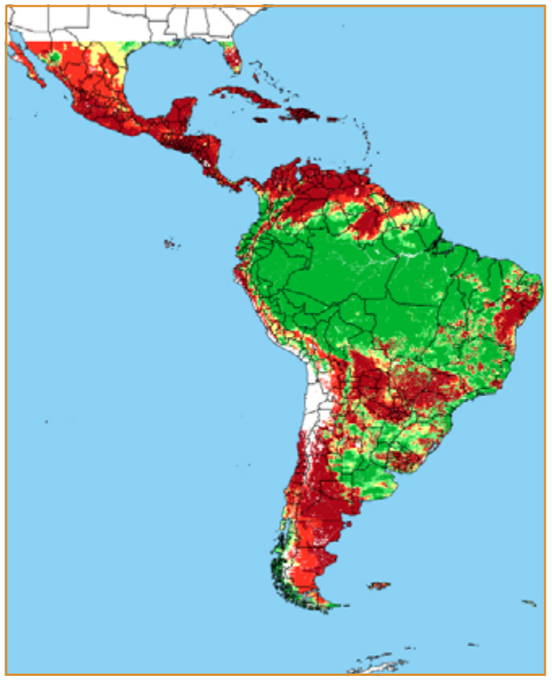
domingo, 3 de fevereiro



segunda-feira, 4 de fevereiro



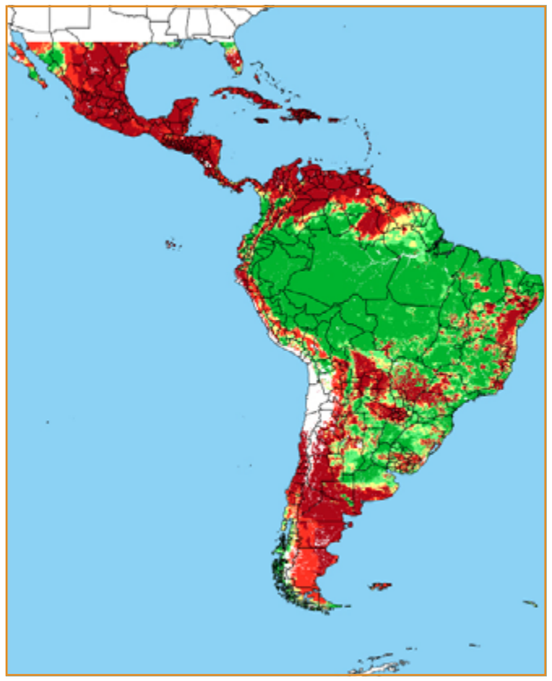
quinta-feira, 7 de fevereiro



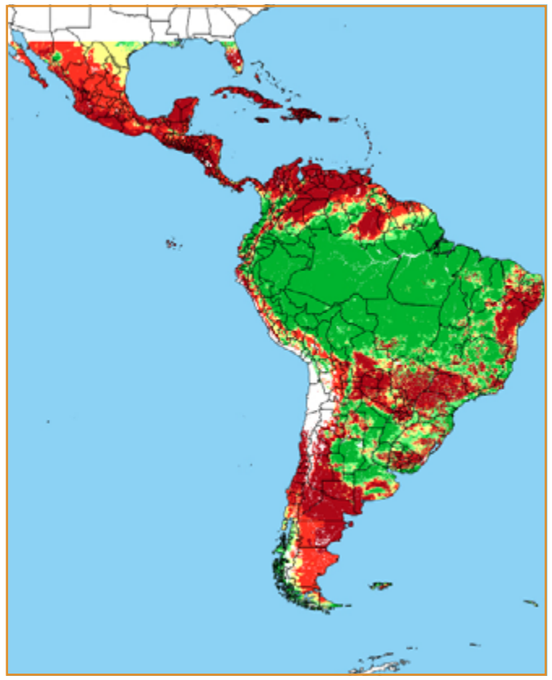
sexta-feira, 8 de fevereiro



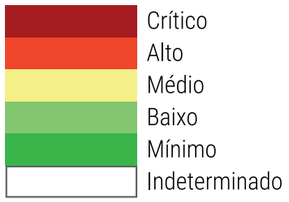
terça-feira, 5 de fevereiro



quarta-feira, 6 de fevereiro



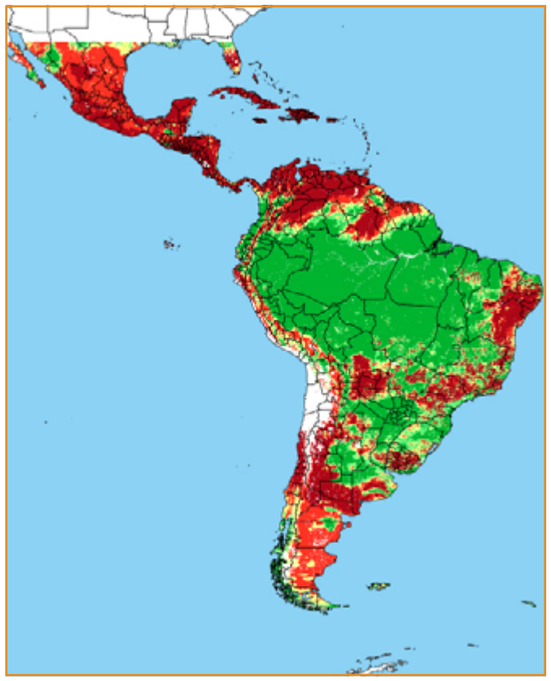
sábado, 9 de fevereiro



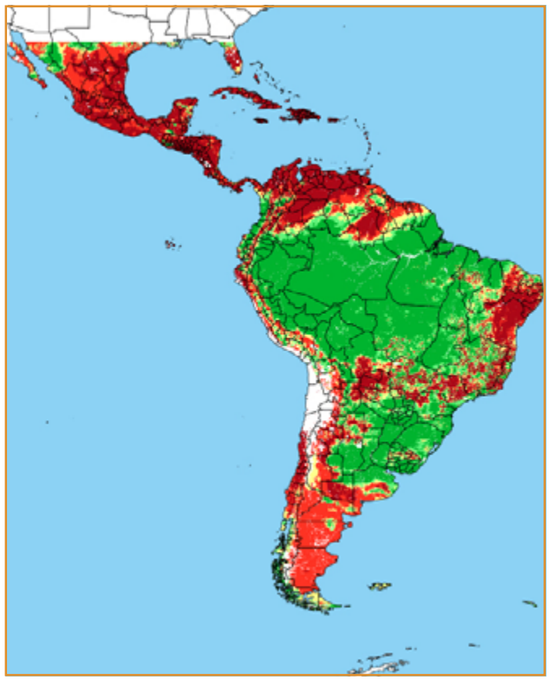
FEVEREIRO / 2019

D	S	T	Q	Q	S	S
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34	35	36	37	38	39	40
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55	56	57	58	59		

CALENDÁRIO JULIANO



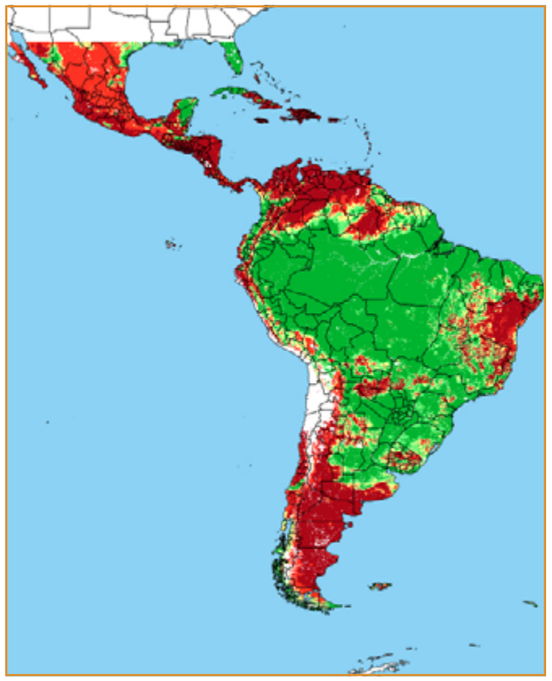
domingo, 10 de fevereiro



segunda-feira, 11 de fevereiro



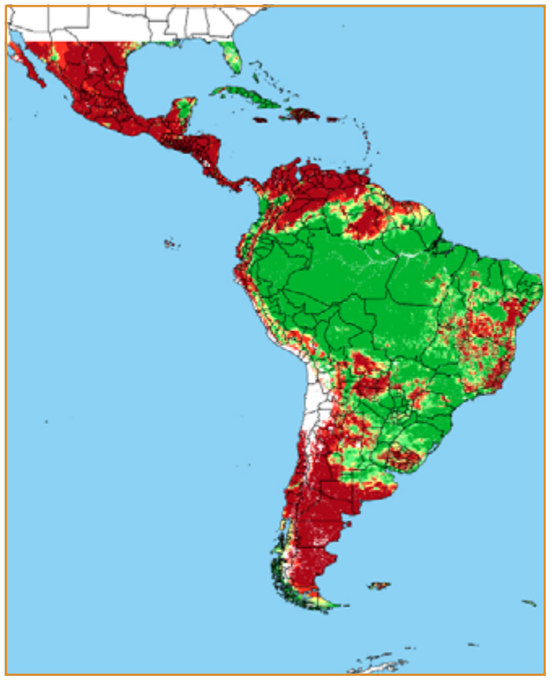
terça-feira, 12 de fevereiro



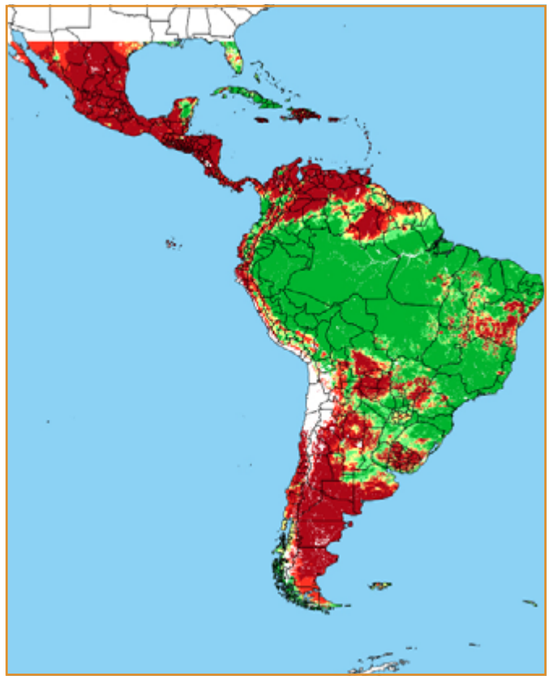
quarta-feira, 13 de fevereiro



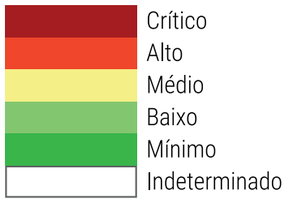
quinta-feira, 14 de fevereiro



sexta-feira, 15 de fevereiro



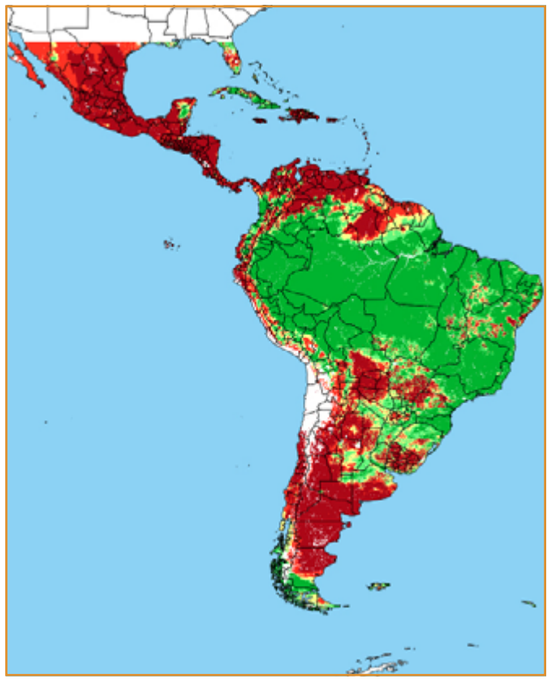
sábado, 16 de fevereiro



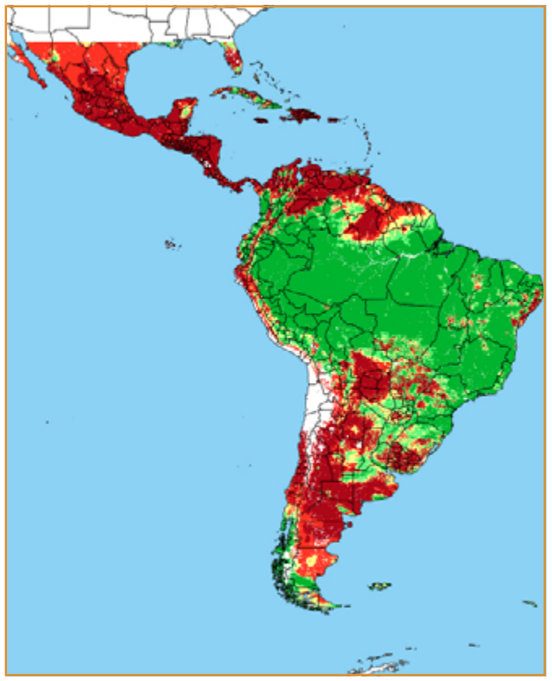
FEVEREIRO / 2019

D	S	T	Q	Q	S	S
					32	33
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55	56	57	58	59		

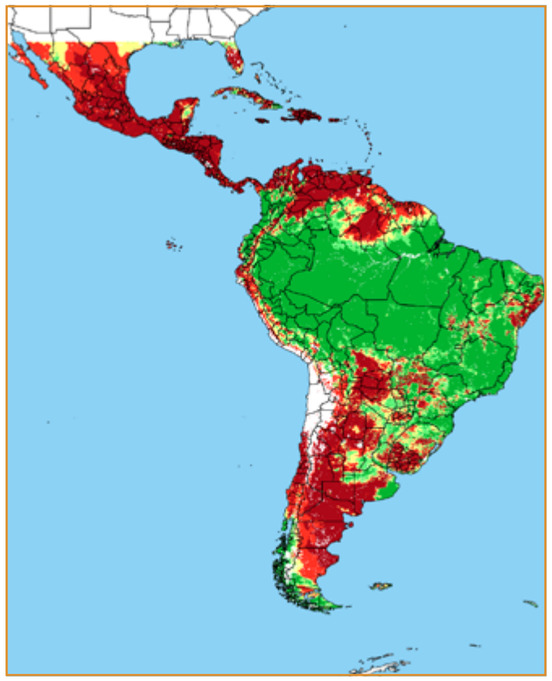
CALENDÁRIO JULIANO



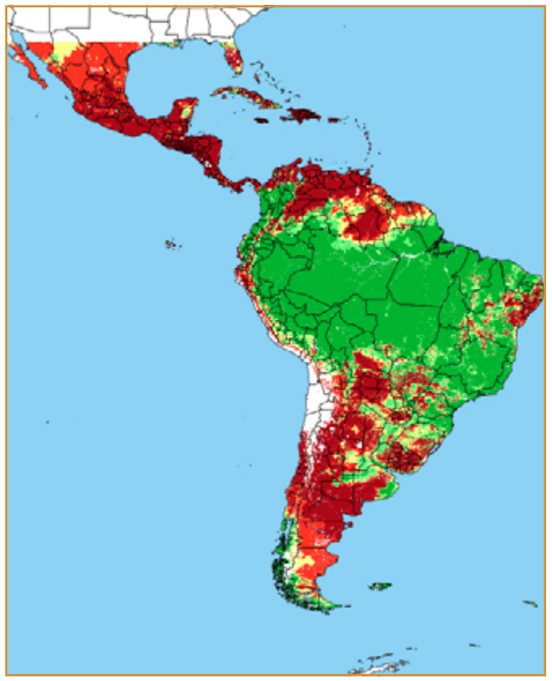
domingo, 17 de fevereiro



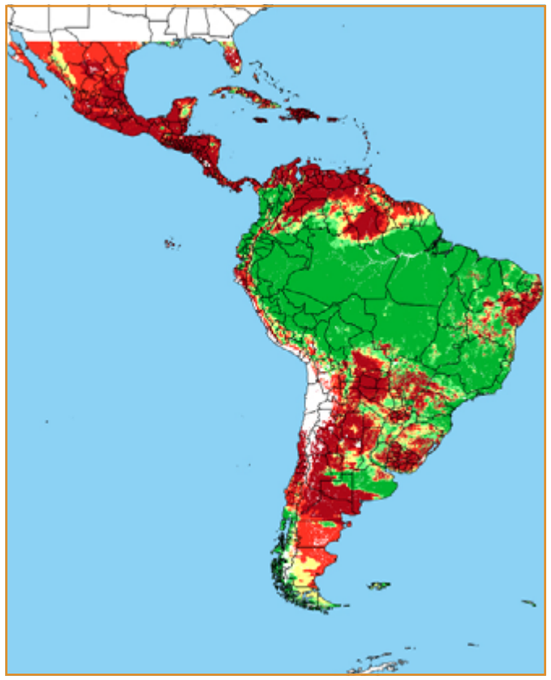
segunda-feira, 18 de fevereiro



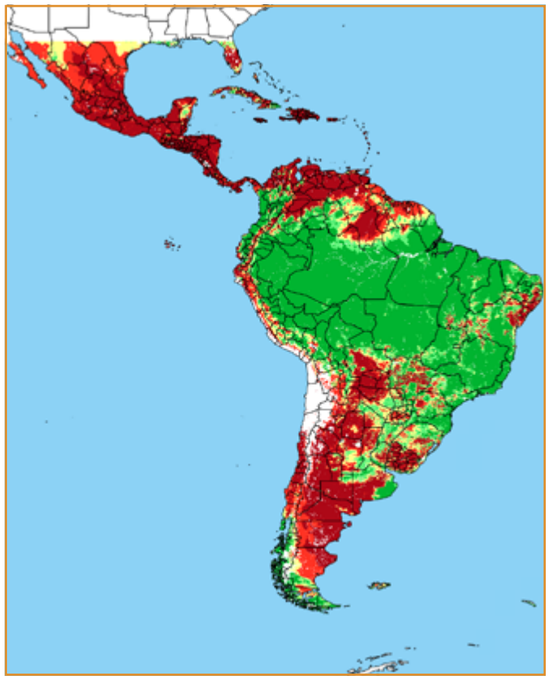
terça-feira, 19 de fevereiro



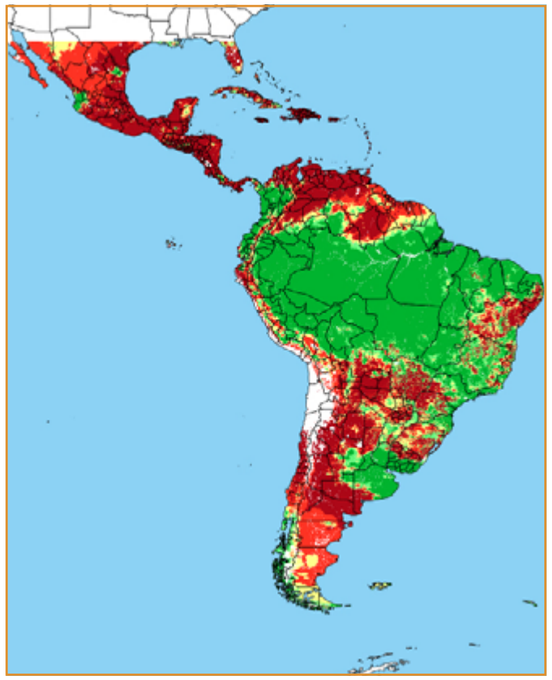
quarta-feira, 20 de fevereiro



quinta-feira, 21 de fevereiro



sexta-feira, 22 de fevereiro



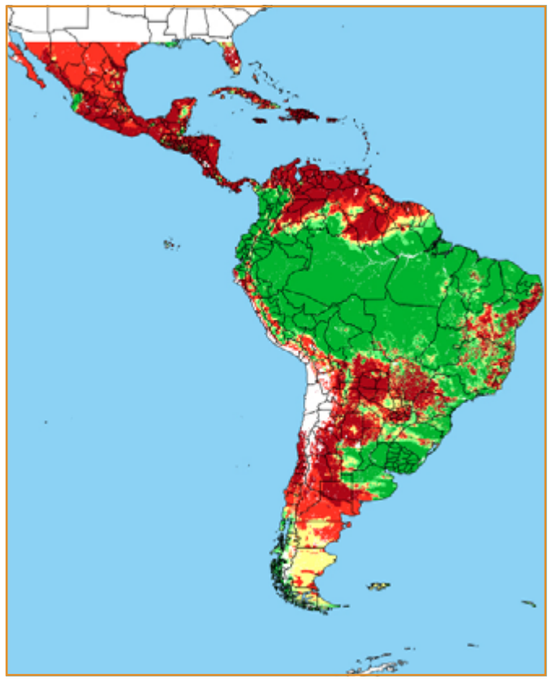
sábado, 23 de fevereiro



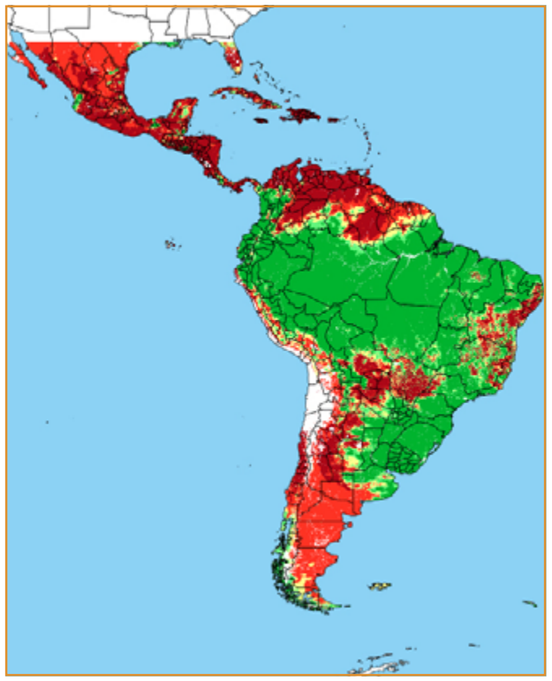
FEVEREIRO / 2019

D	S	T	Q	Q	S	S
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55	56	57	58	59		

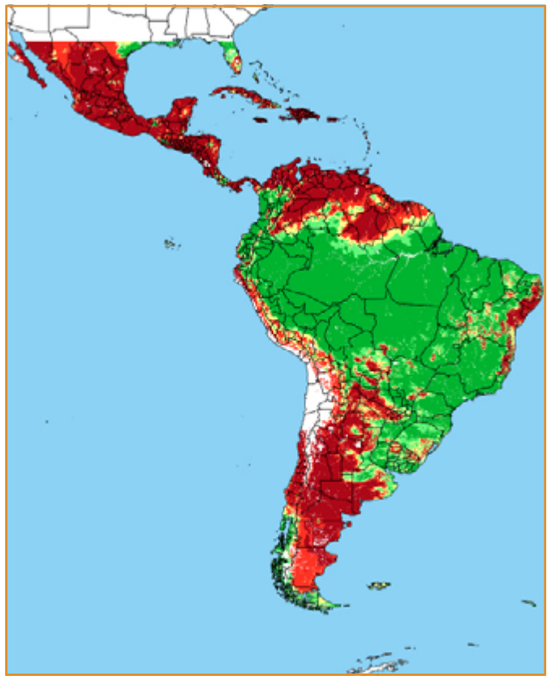
CALENDÁRIO JULIANO



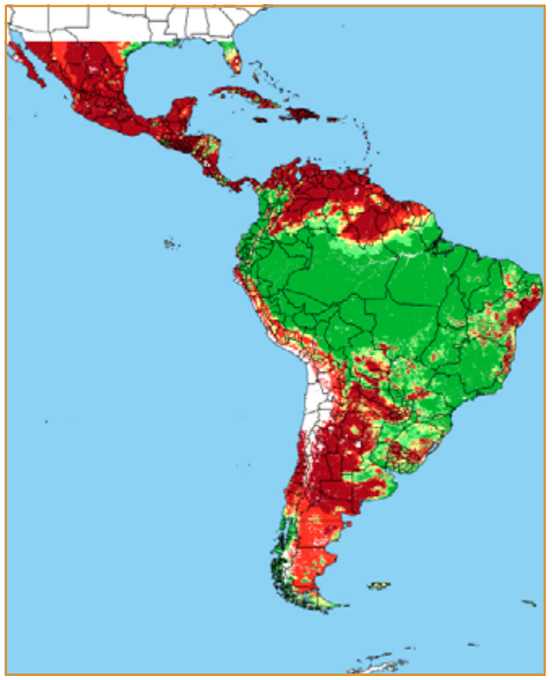
domingo, 24 de fevereiro



segunda-feira, 25 de fevereiro



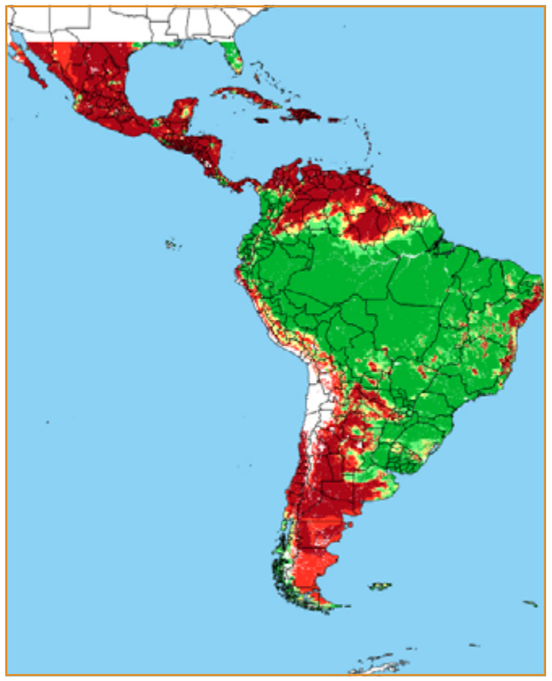
quinta-feira, 28 de fevereiro



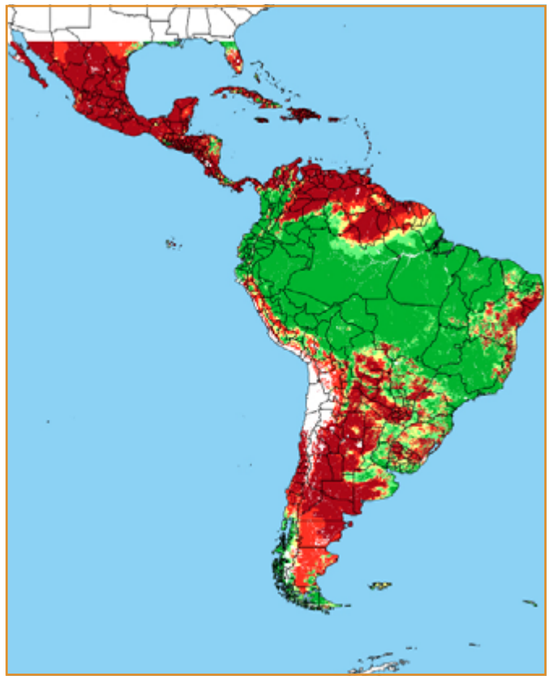
sexta-feira, 1 de março



terça-feira, 26 de fevereiro



quarta-feira, 27 de fevereiro



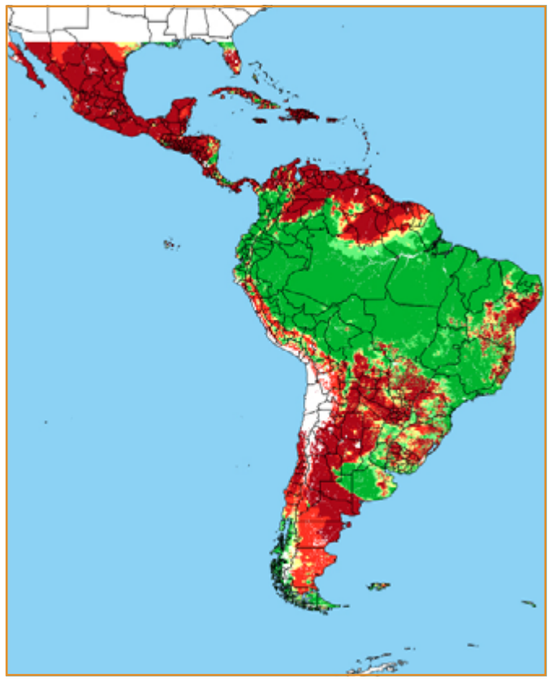
sábado, 2 de março

Crítico
Alto
Médio
Baixo
Mínimo
Indeterminado

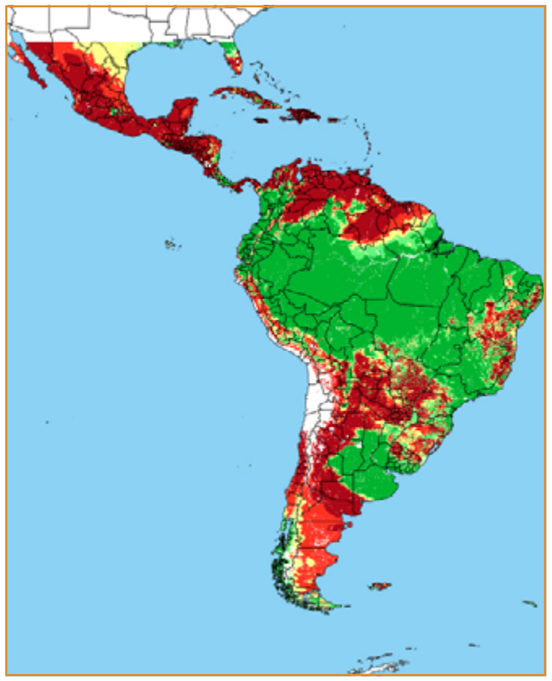
FEVEREIRO / 2019

D	S	T	Q	Q	S	S
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55	56	57	58	59	60	61

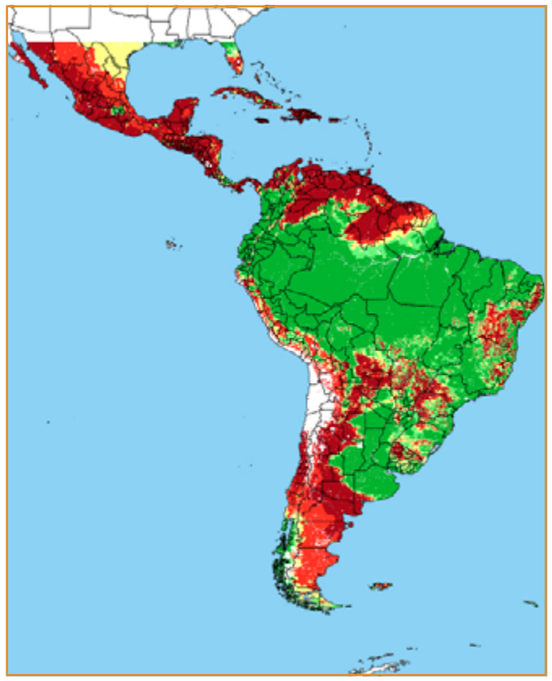
CALENDÁRIO JULIANO



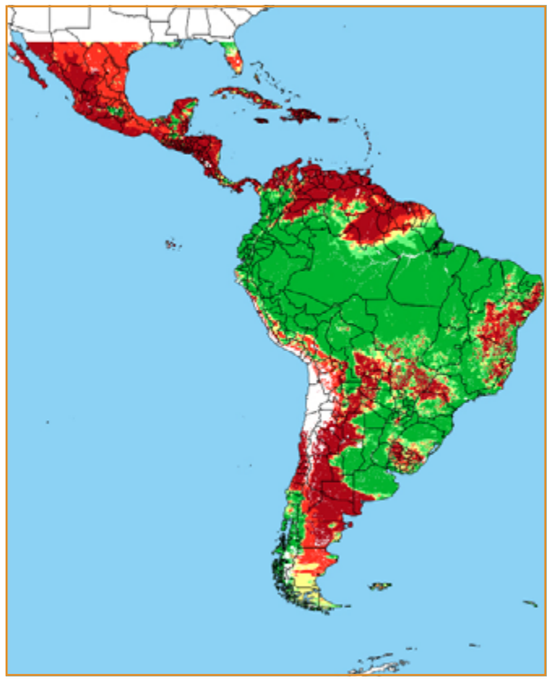
domingo, 3 de março



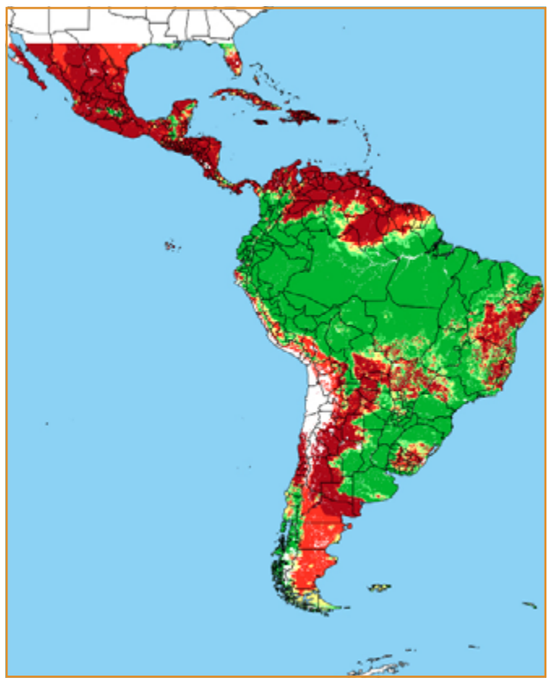
segunda-feira, 4 de março



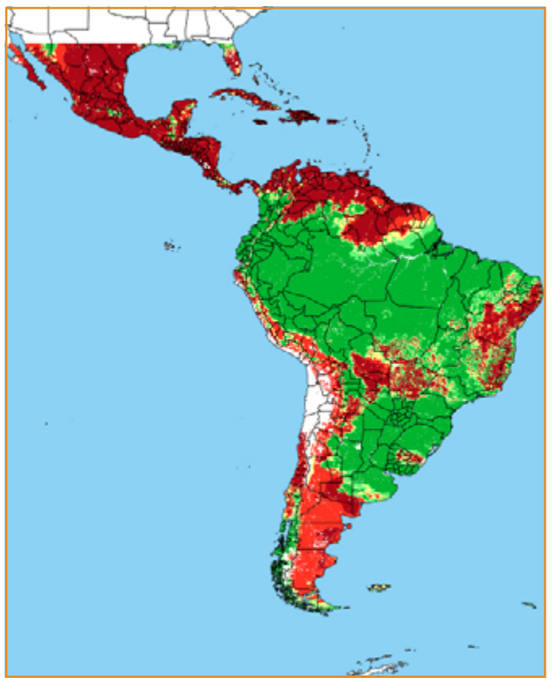
terça-feira, 5 de março



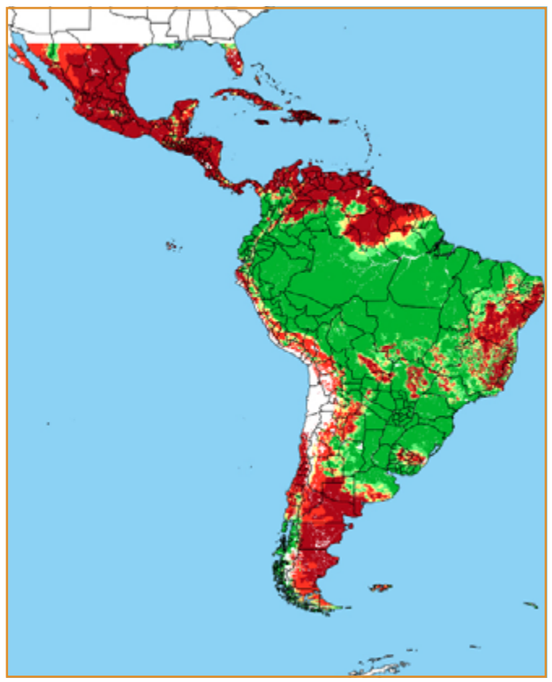
quarta-feira, 6 de março



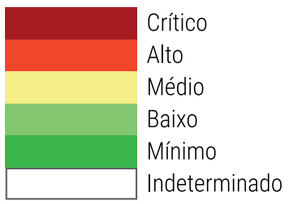
quinta-feira, 7 de março



sexta-feira, 8 de março



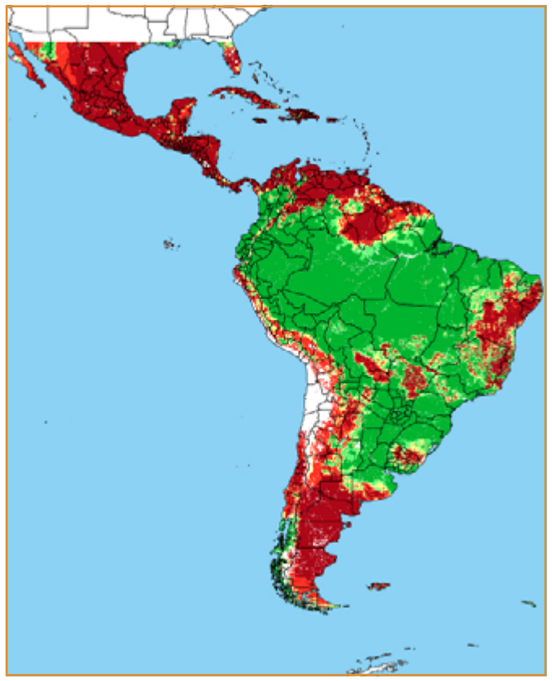
sábado, 9 de março



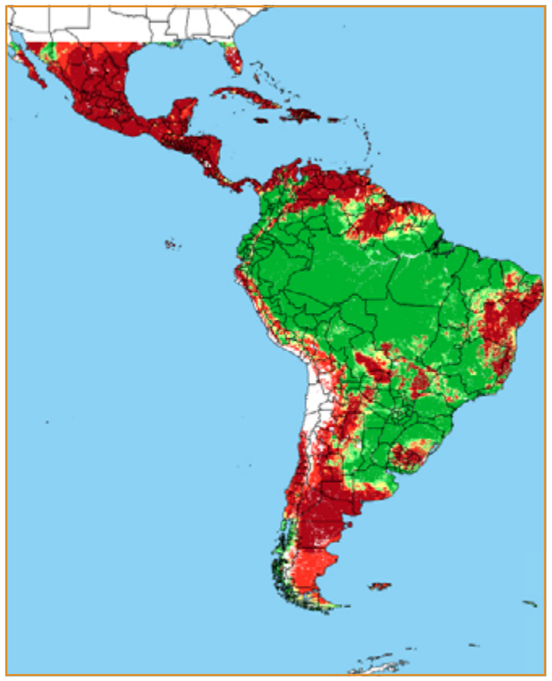
MARÇO / 2019

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69	70	71	72	73	74	75
76	77	78	79	80	81	82
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90						

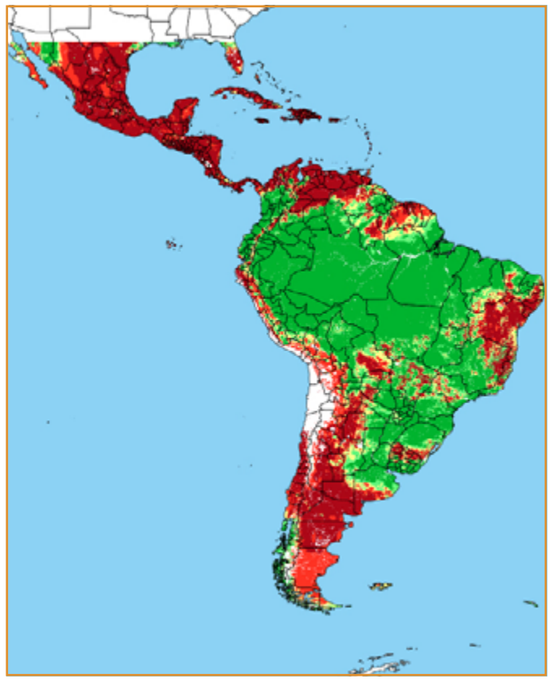
CALENDÁRIO JULIANO



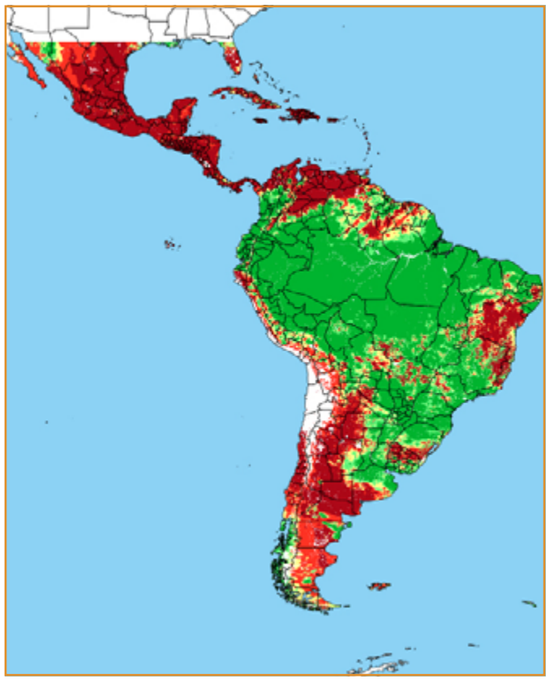
domingo, 10 de março



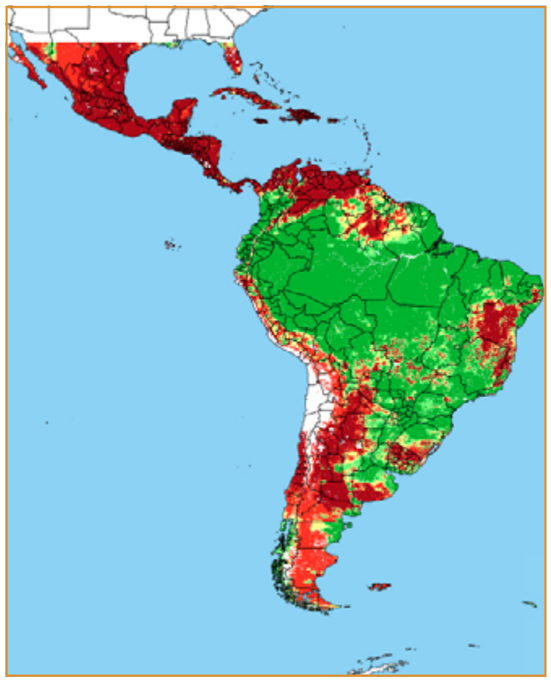
segunda-feira, 11 de março



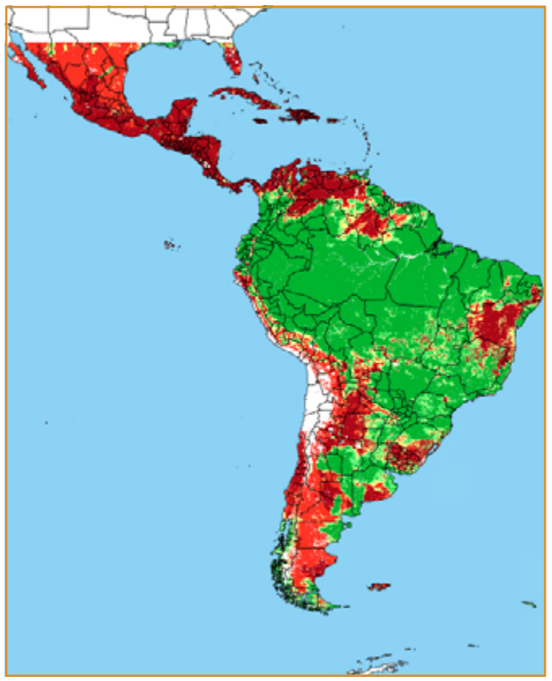
terça-feira, 12 de março



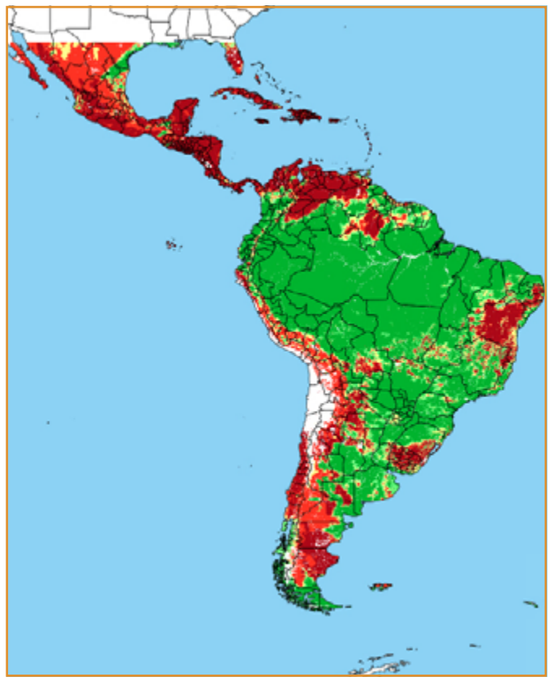
quarta-feira, 13 de março



quinta-feira, 14 de março



sexta-feira, 15 de março



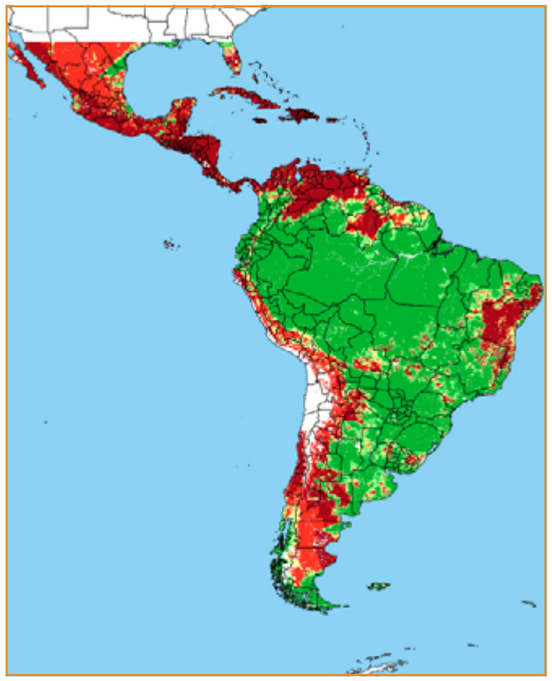
sábado, 16 de março



MARÇO / 2019

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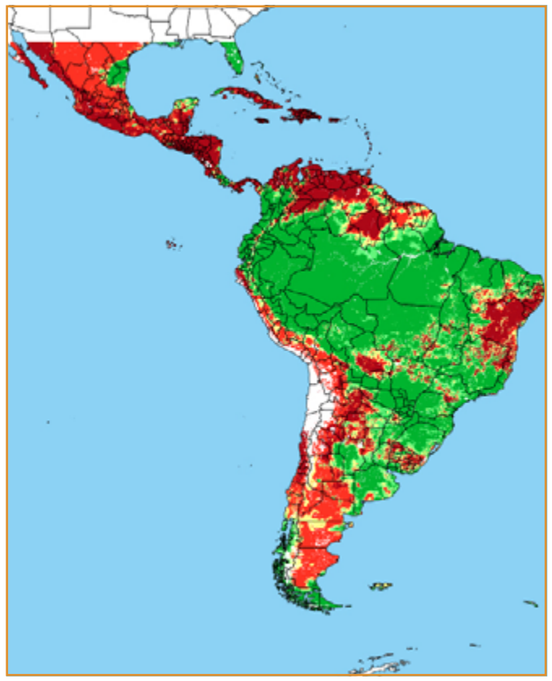
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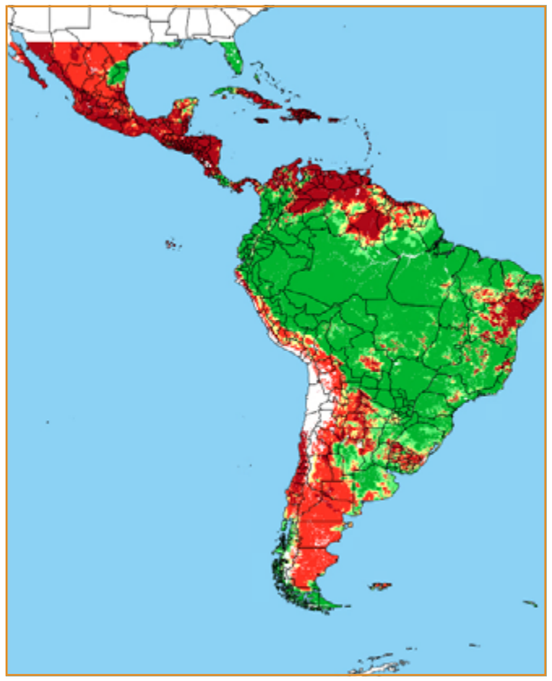
domingo, 17 de março



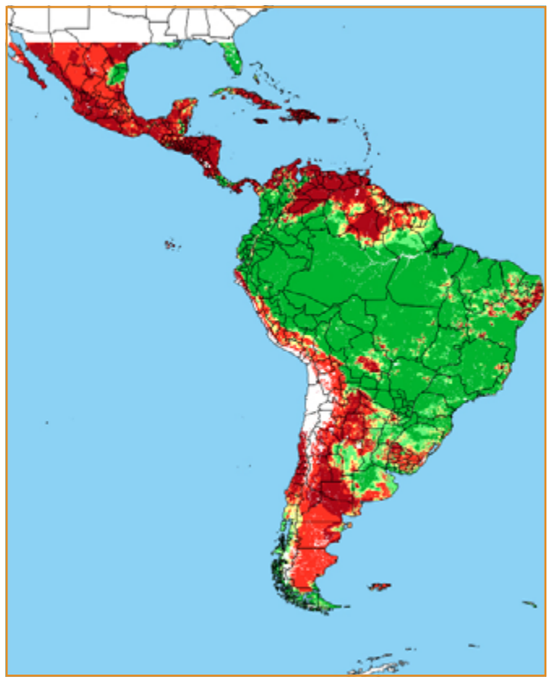
segunda-feira, 18 de março



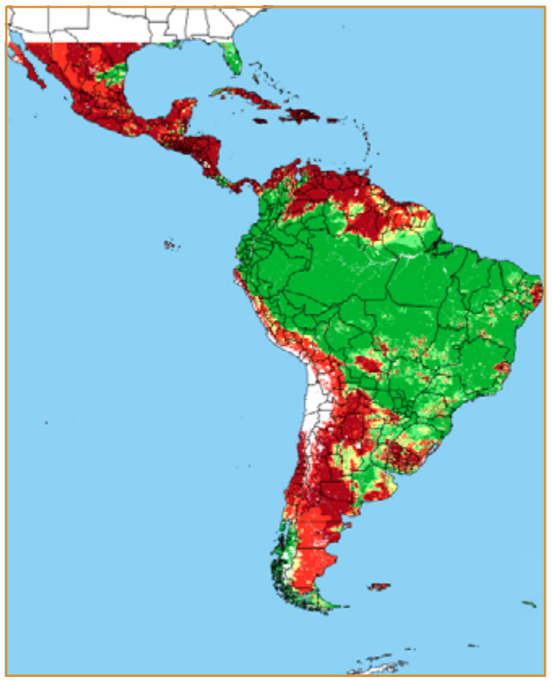
terça-feira, 19 de março



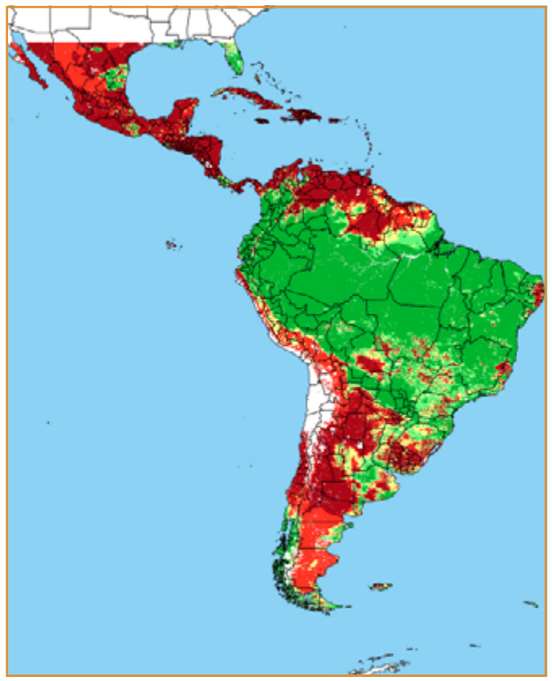
quarta-feira, 20 de março



quinta-feira, 21 de março



sexta-feira, 22 de março



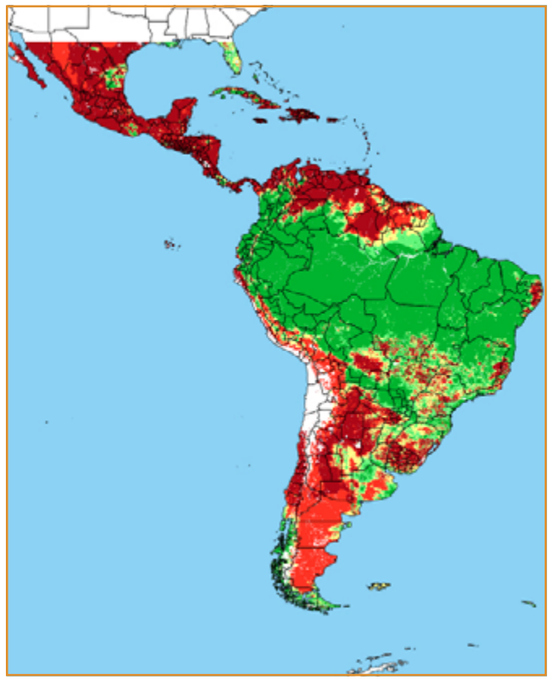
sábado, 23 de março



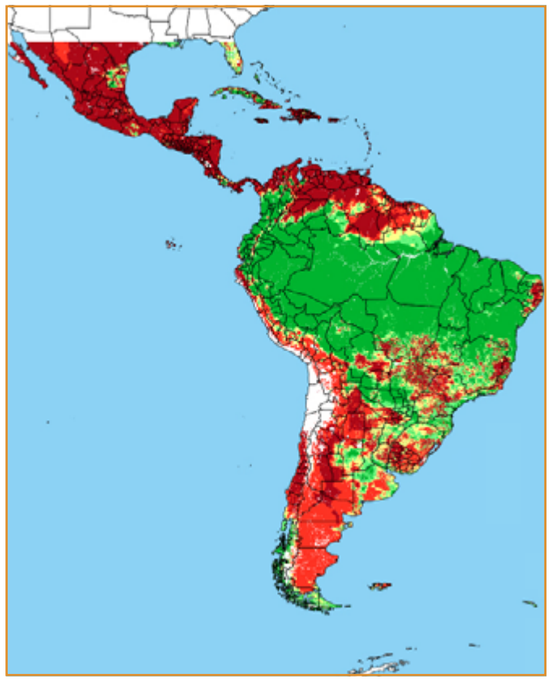
MARÇO / 2019

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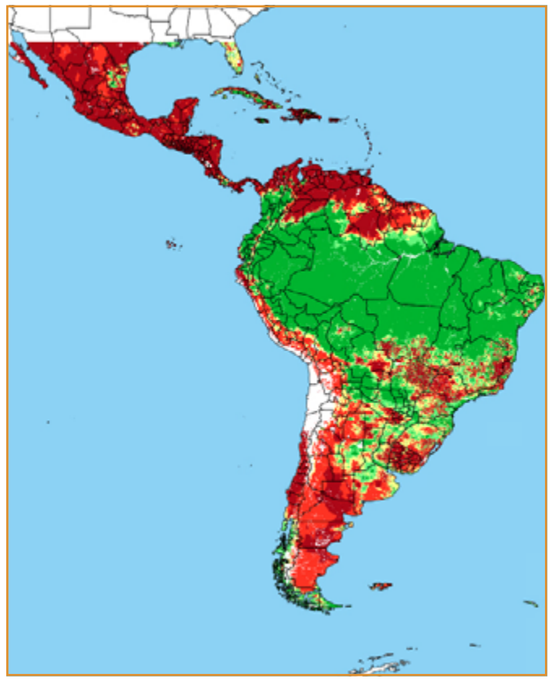
CALENDÁRIO JULIANO



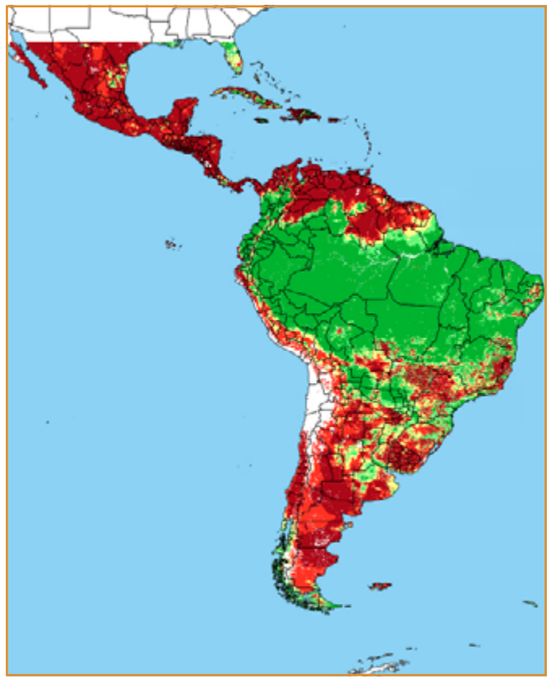
domingo, 24 de março



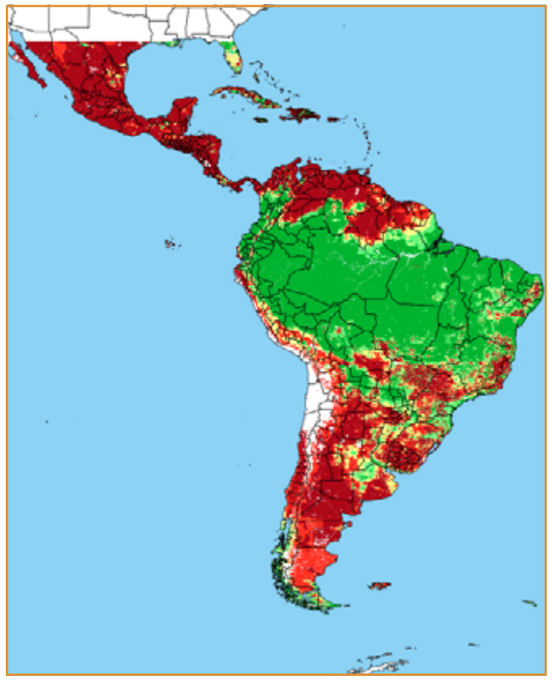
segunda-feira, 25 de março



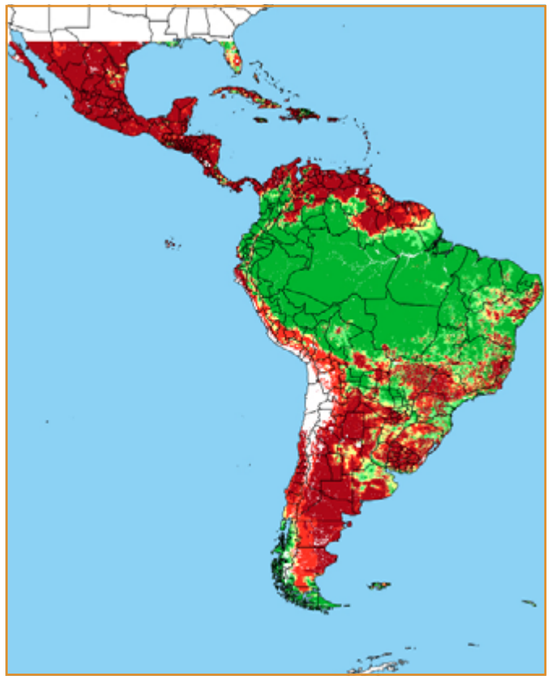
terça-feira, 26 de março



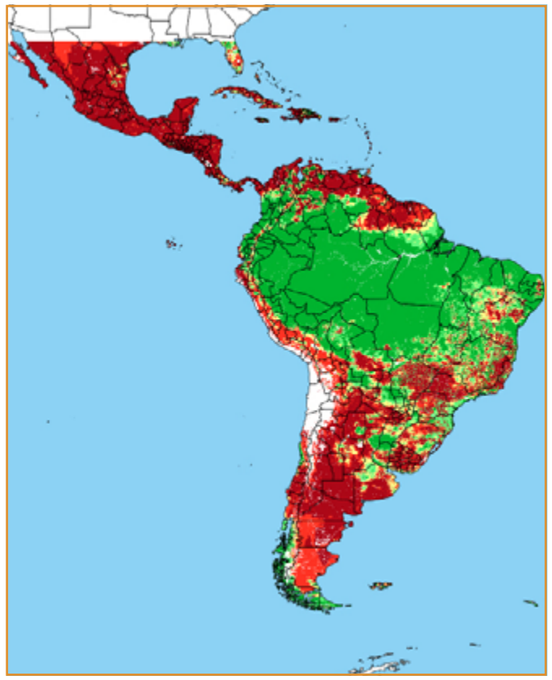
quarta-feira, 27 de março



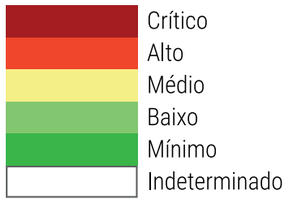
quinta-feira, 28 de março



sexta-feira, 29 de março



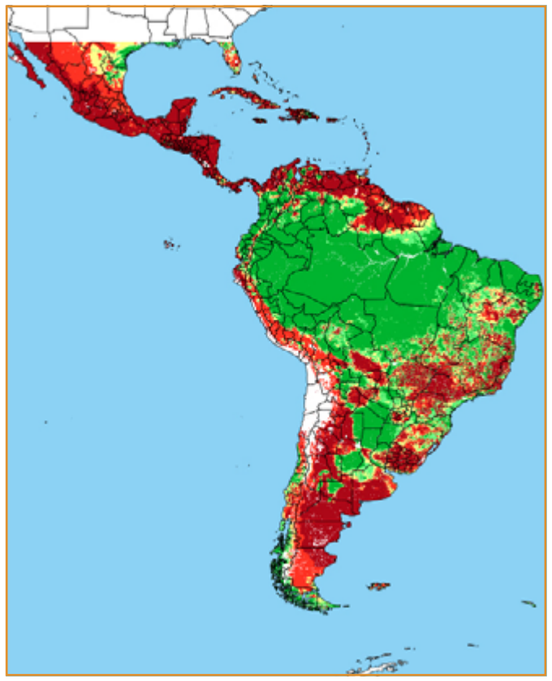
sábado, 30 de março



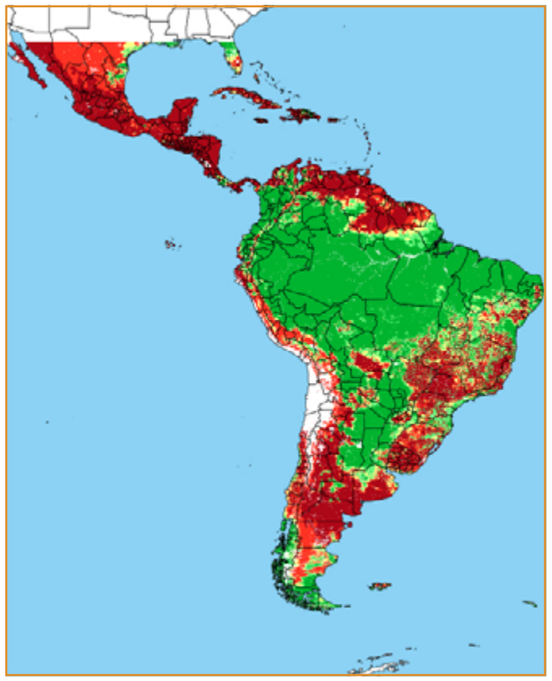
MARÇO / 2019

D	S	T	Q	Q	S	S
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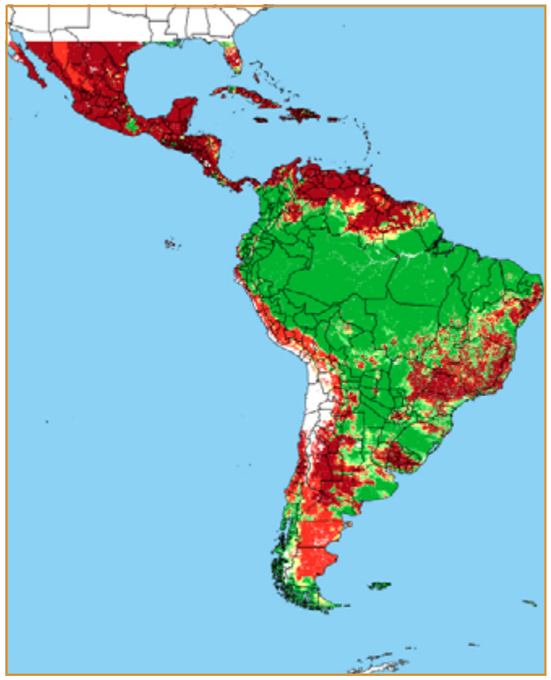
CALENDÁRIO JULIANO



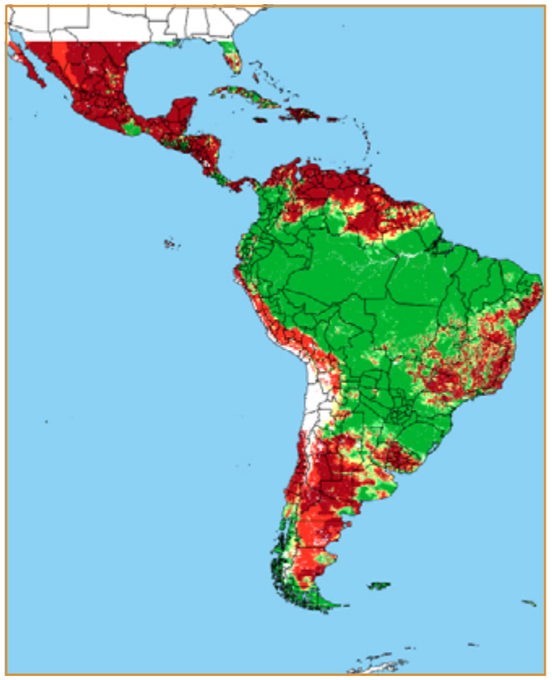
domingo, 31 de março



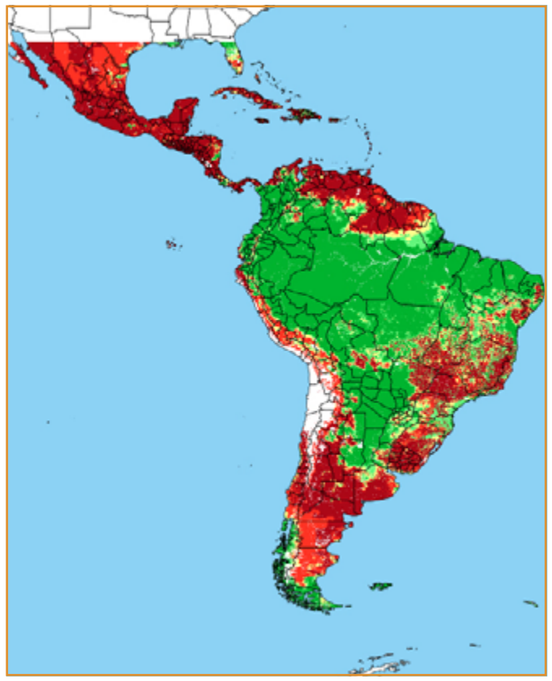
segunda-feira, 1 de abril



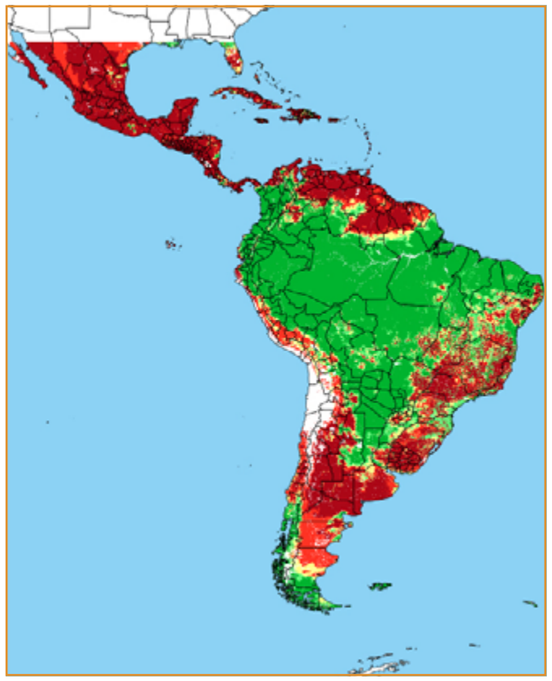
quinta-feira, 4 de abril



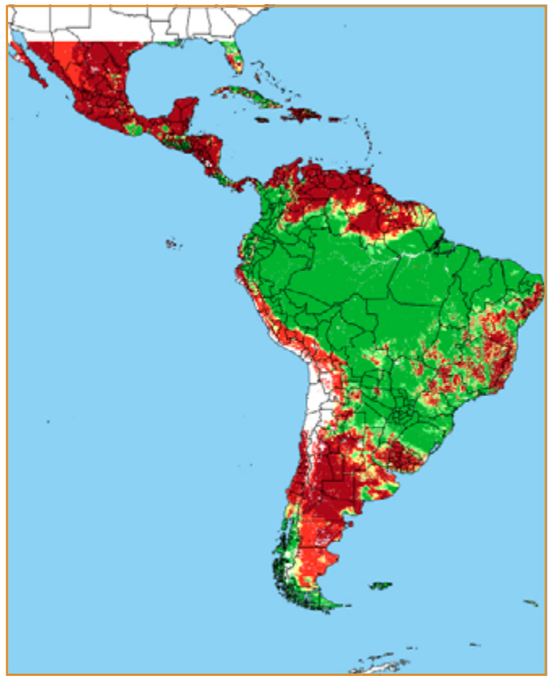
sexta-feira, 5 de abril



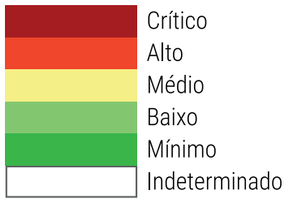
terça-feira, 2 de abril



quarta-feira, 3 de abril



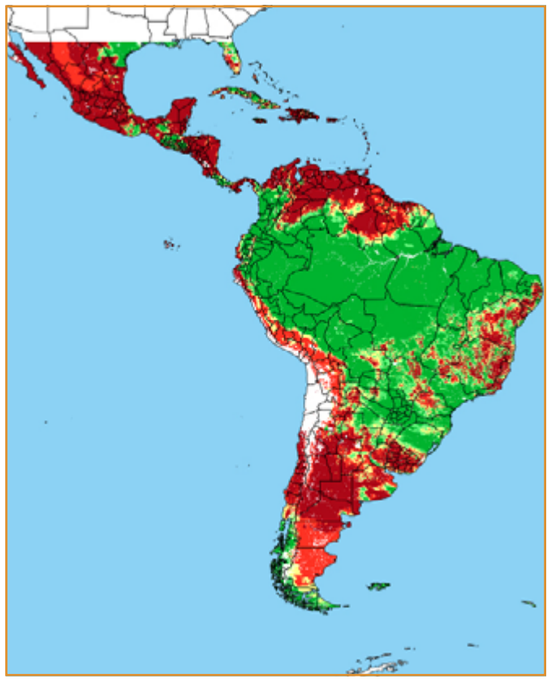
sábado, 6 de abril



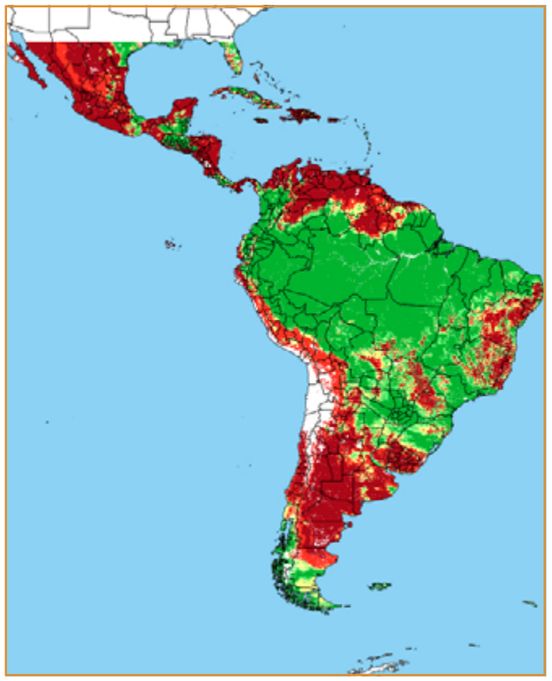
ABRIL / 2019

D	S	T	Q	Q	S	S
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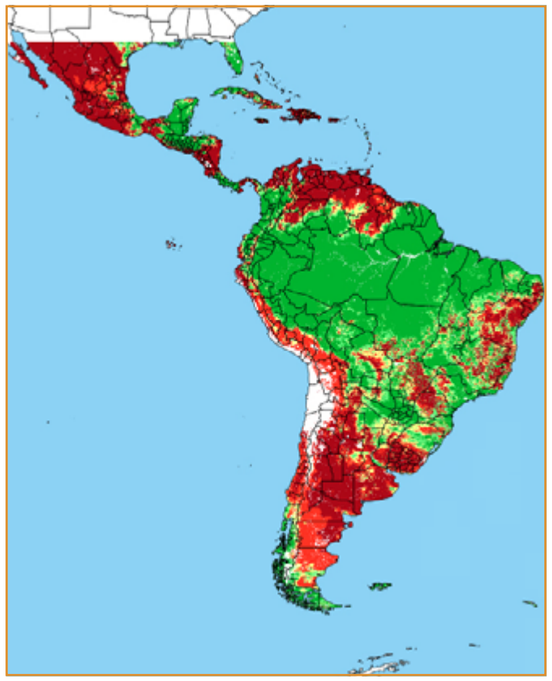
CALENDÁRIO JULIANO



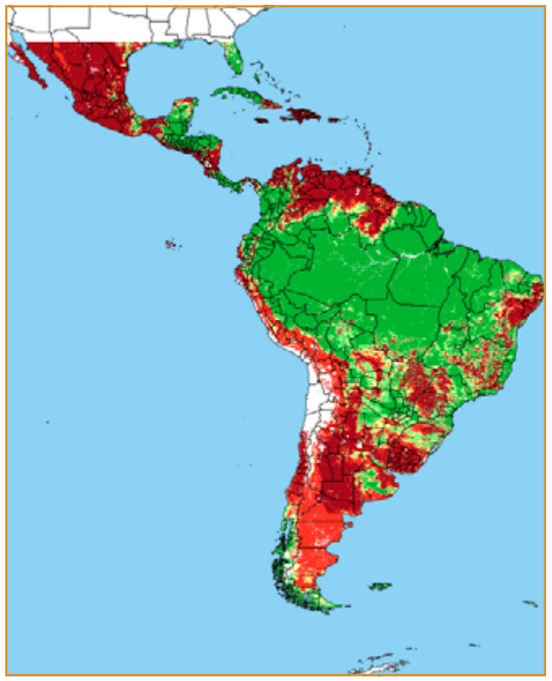
domingo, 7 de abril



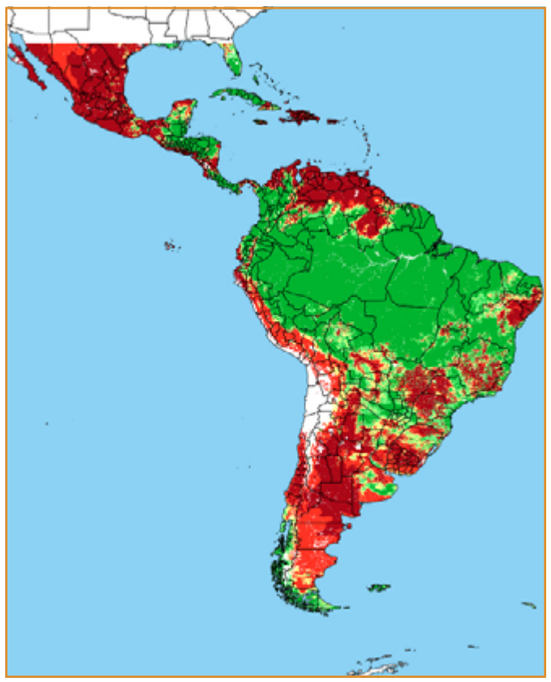
segunda-feira, 8 de abril



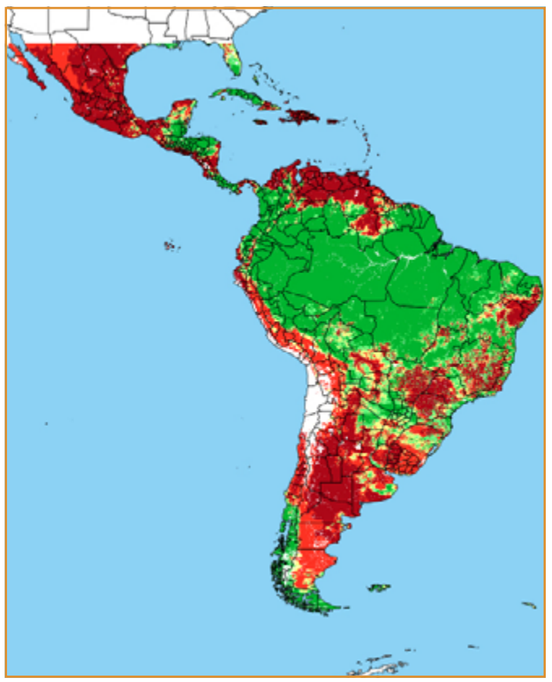
terça-feira, 9 de abril



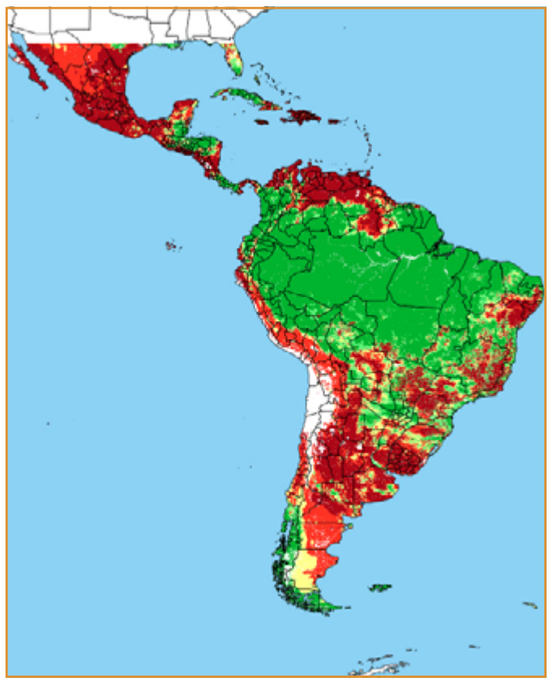
quarta-feira, 10 de abril



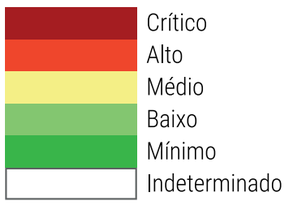
quinta-feira, 11 de abril



sexta-feira, 12 de abril



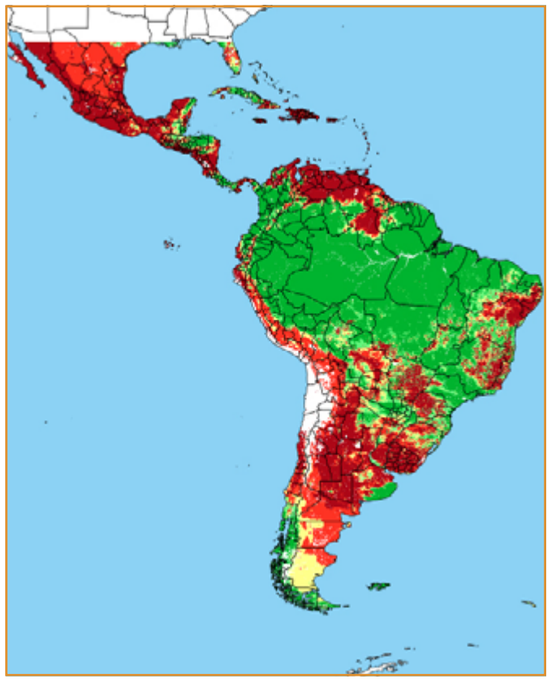
sábado, 13 de abril



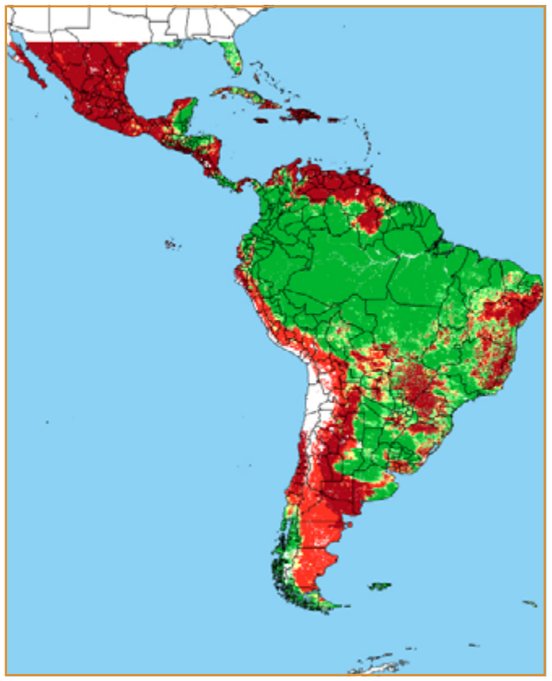
ABRIL / 2019

D	S	T	Q	Q	S	S
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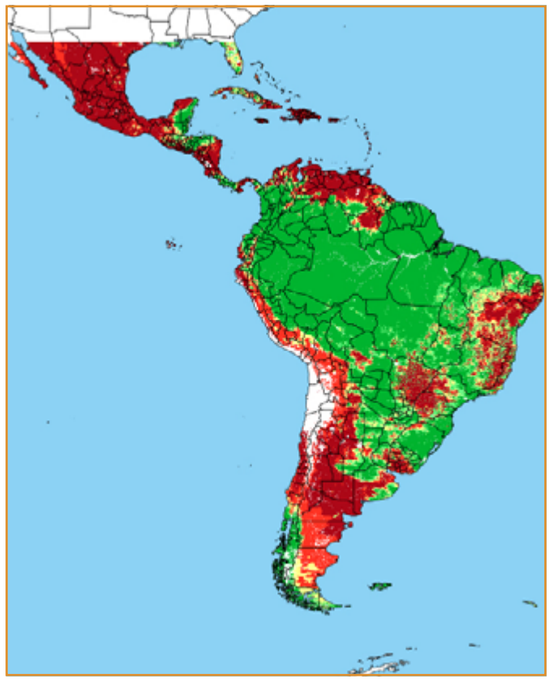
CALENDÁRIO JULIANO



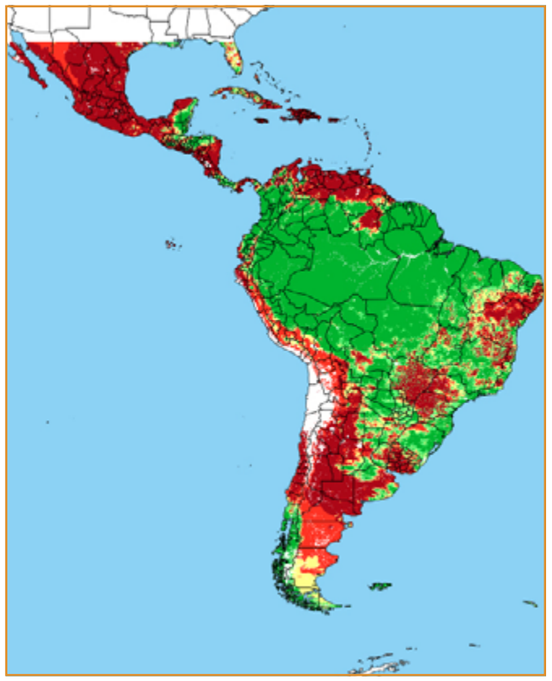
domingo, 14 de abril



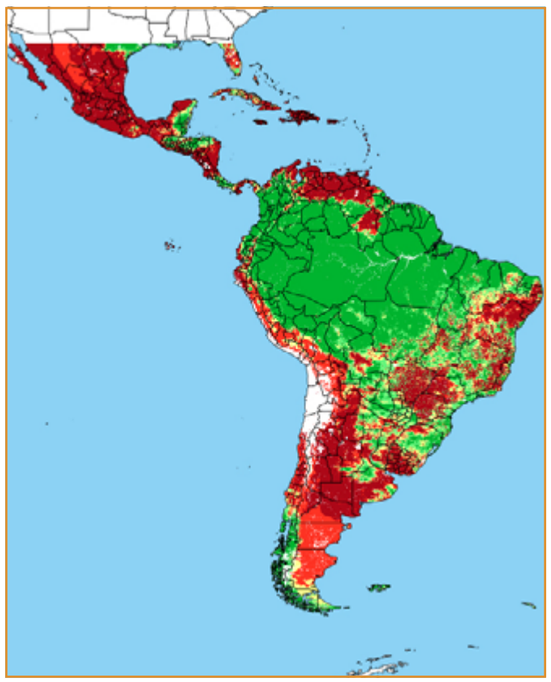
segunda-feira, 15 de abril



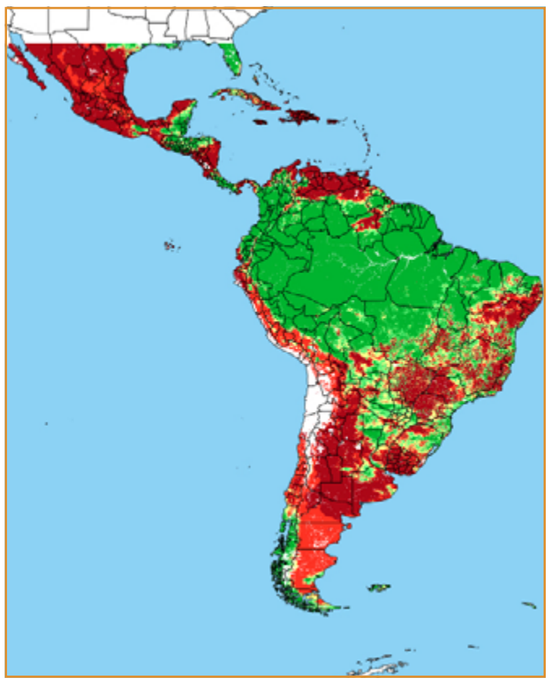
terça-feira, 16 de abril



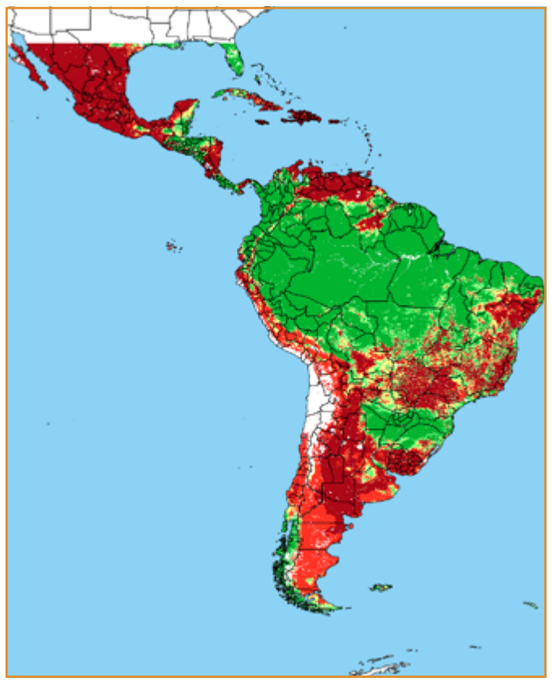
quarta-feira, 17 de abril



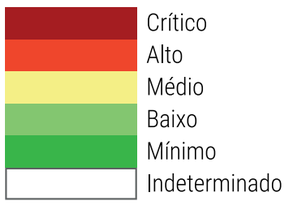
quinta-feira, 18 de abril



sexta-feira, 19 de abril



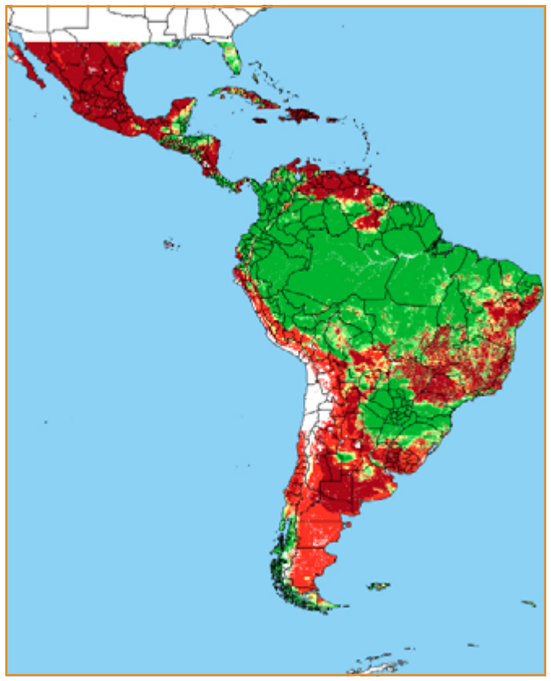
sábado, 20 de abril



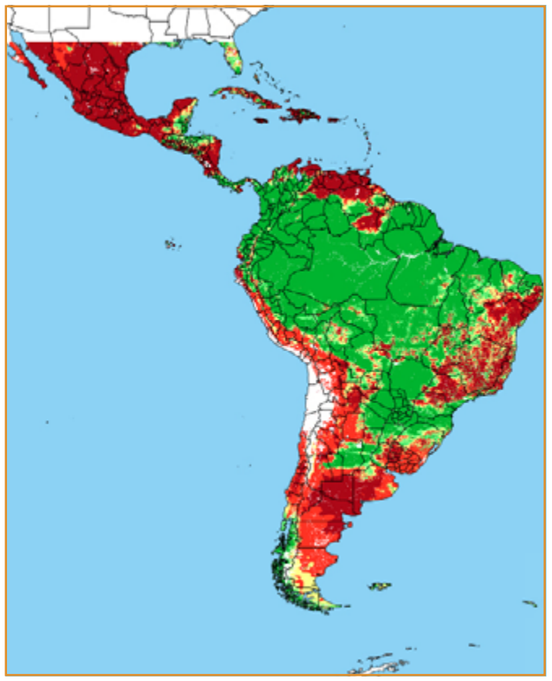
ABRIL / 2019

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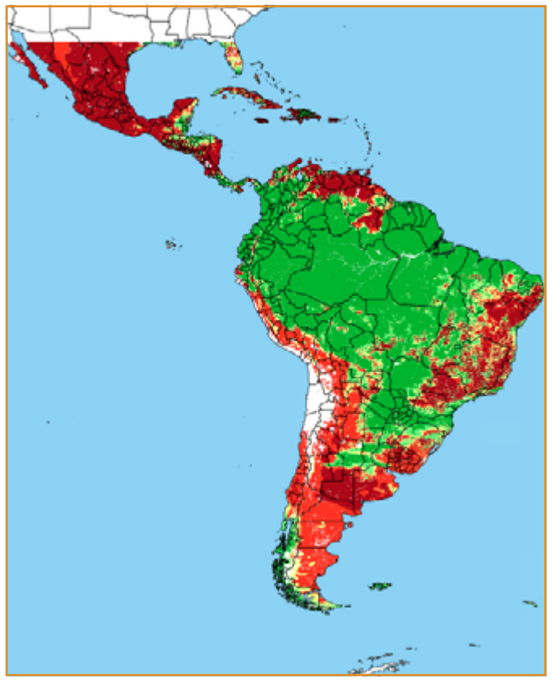
CALENDÁRIO JULIANO



domingo, 21 de abril



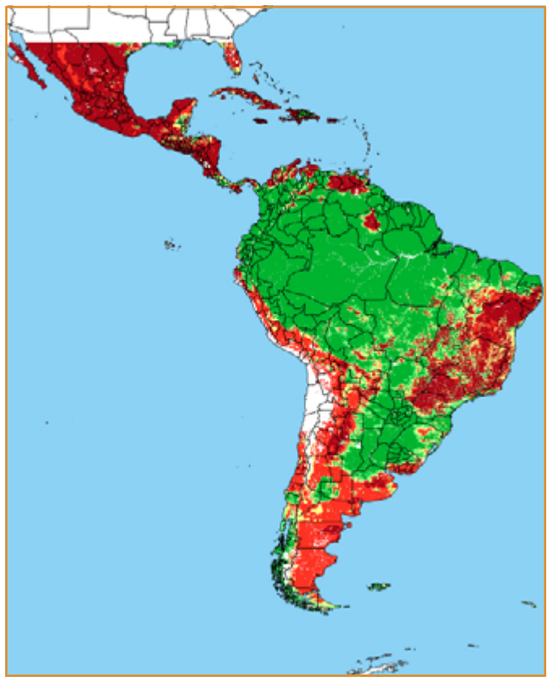
segunda-feira, 22 de abril



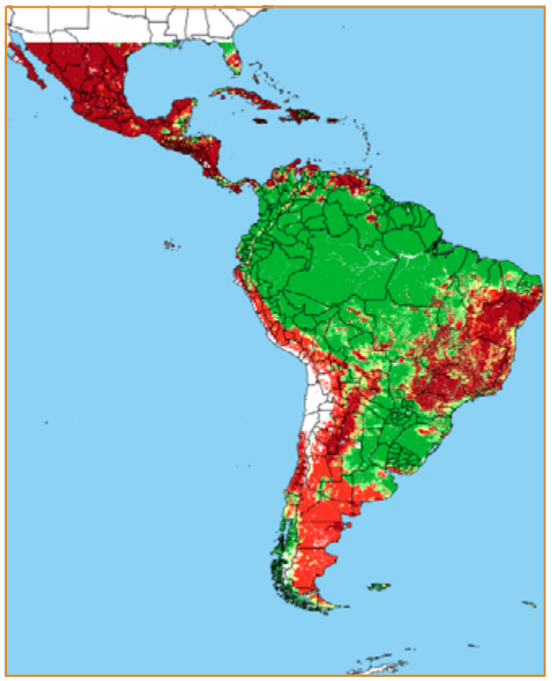
terça-feira, 23 de abril



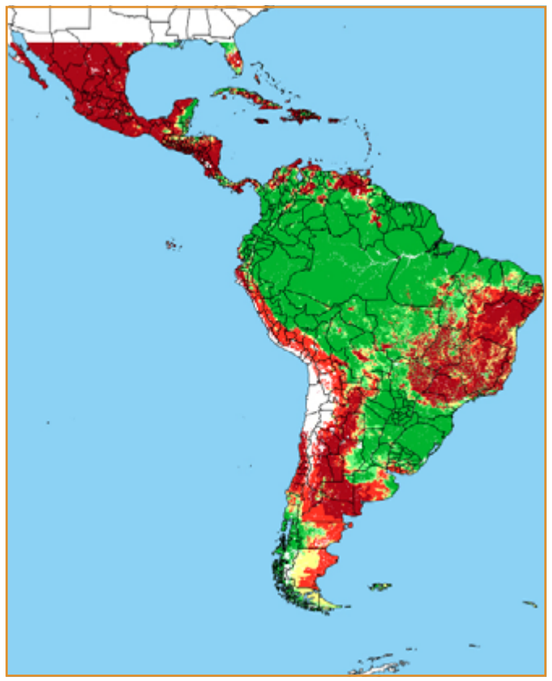
quarta-feira, 24 de abril



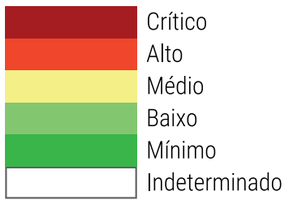
quinta-feira, 25 de abril



sexta-feira, 26 de abril



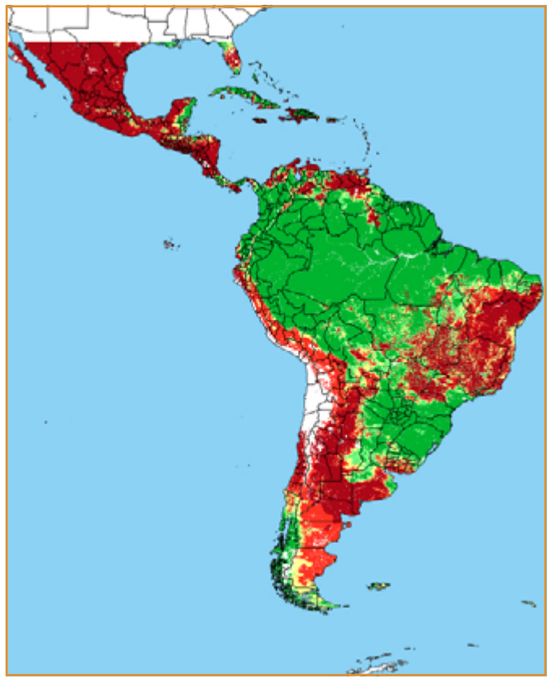
sábado, 27 de abril



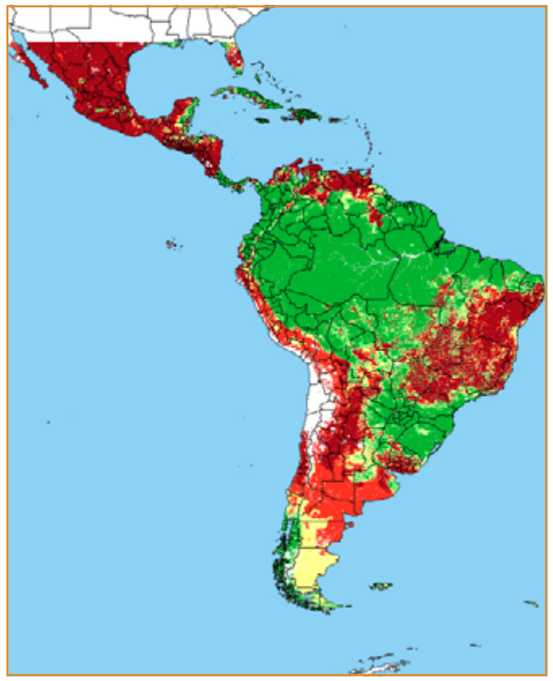
ABRIL / 2019

D	S	T	Q	Q	S	S
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118	119	120				

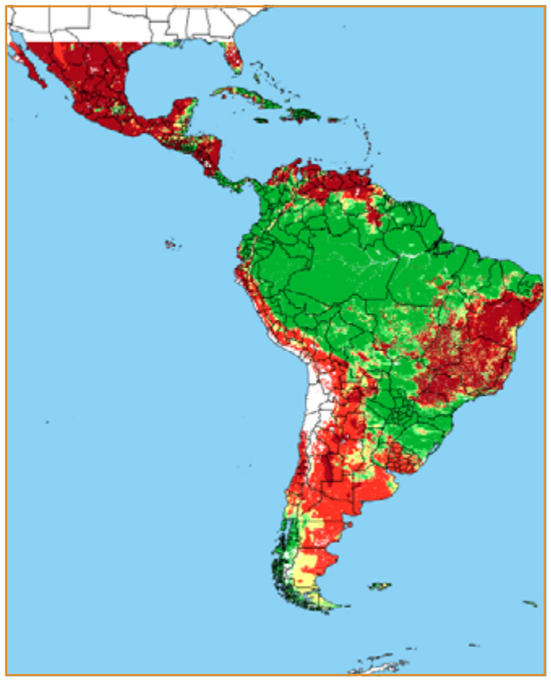
CALENDÁRIO JULIANO



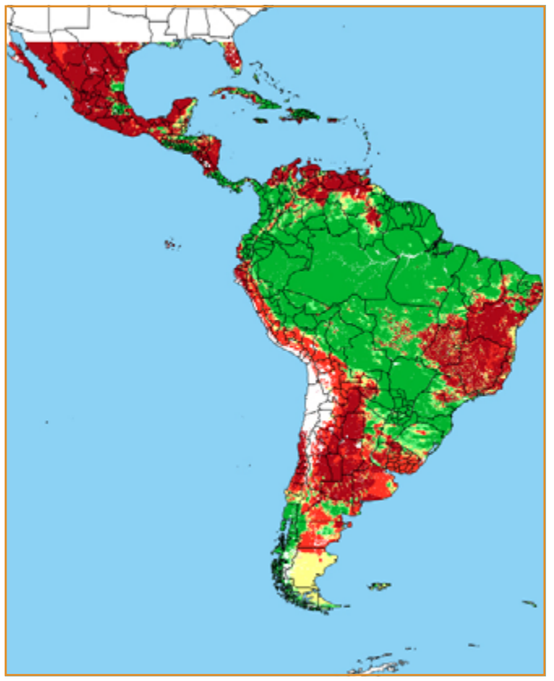
domingo, 28 de abril



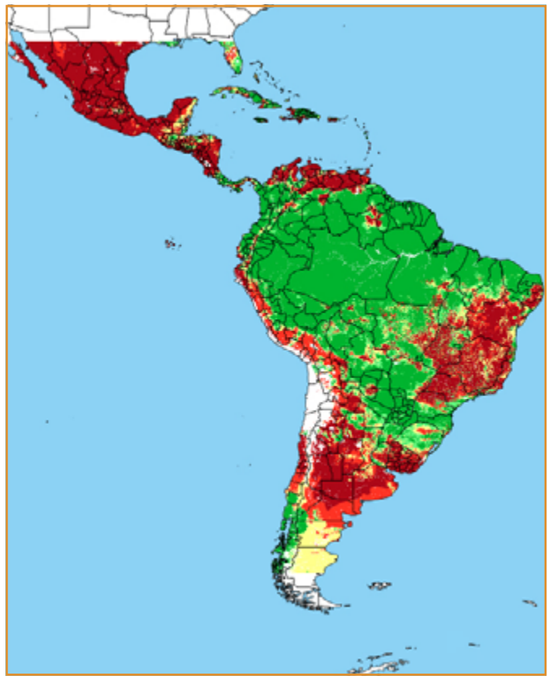
segunda-feira, 29 de abril



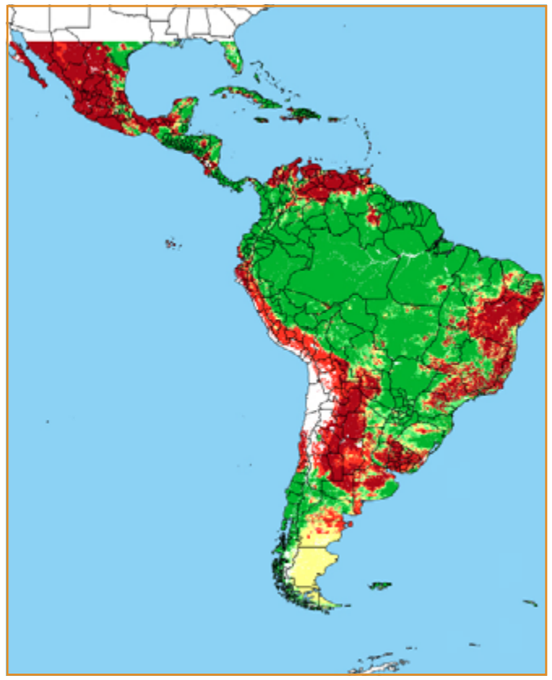
terça-feira, 30 de abril



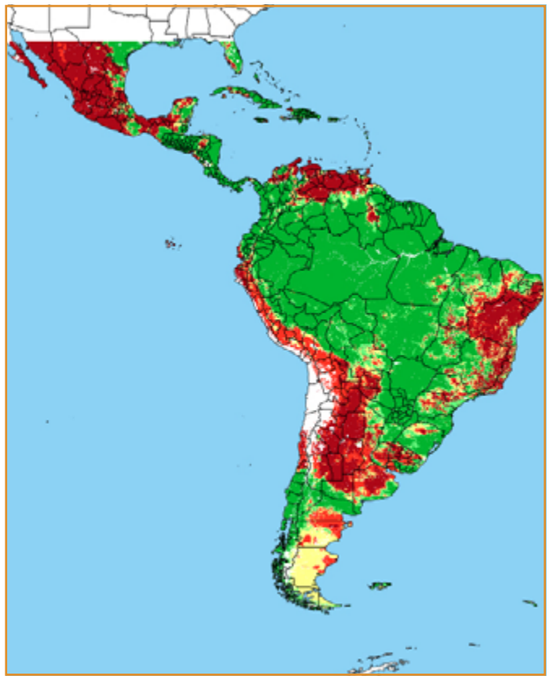
quarta-feira, 1 de maio



quinta-feira, 2 de maio



sexta-feira, 3 de maio



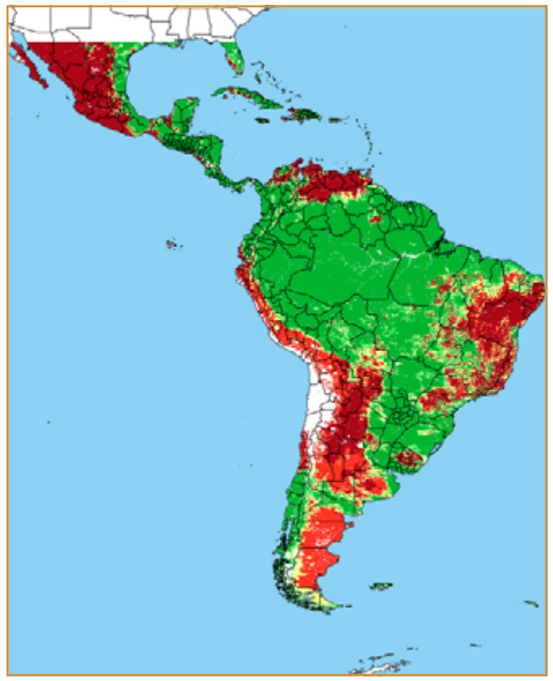
sábado, 4 de maio

Crítico
Alto
Médio
Baixo
Mínimo
Indeterminado

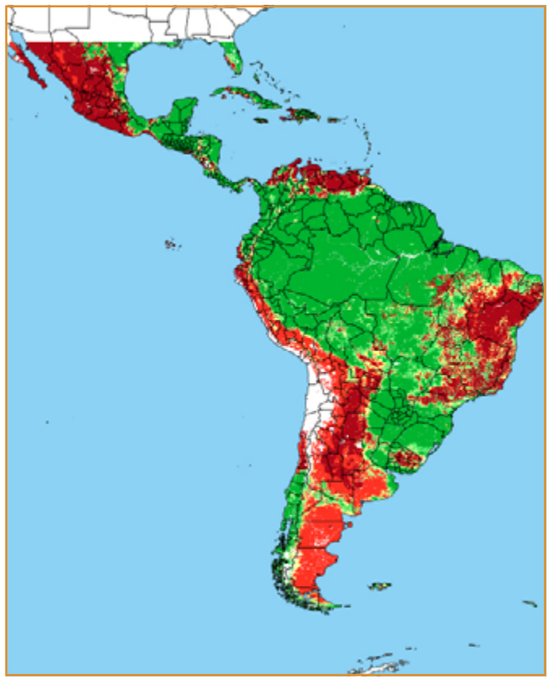
MAIO / 2019

D	S	T	Q	Q	S	S
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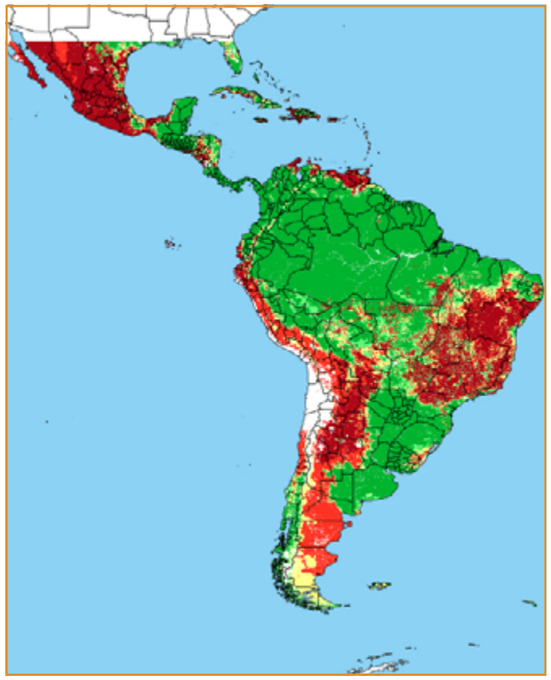
CALENDÁRIO JULIANO



domingo, 5 de maio



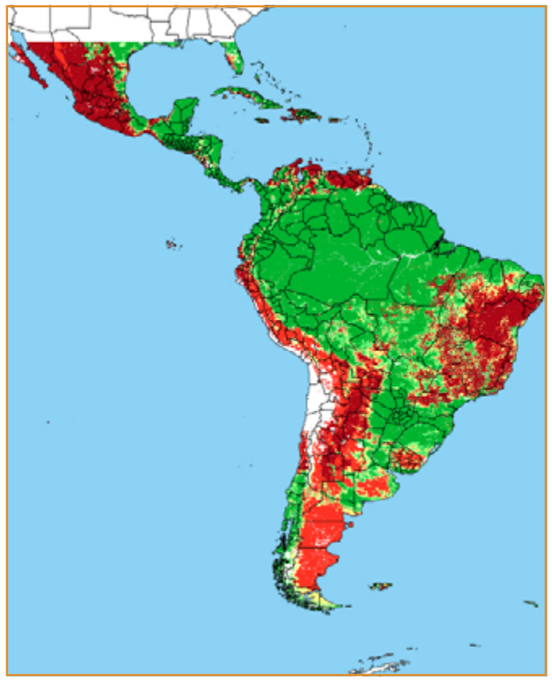
segunda-feira, 6 de maio



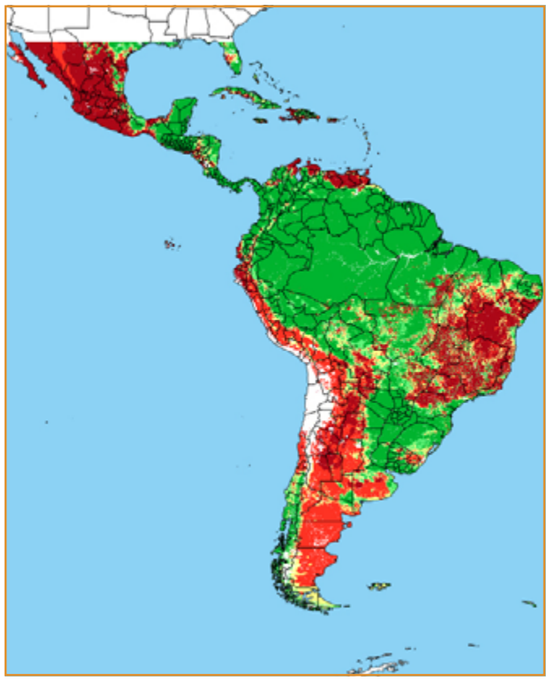
quinta-feira, 9 de maio



sexta-feira, 10 de maio



terça-feira, 7 de maio



quarta-feira, 8 de maio



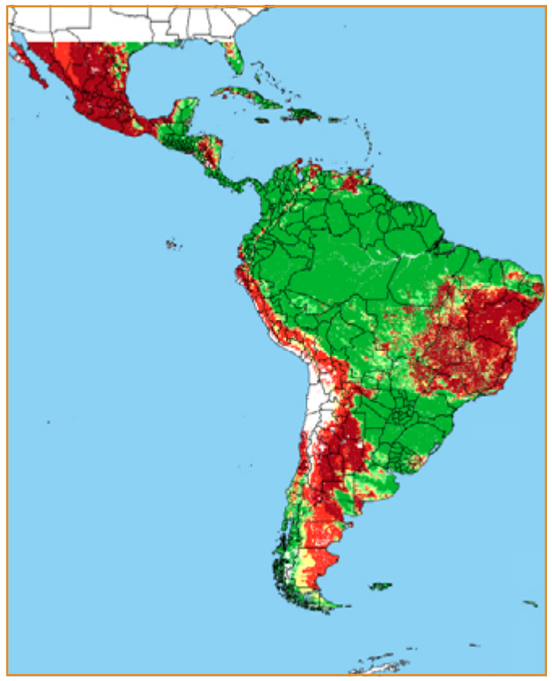
sábado, 11 de maio

Crítico
Alto
Médio
Baixo
Mínimo
Indeterminado

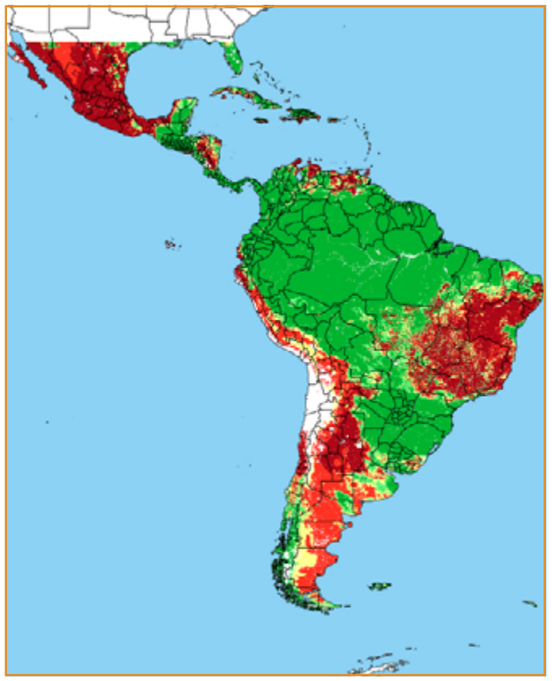
MAIO / 2019

D	S	T	Q	Q	S	S
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146	147	148	149	150	151	

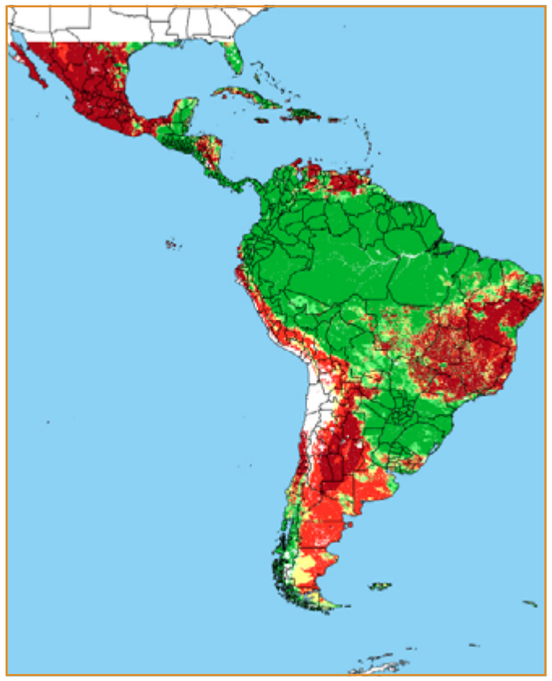
CALENDÁRIO JULIANO



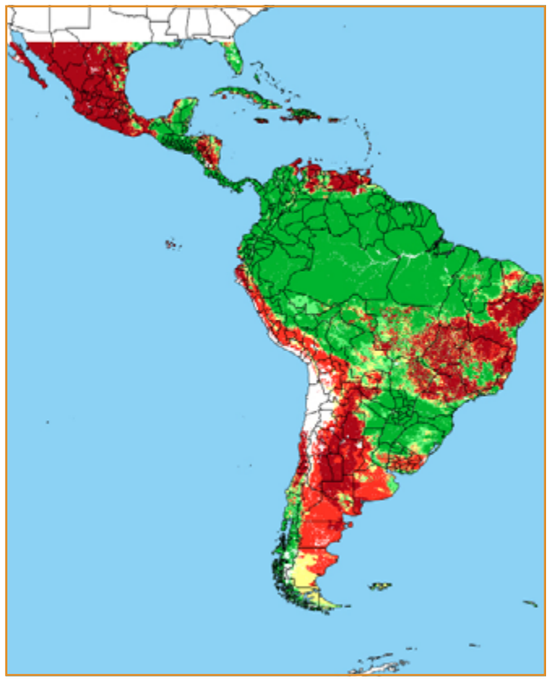
domingo, 12 de maio



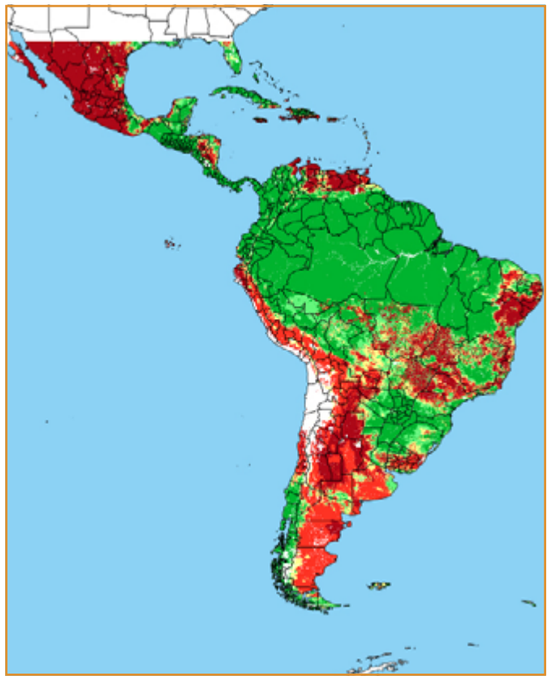
segunda-feira, 13 de maio



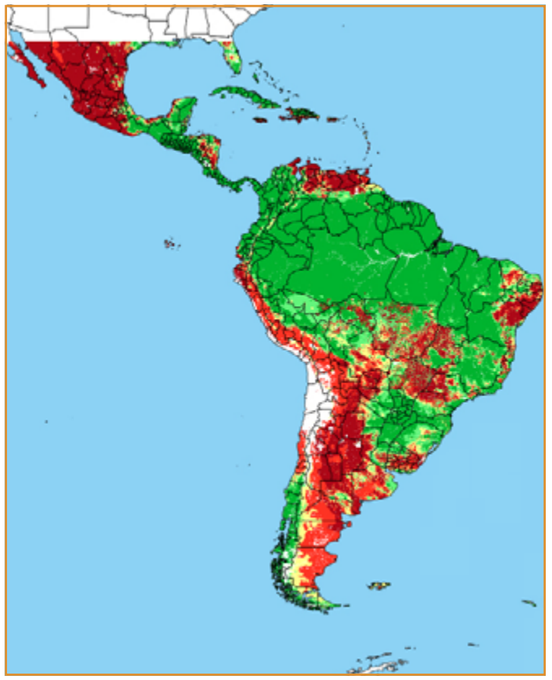
terça-feira, 14 de maio



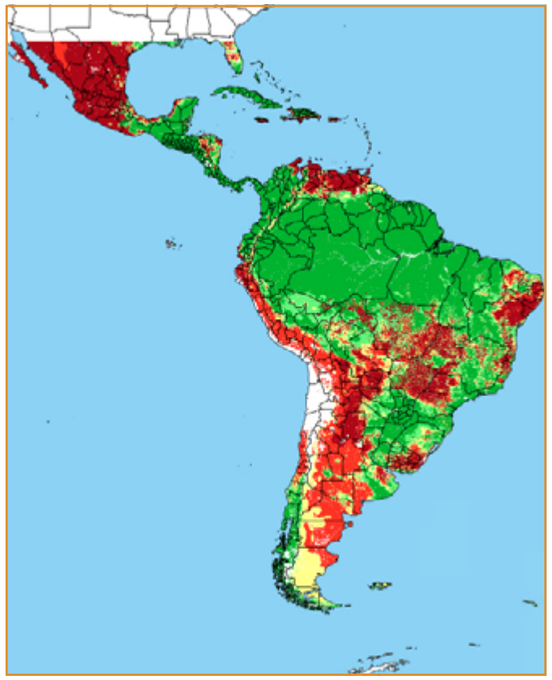
quarta-feira, 15 de maio



quinta-feira, 16 de maio



sexta-feira, 17 de maio



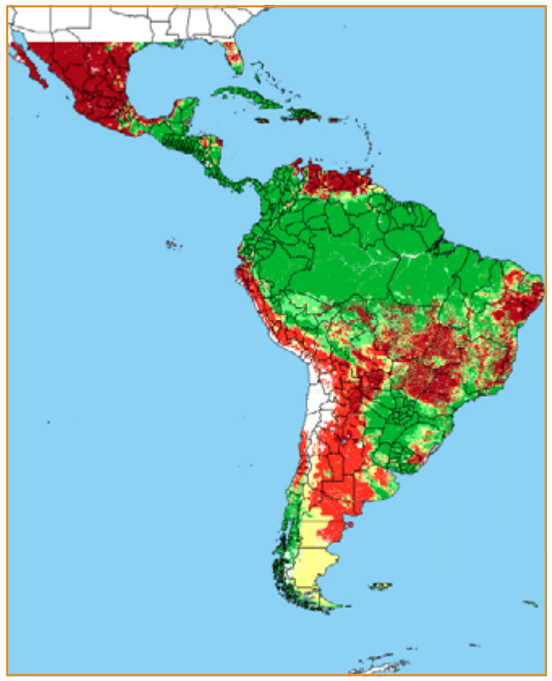
sábado, 18 de maio



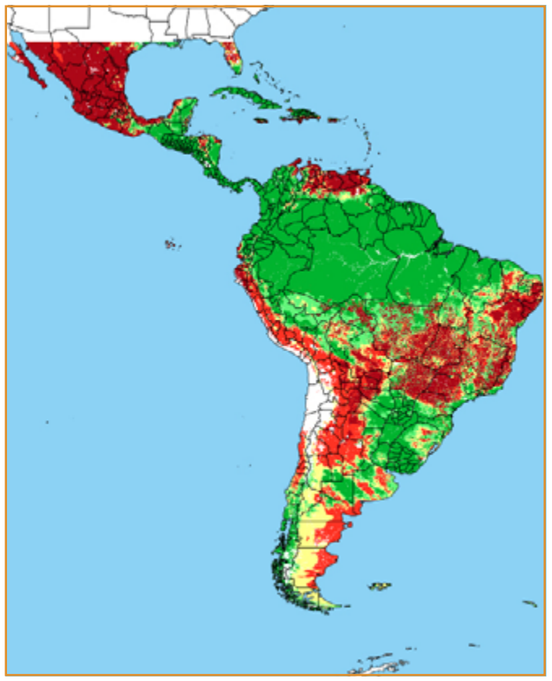
MAIO / 2019

D	S	T	Q	Q	S	S
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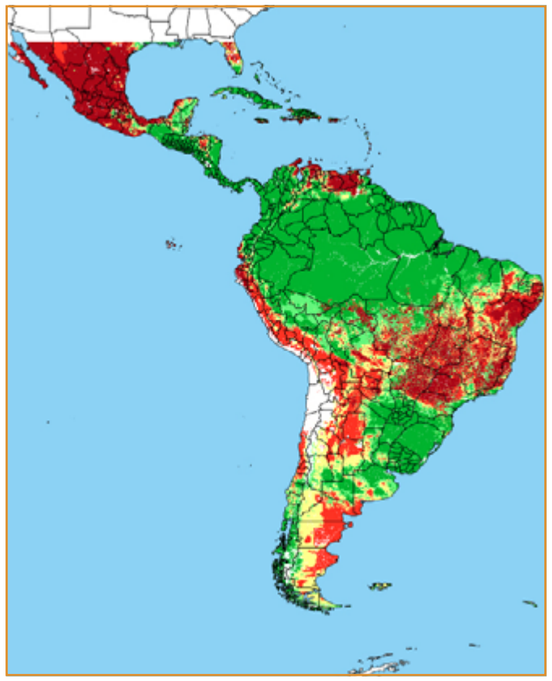
CALENDÁRIO JULIANO



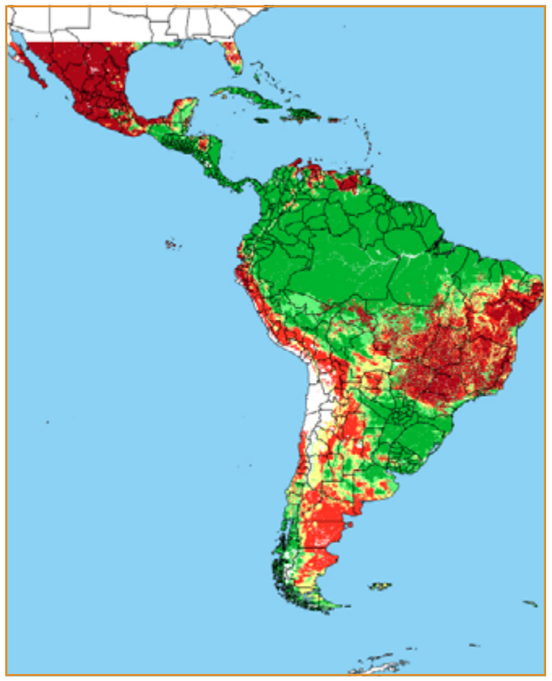
domingo, 19 de maio



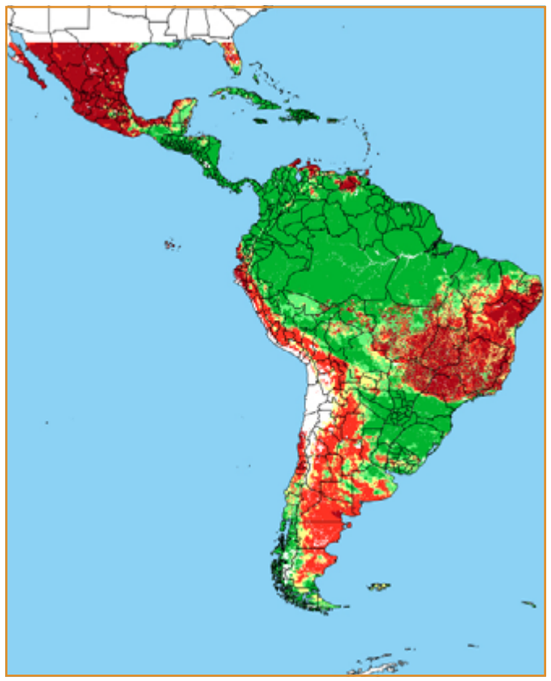
segunda-feira, 20 de maio



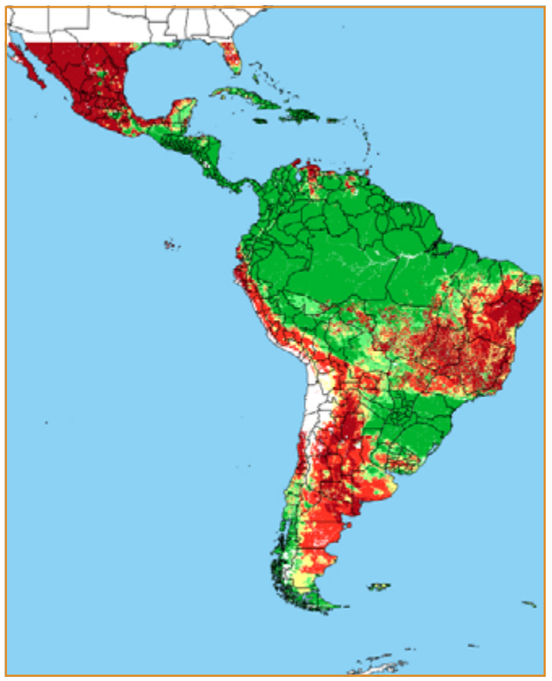
terça-feira, 21 de maio



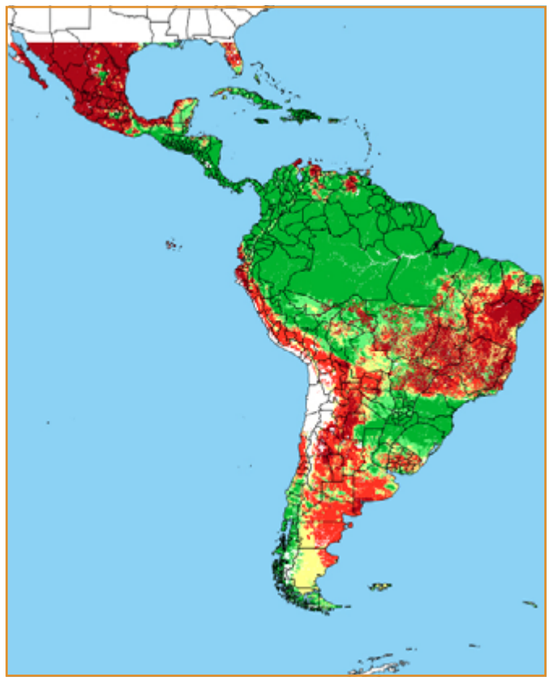
quarta-feira, 22 de maio



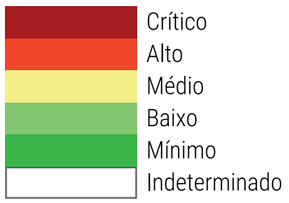
quinta-feira, 23 de maio



sexta-feira, 24 de maio



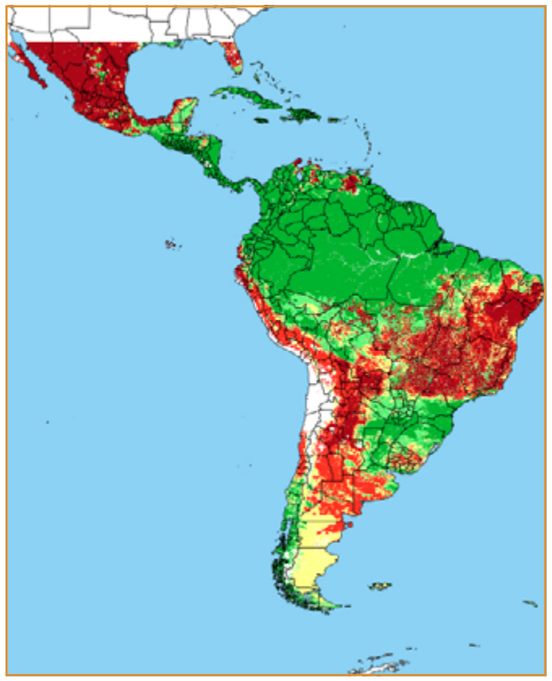
sábado, 25 de maio



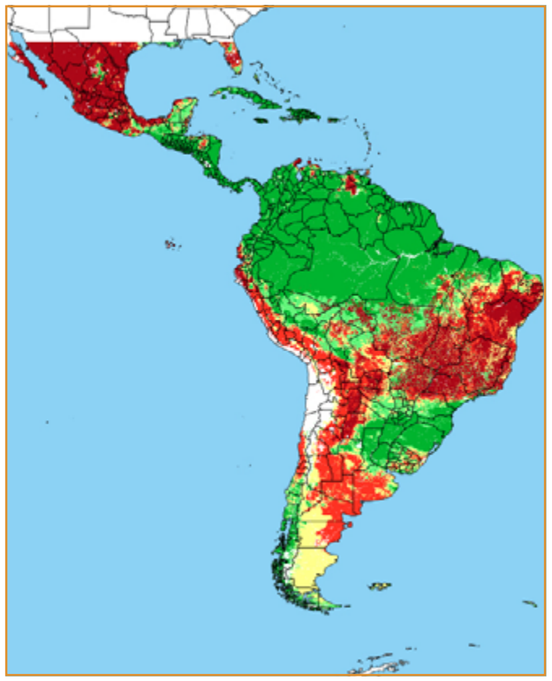
MAIO / 2019

D	S	T	Q	Q	S	S
			121	122	123	124
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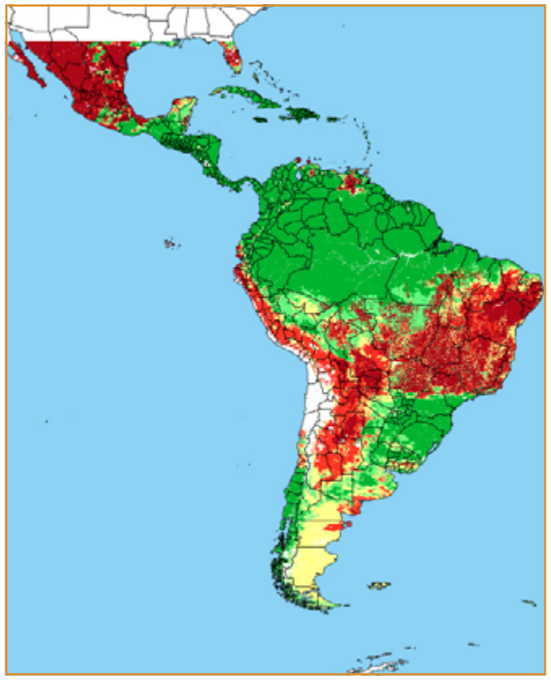
CALENDÁRIO JULIANO



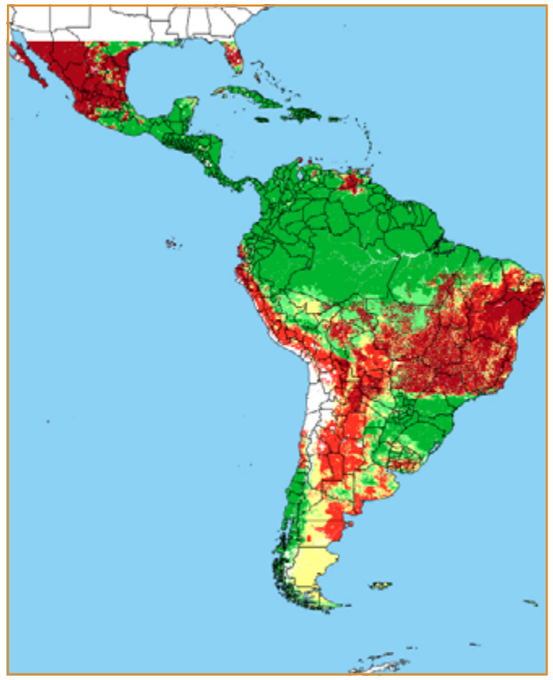
domingo, 26 de maio



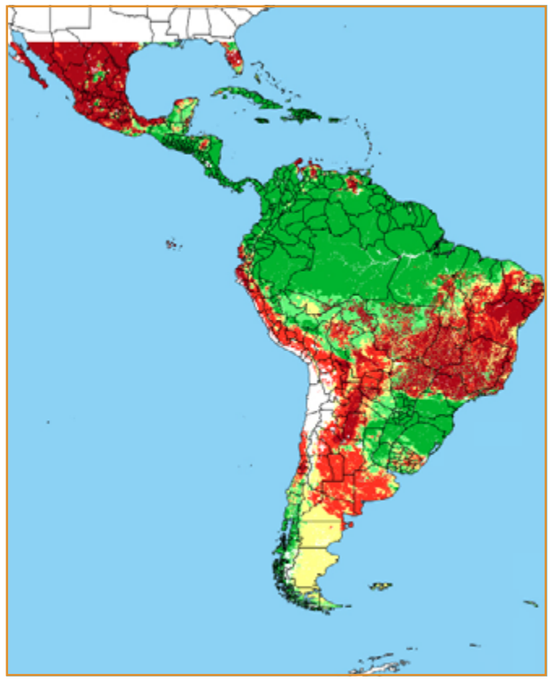
segunda-feira, 27 de maio



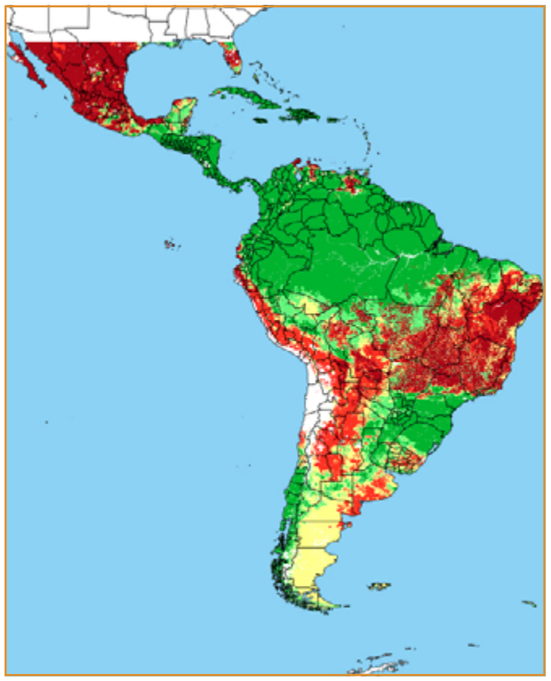
quinta-feira, 30 de maio



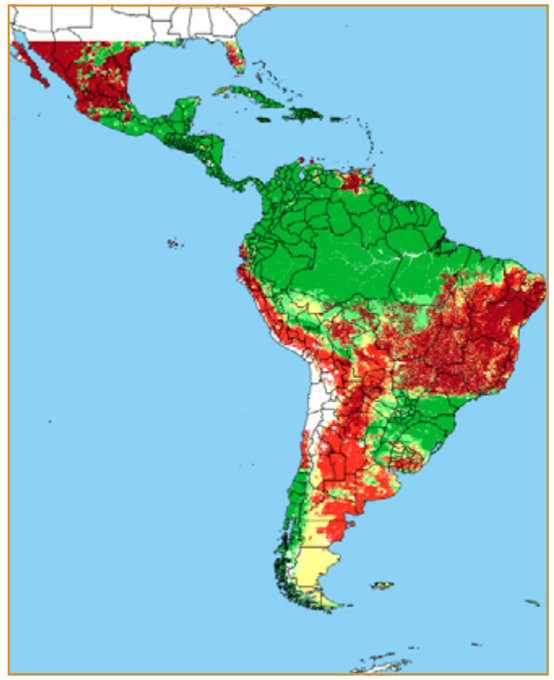
sexta-feira, 31 de maio



terça-feira, 28 de maio



quarta-feira, 29 de maio



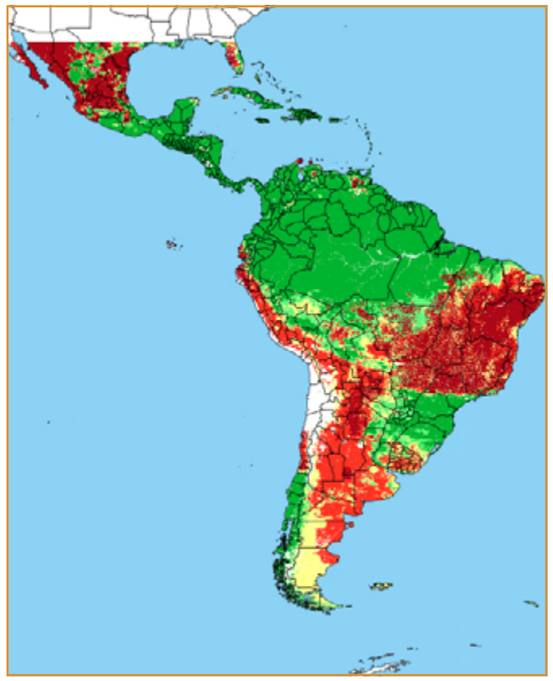
sábado, 1 de junho

Crítico
Alto
Médio
Baixo
Mínimo
Indeterminado

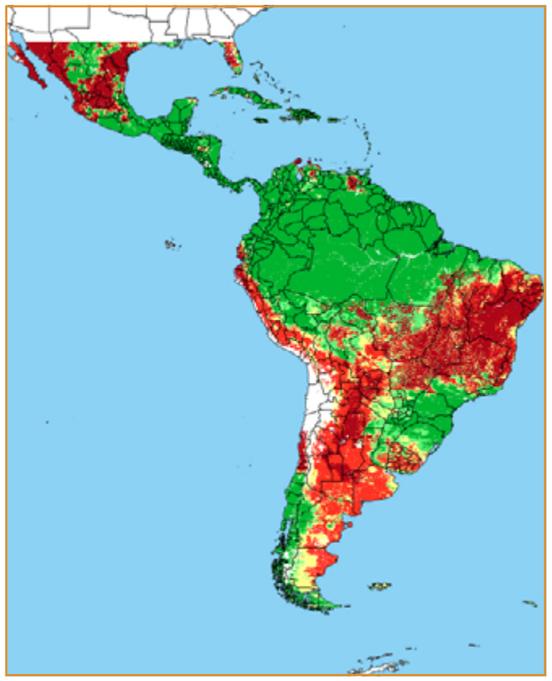
MAIO / 2019

D	S	T	Q	Q	S	S
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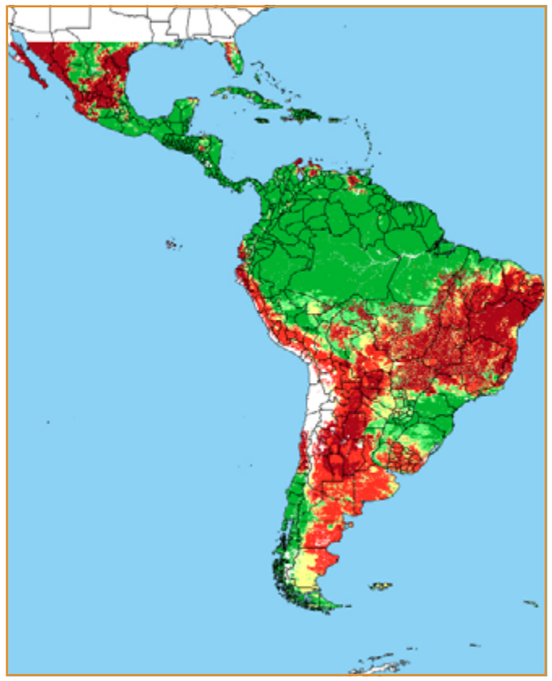
CALENDÁRIO JULIANO



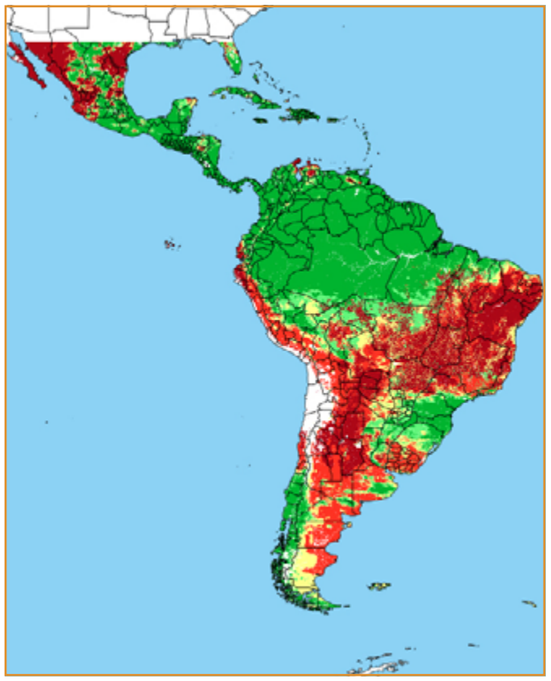
domingo, 2 de junho



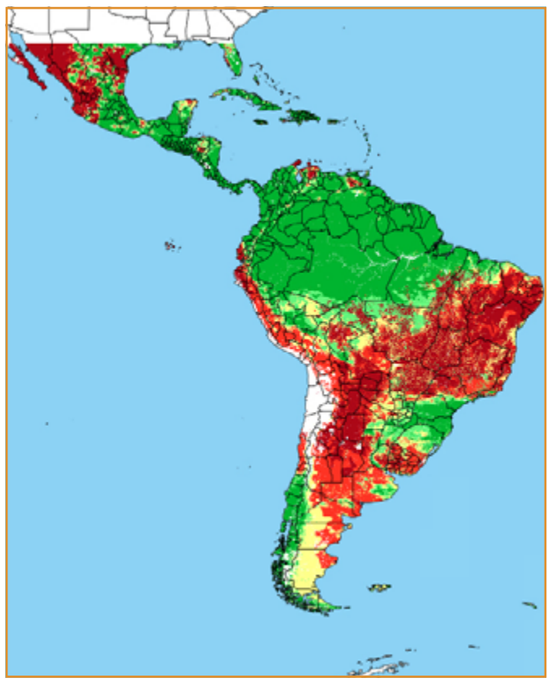
segunda-feira, 3 de junho



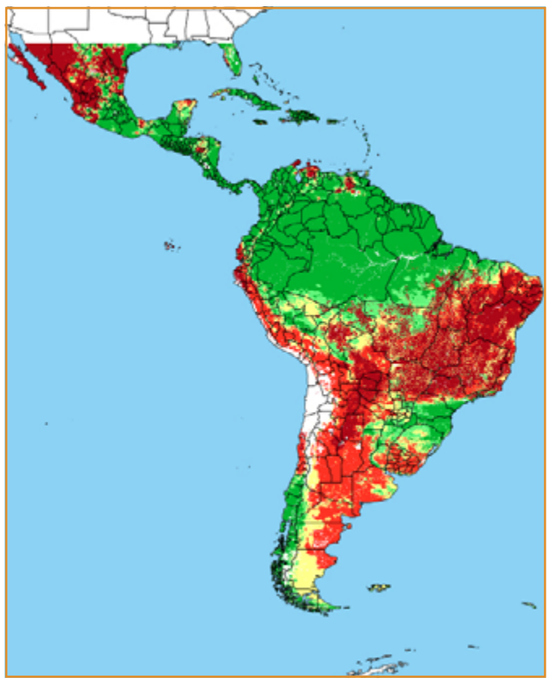
terça-feira, 4 de junho



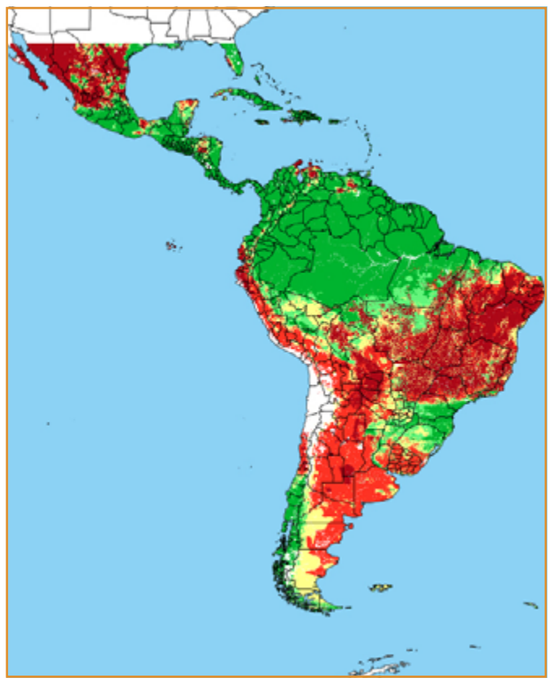
quarta-feira, 5 de junho



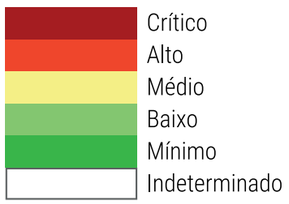
quinta-feira, 6 de junho



sexta-feira, 7 de junho



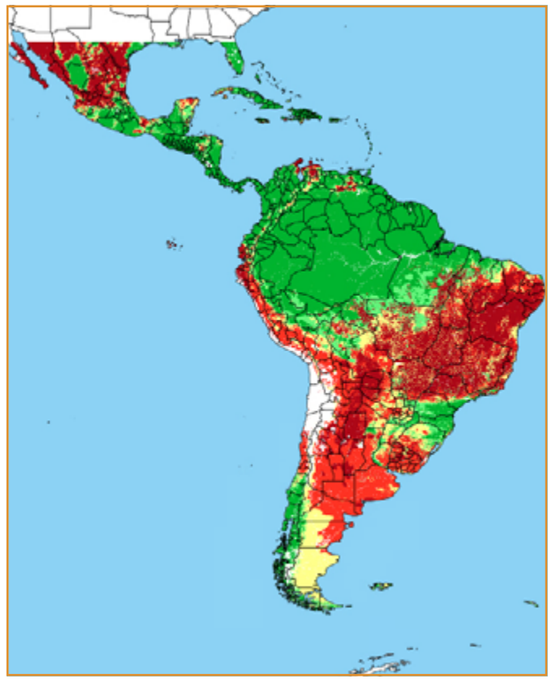
sábado, 8 de junho



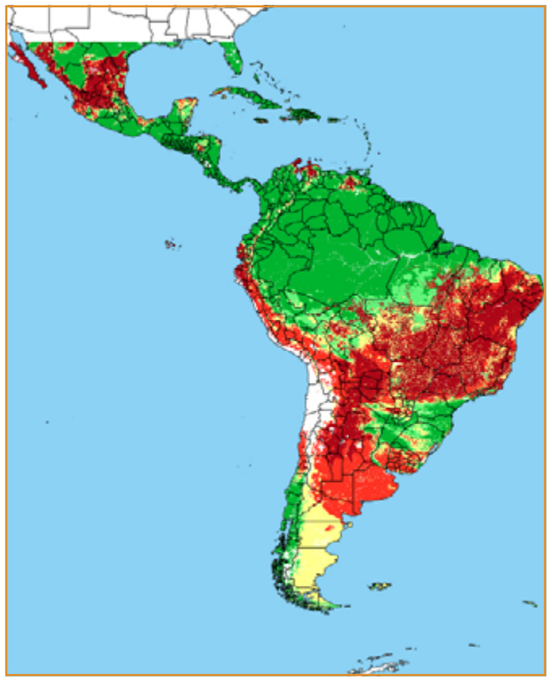
JUNHO / 2019

D	S	T	Q	Q	S	S
						152
153	154	155	156	157	158	159
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181						

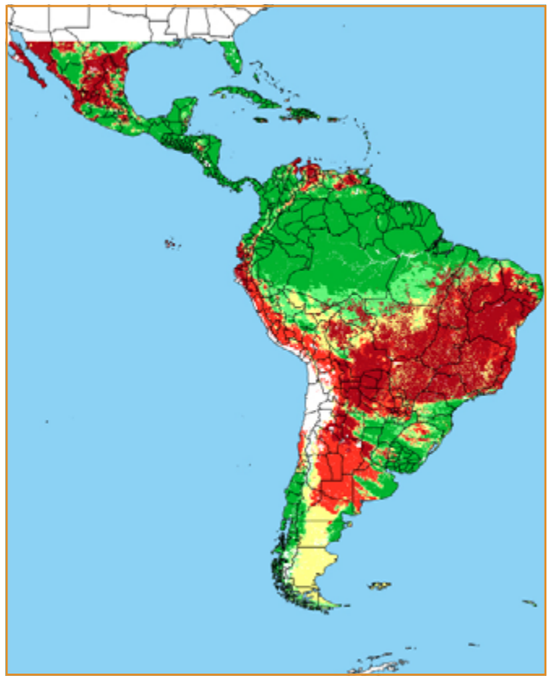
CALENDÁRIO JULIANO



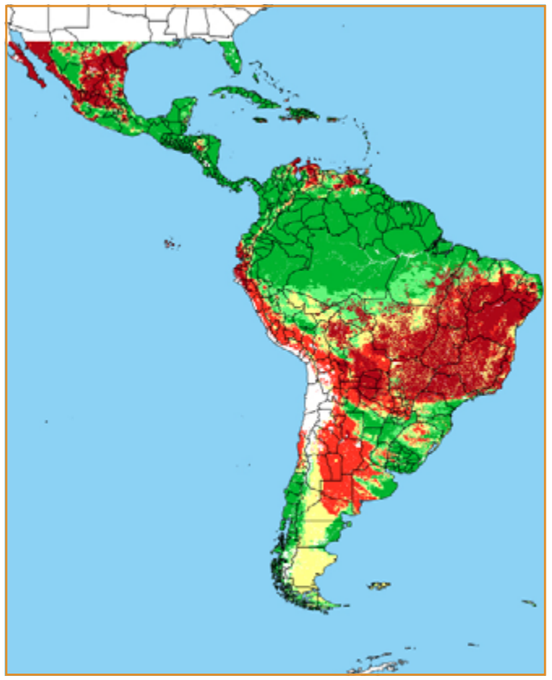
domingo, 9 de junho



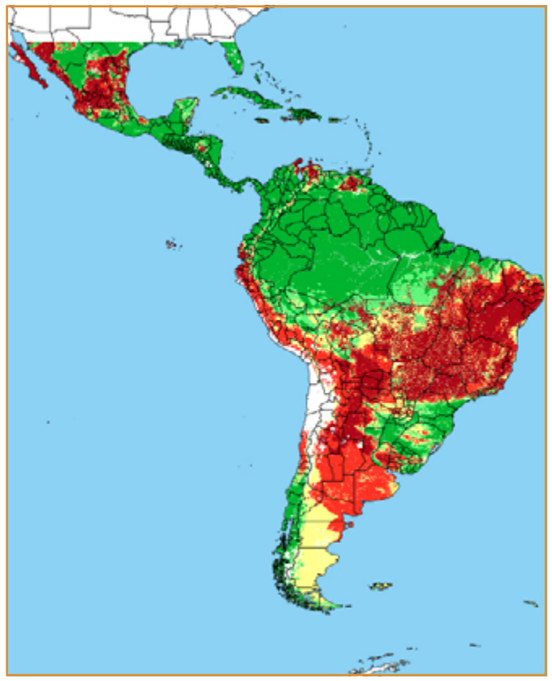
segunda-feira, 10 de junho



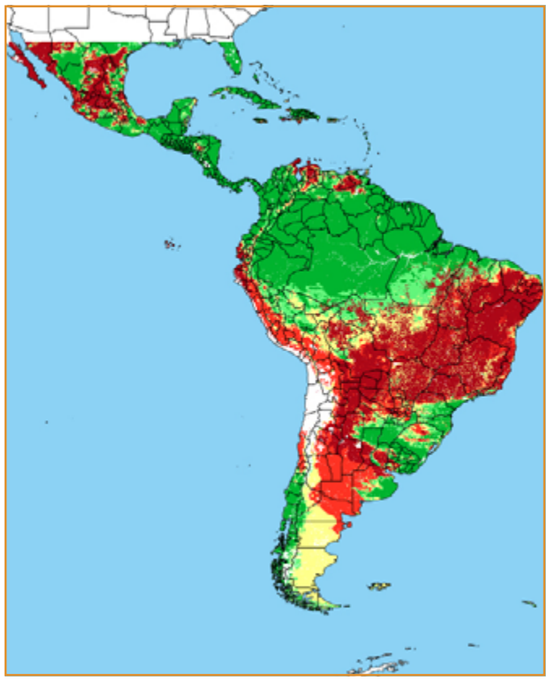
quinta-feira, 13 de junho



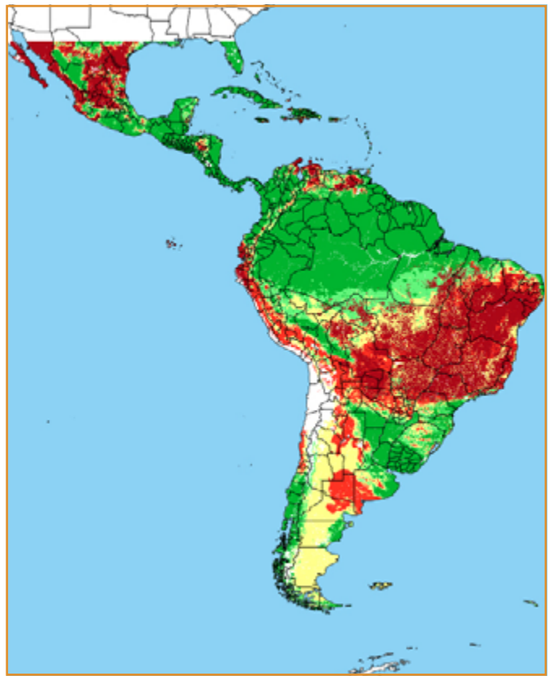
sexta-feira, 14 de junho



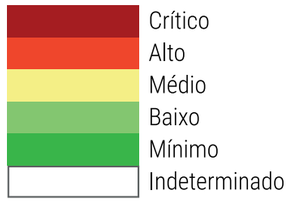
terça-feira, 11 de junho



quarta-feira, 12 de junho



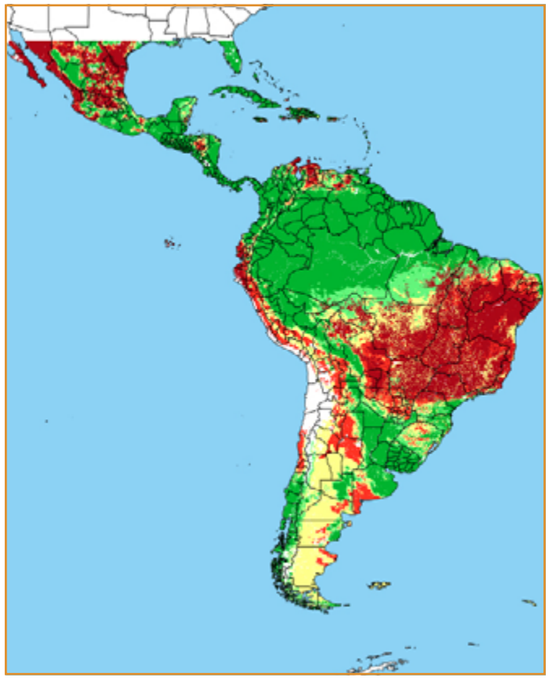
sábado, 15 de junho



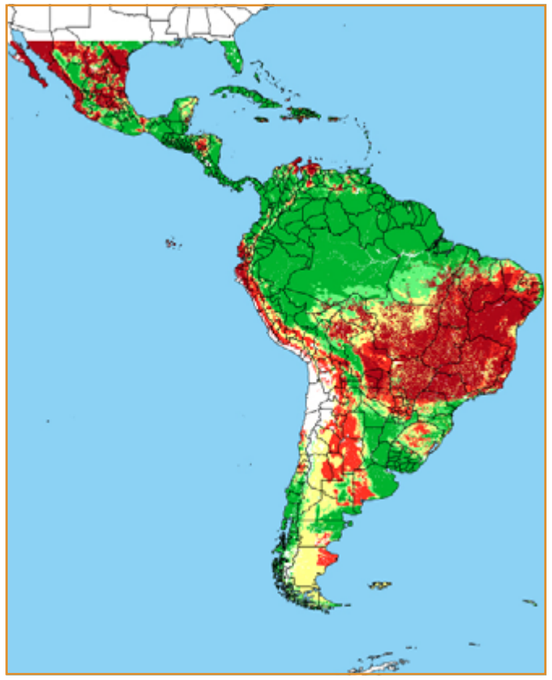
JUNHO / 2019

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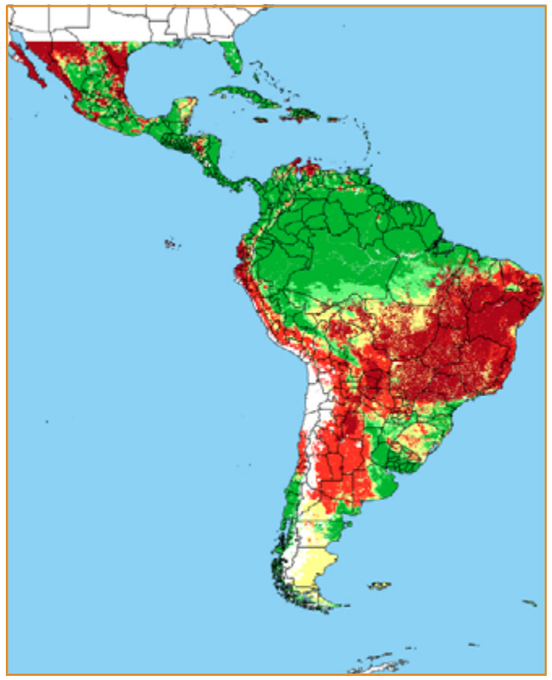
CALENDÁRIO JULIANO



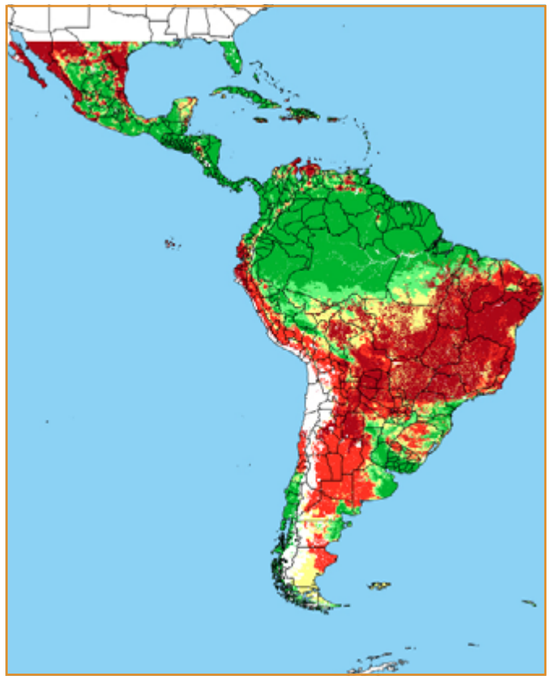
domingo, 16 de junho



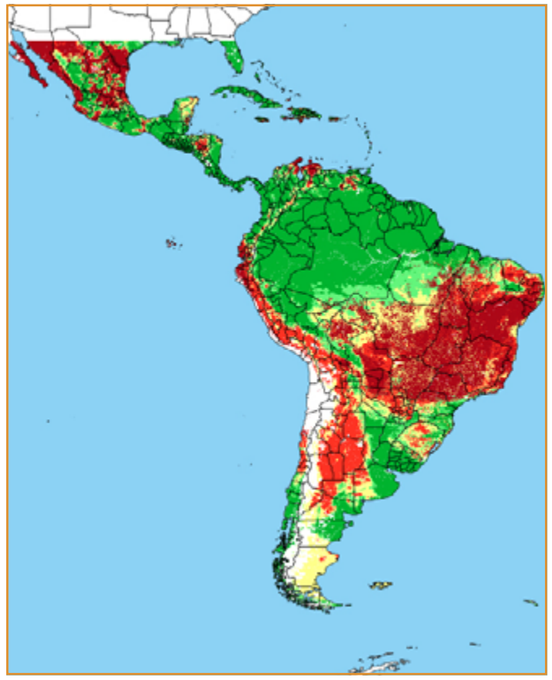
segunda-feira, 17 de junho



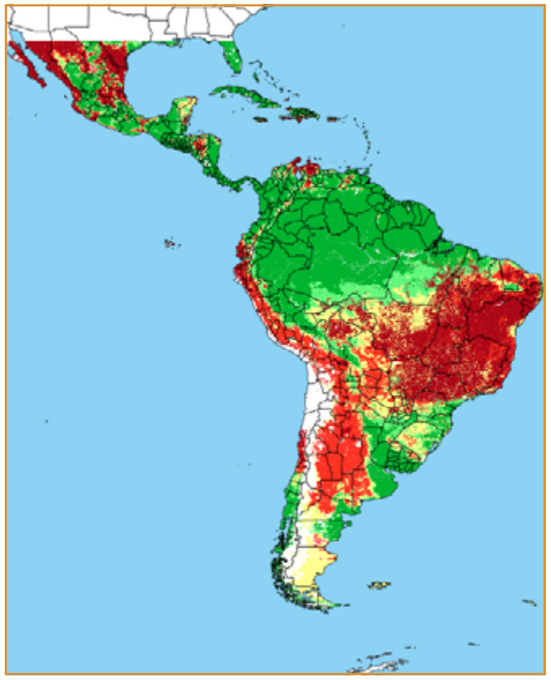
quinta-feira, 20 de junho



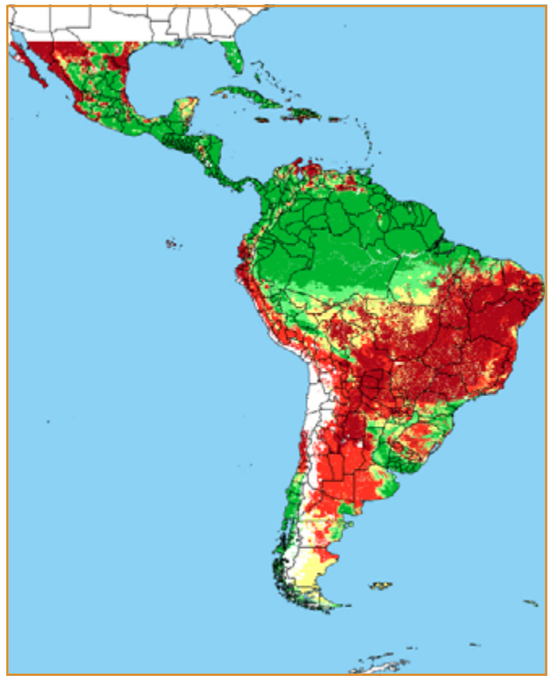
sexta-feira, 21 de junho



terça-feira, 18 de junho



quarta-feira, 19 de junho



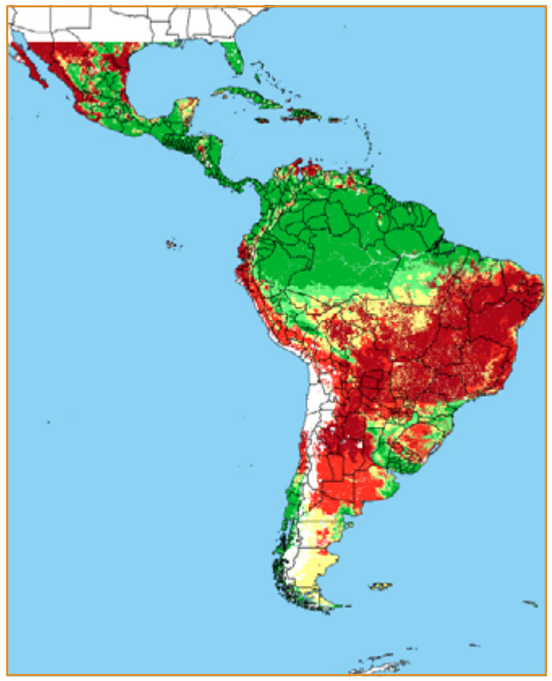
sábado, 22 de junho

Crítico
Alto
Médio
Baixo
Mínimo
Indeterminado

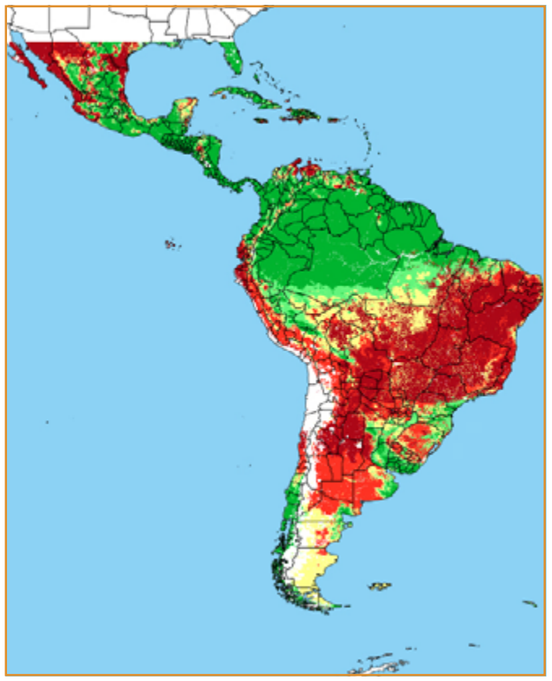
JUNHO / 2019

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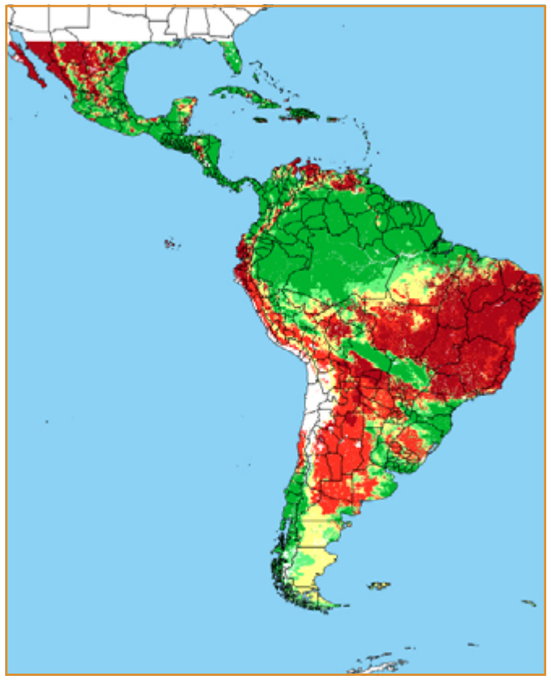
CALENDÁRIO JULIANO



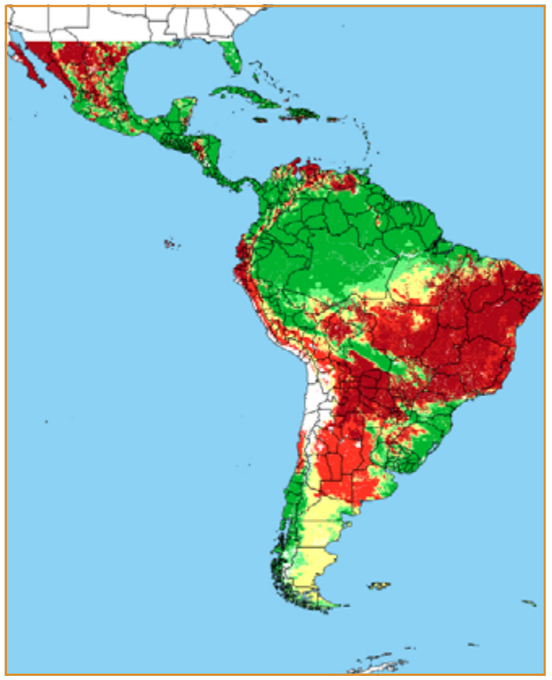
domingo, 23 de junho



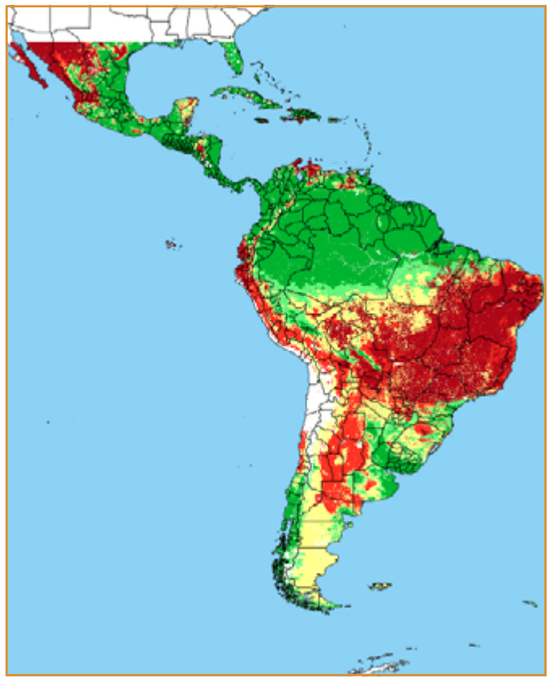
segunda-feira, 24 de junho



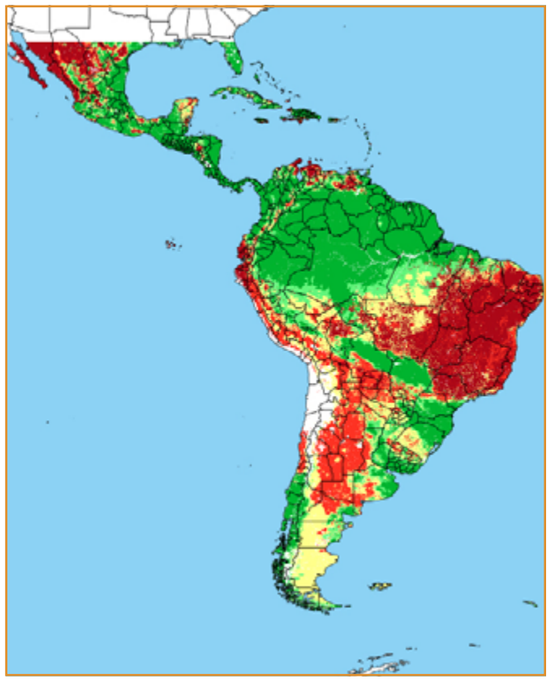
quinta-feira, 27 de junho



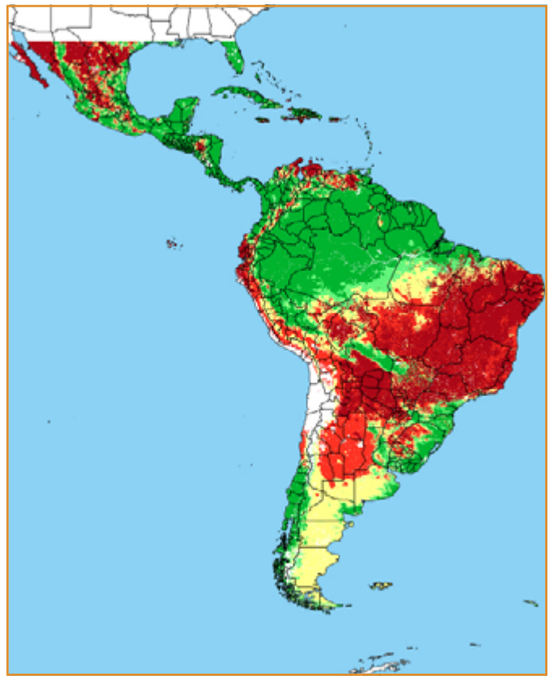
sexta-feira, 28 de junho



terça-feira, 25 de junho



quarta-feira, 26 de junho



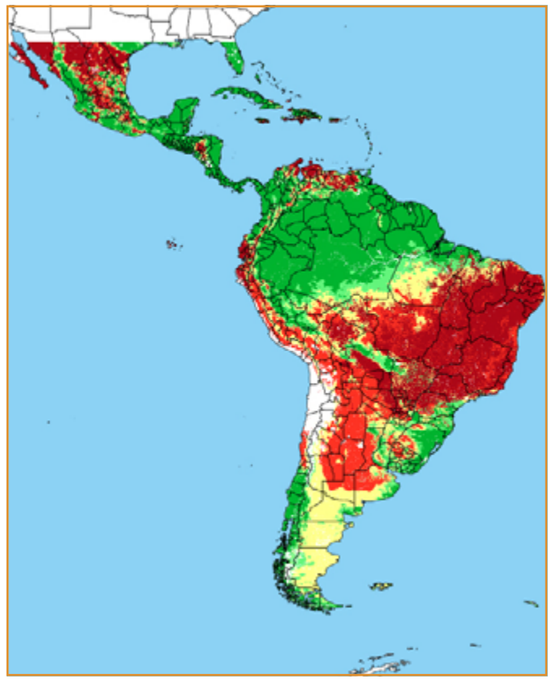
sábado, 29 de junho

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Médio
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Mínimo
Indeterminado

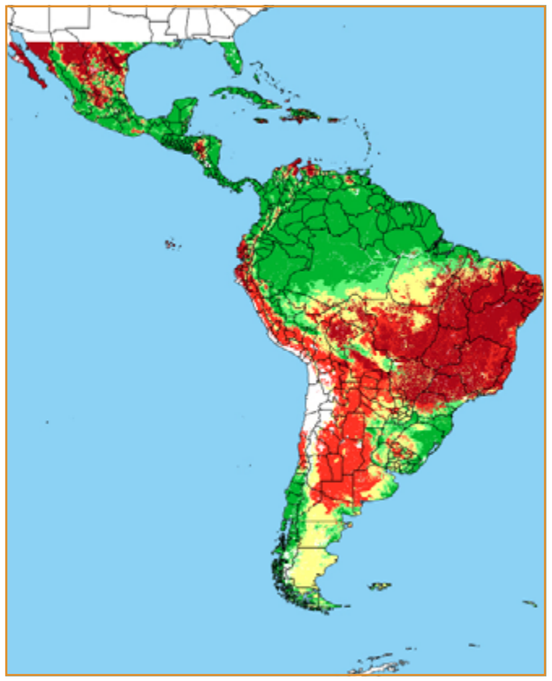
JUNHO / 2019

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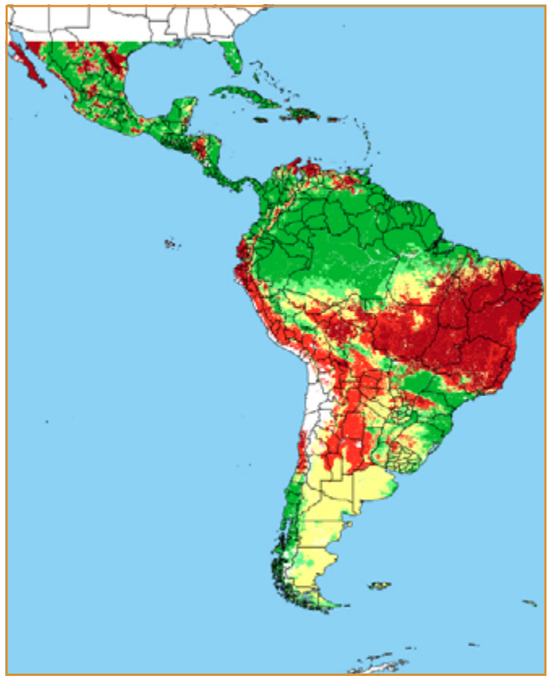
CALENDÁRIO JULIANO



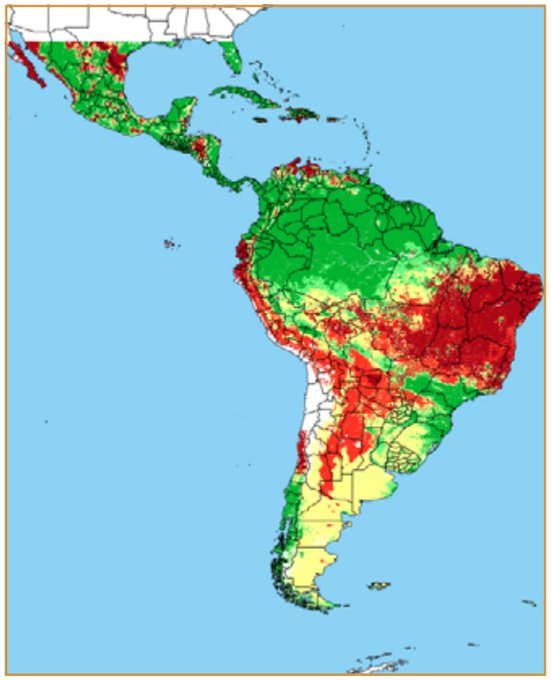
domingo, 30 de junho



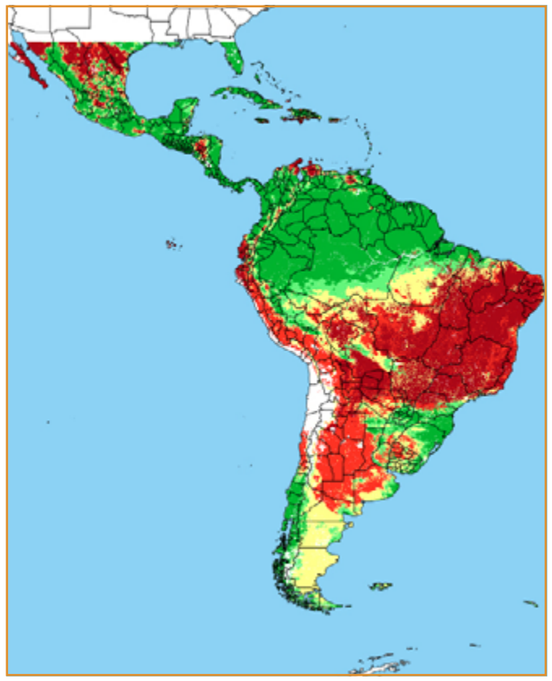
segunda-feira, 1 de julho



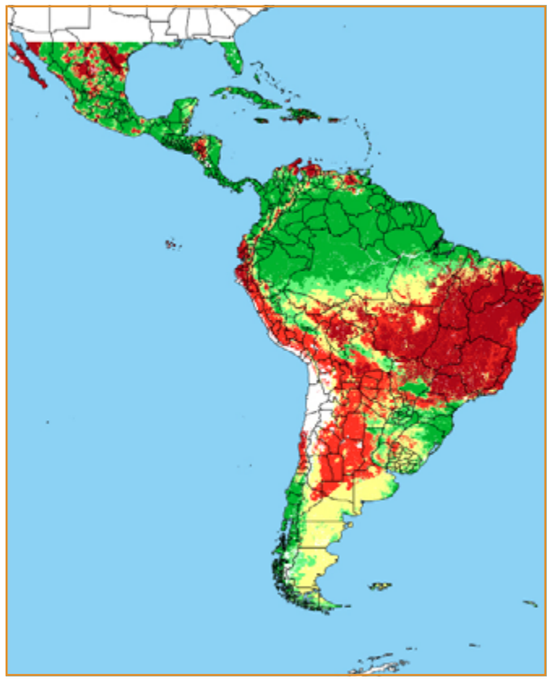
quinta-feira, 4 de julho



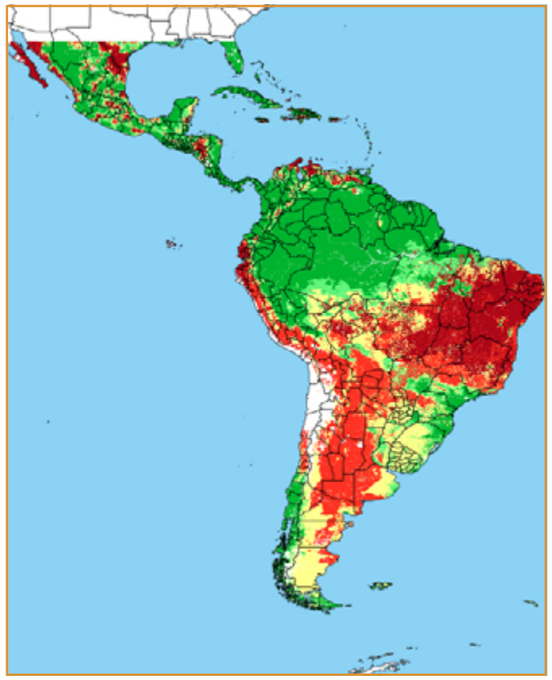
sexta-feira, 5 de julho



terça-feira, 2 de julho



quarta-feira, 3 de julho



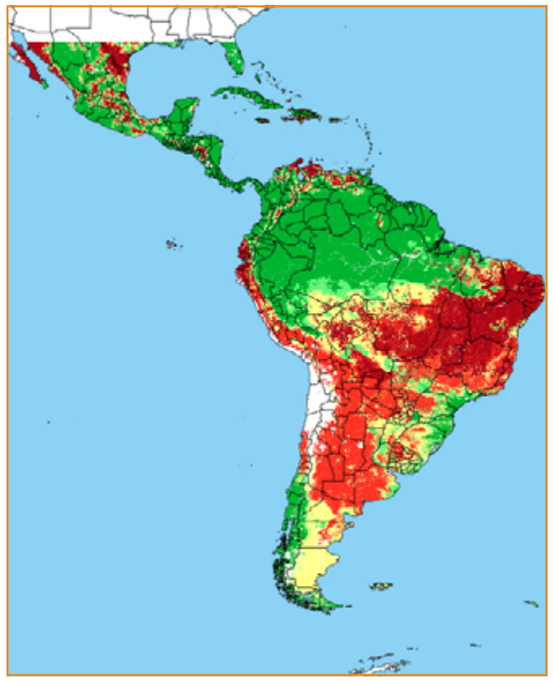
sábado, 6 de julho

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Alto
Médio
Baixo
Mínimo
Indeterminado

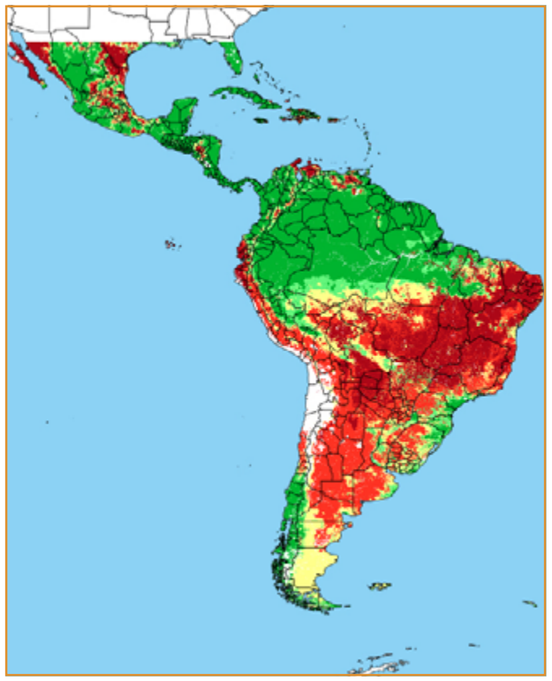
JULHO / 2019

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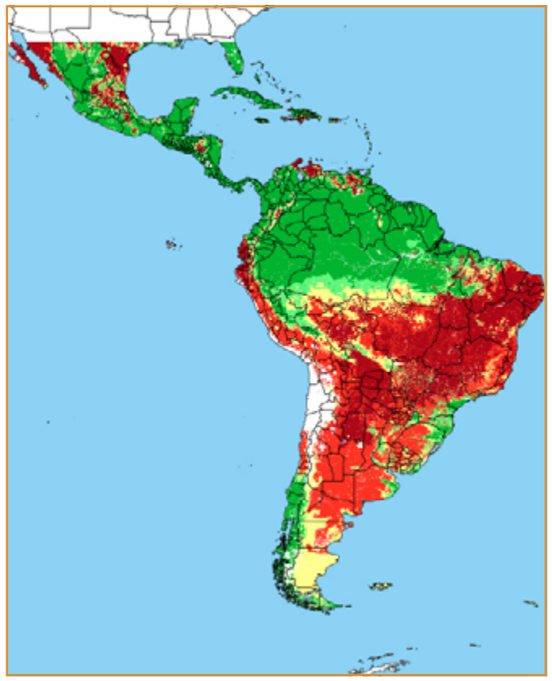
CALENDÁRIO JULIANO



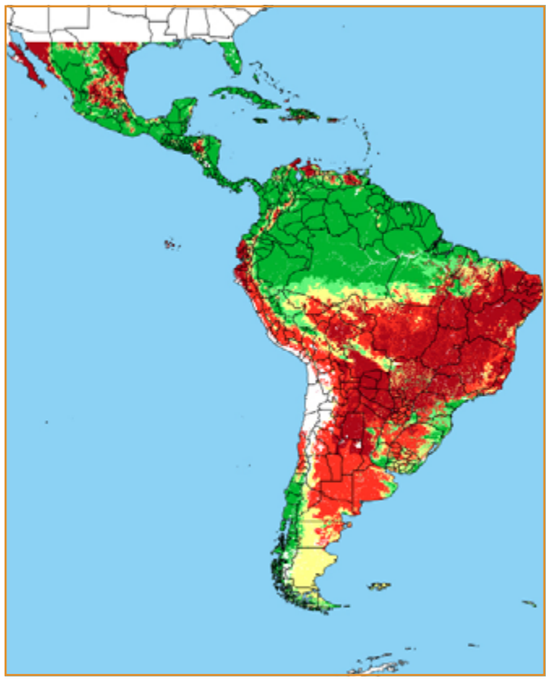
domingo, 7 de julho



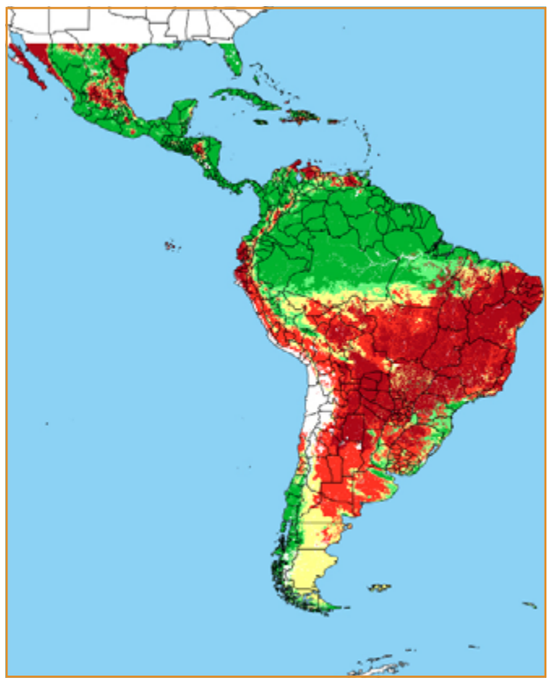
segunda-feira, 8 de julho



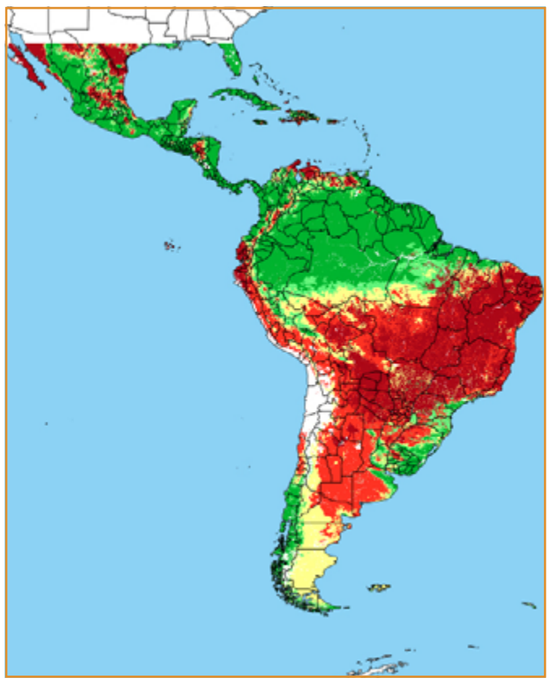
terça-feira, 9 de julho



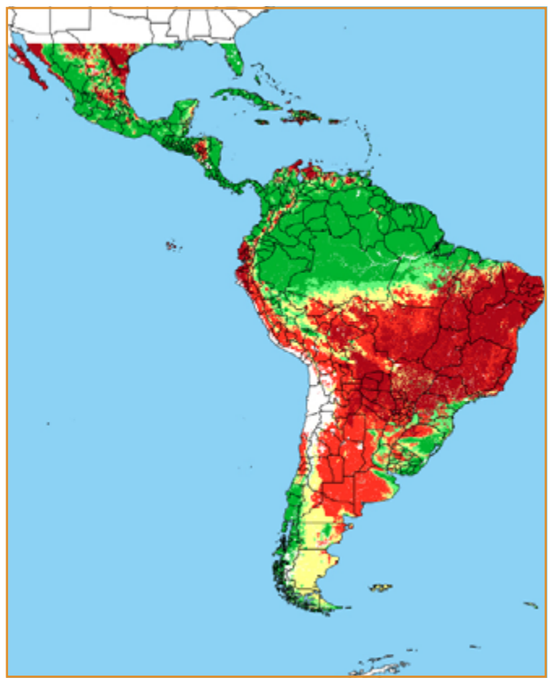
quarta-feira, 10 de julho



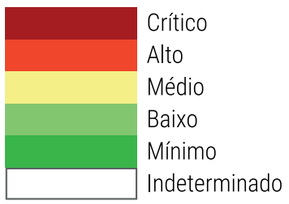
quinta-feira, 11 de julho



sexta-feira, 12 de julho



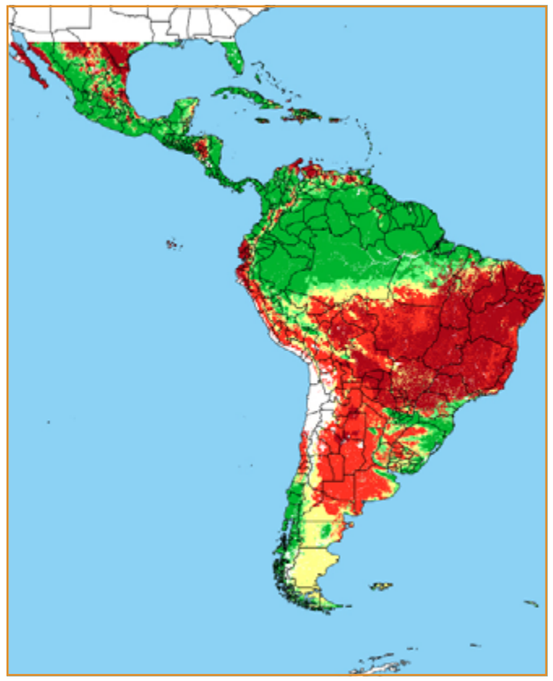
sábado, 13 de julho



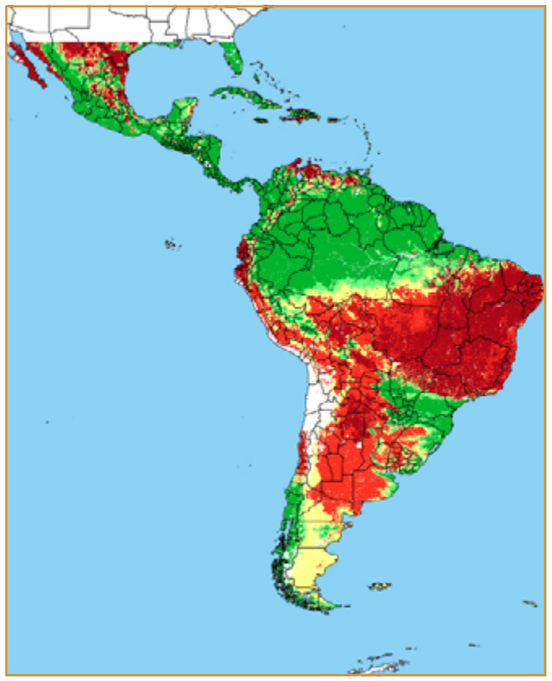
JULHO / 2019

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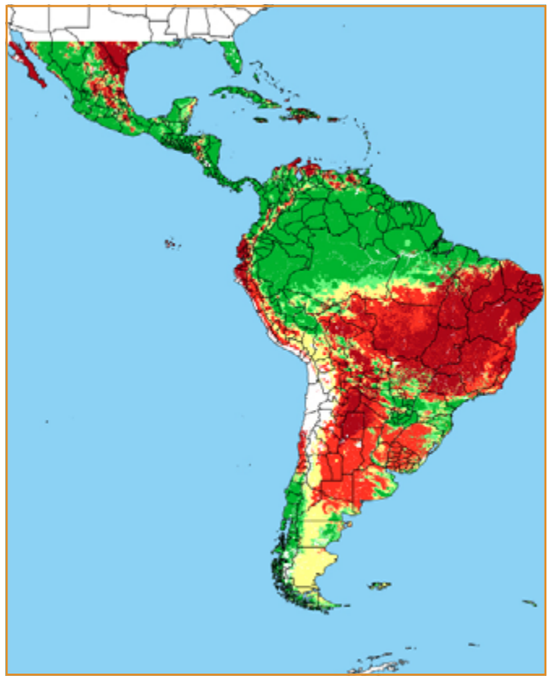
CALENDÁRIO JULIANO



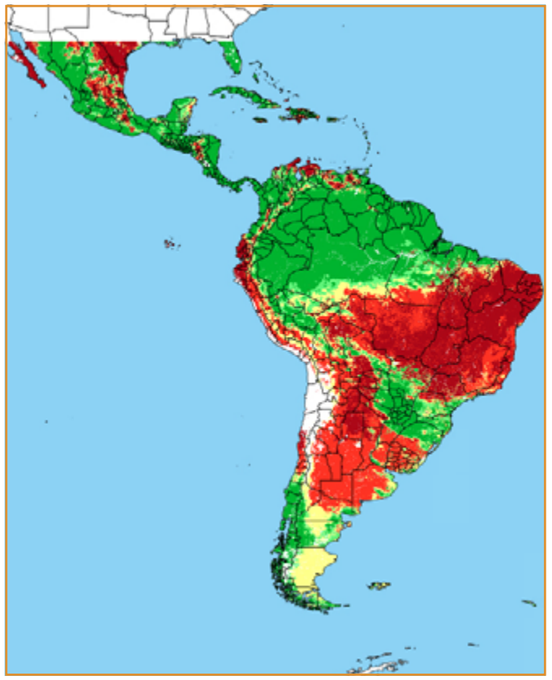
domingo, 14 de julho



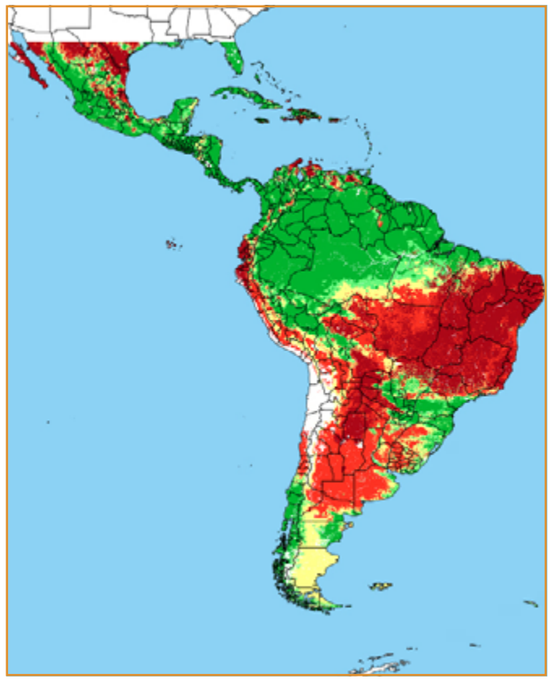
segunda-feira, 15 de julho



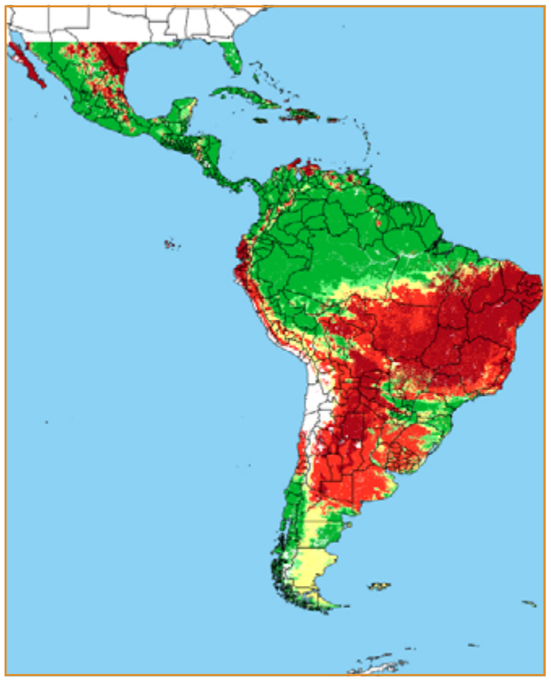
quinta-feira, 18 de julho



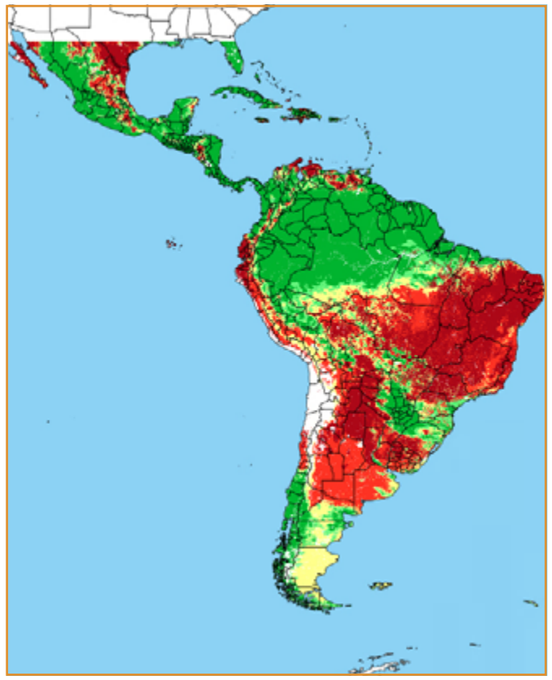
sexta-feira, 19 de julho



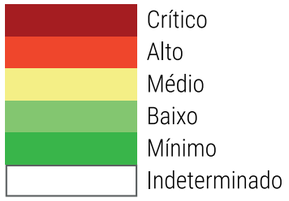
terça-feira, 16 de julho



quarta-feira, 17 de julho



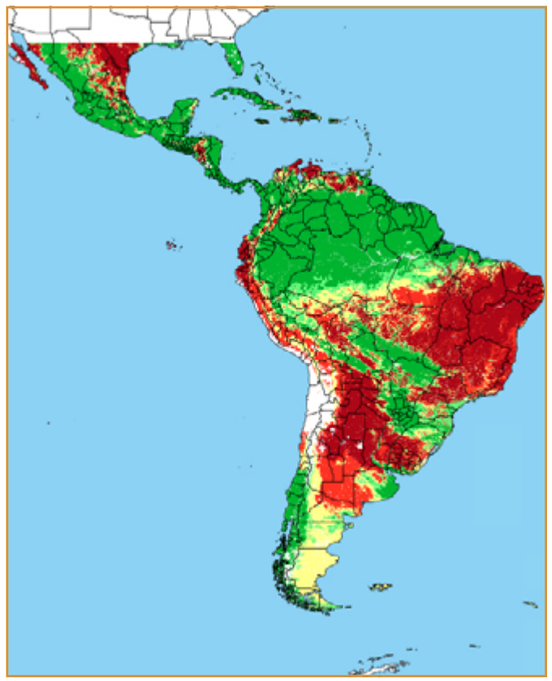
sábado, 20 de julho



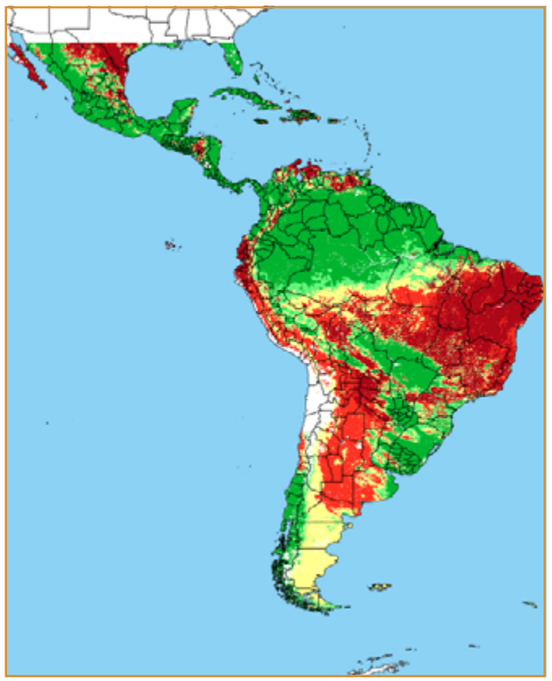
JULHO / 2019

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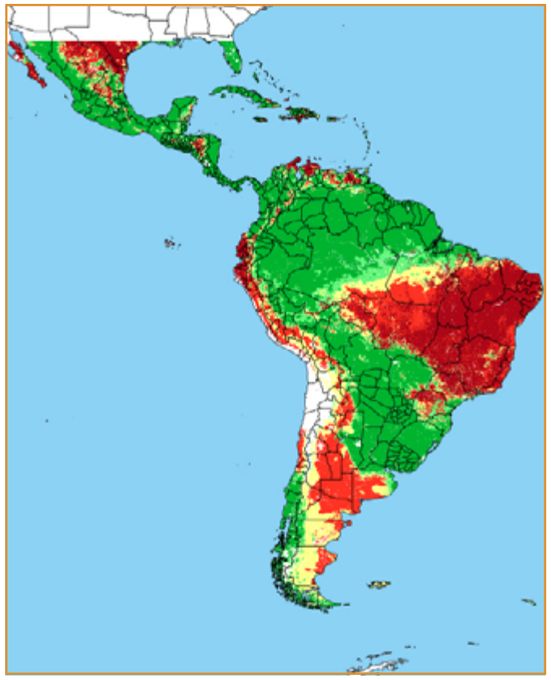
CALENDÁRIO JULIANO



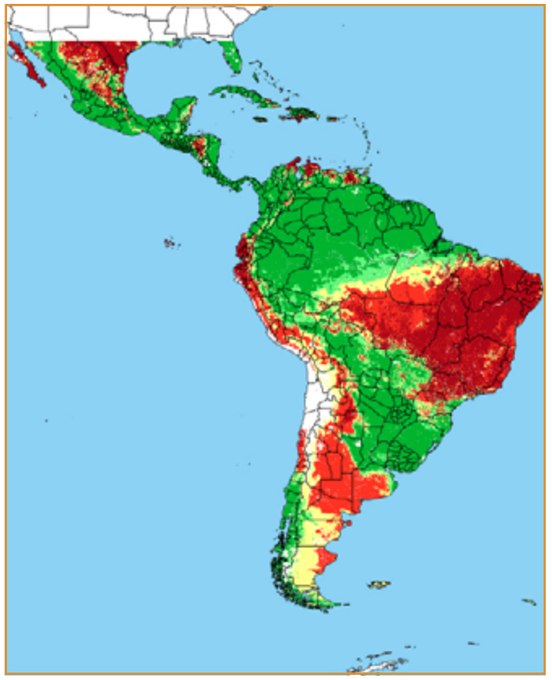
domingo, 21 de julho



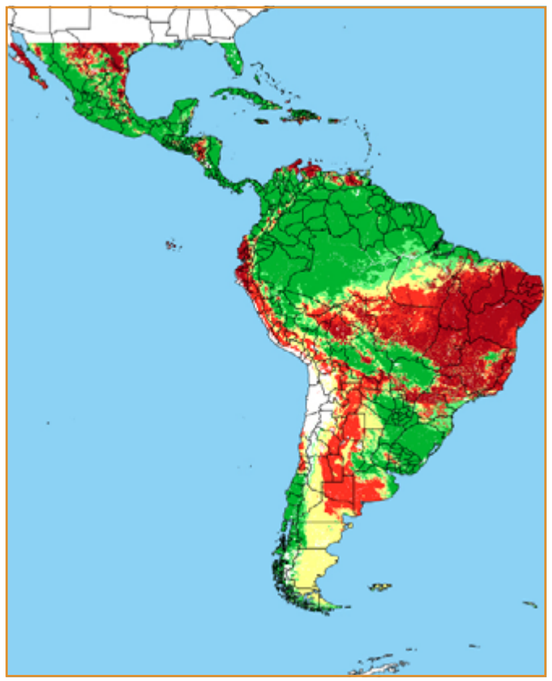
segunda-feira, 22 de julho



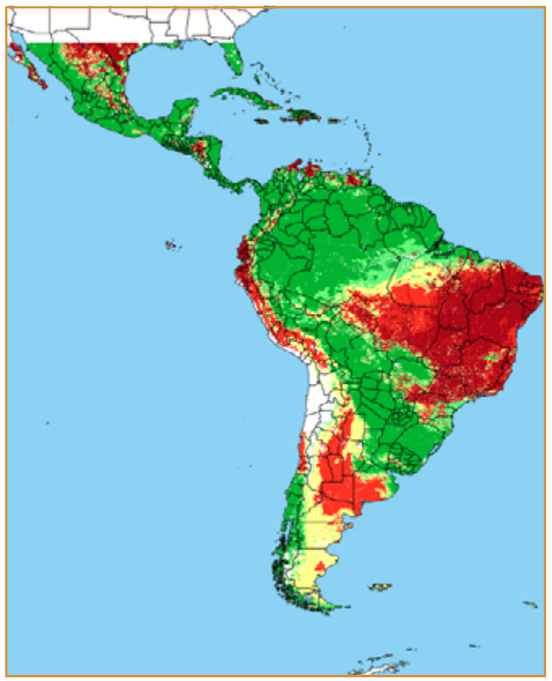
quinta-feira, 25 de julho



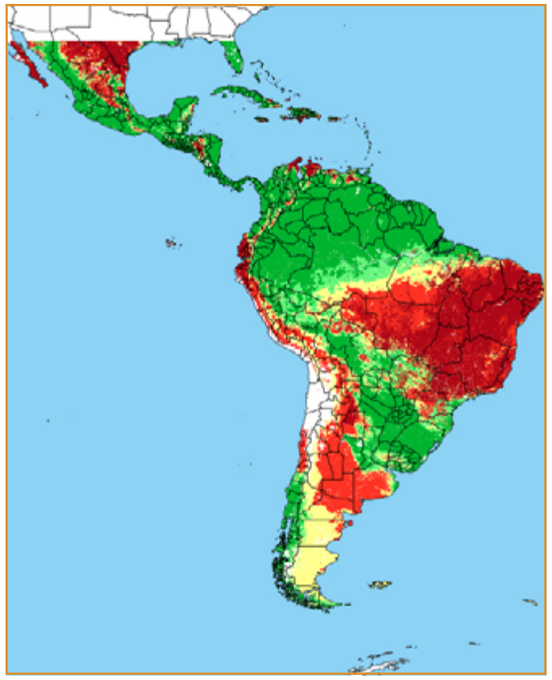
sexta-feira, 26 de julho



terça-feira, 23 de julho



quarta-feira, 24 de julho



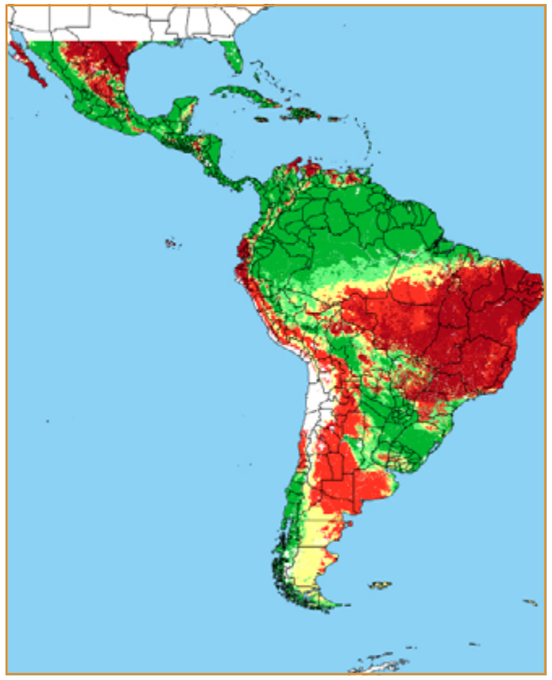
sábado, 27 de julho

Crítico
Alto
Médio
Baixo
Mínimo
Indeterminado

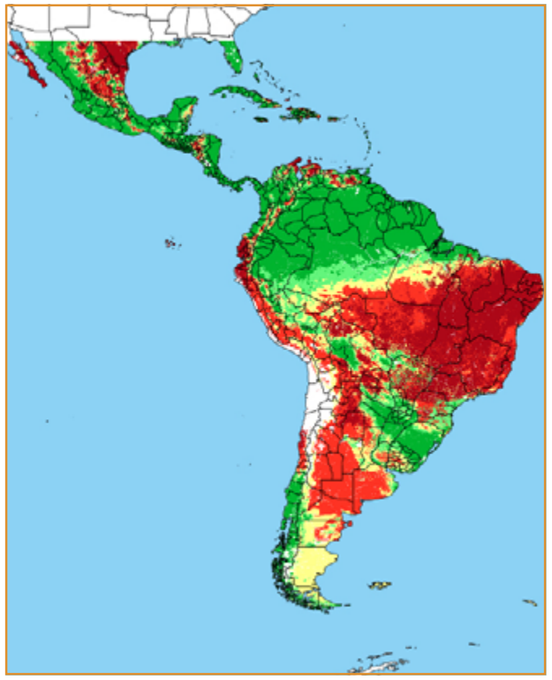
JULHO / 2019

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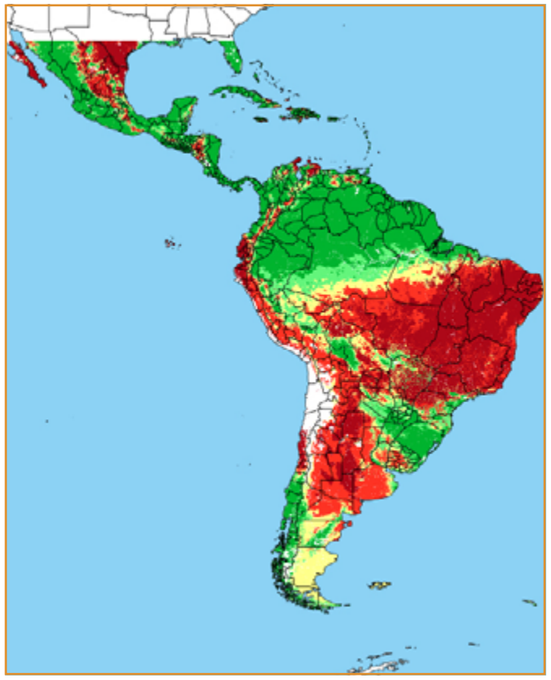
CALENDÁRIO JULIANO



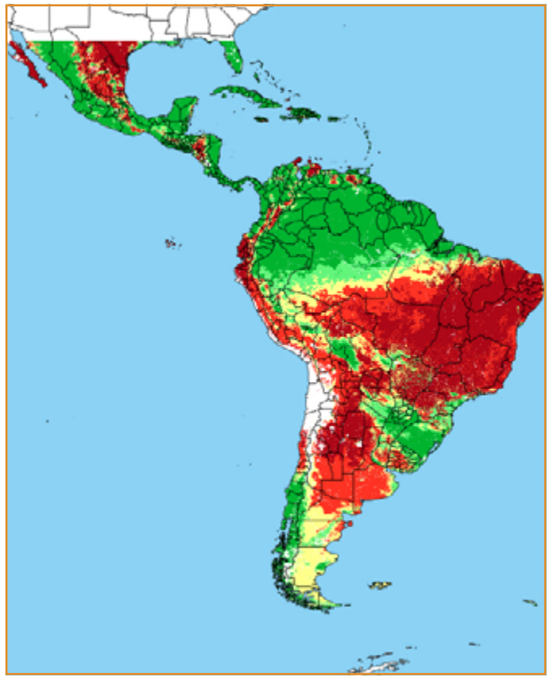
domingo, 28 de julho



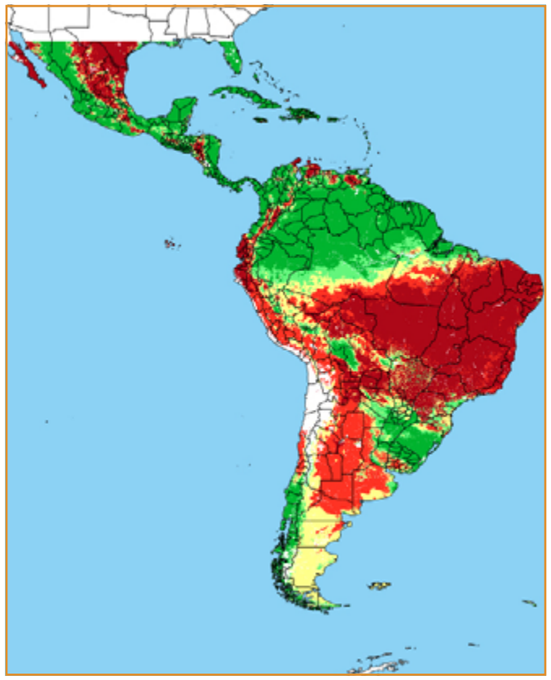
segunda-feira, 29 de julho



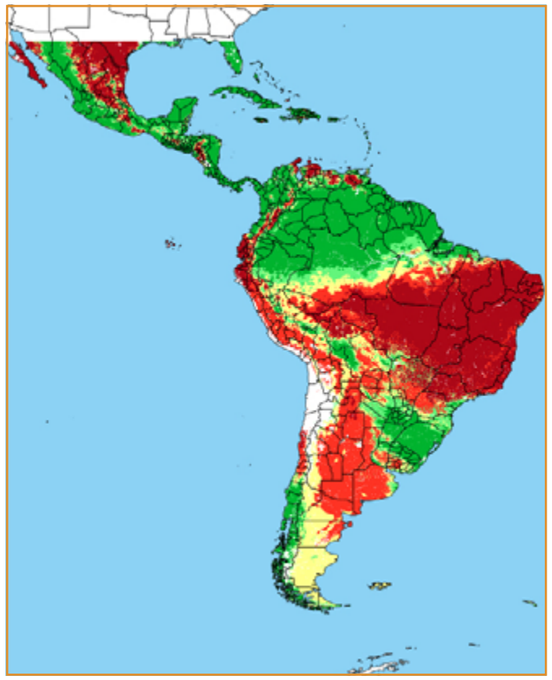
terça-feira, 30 de julho



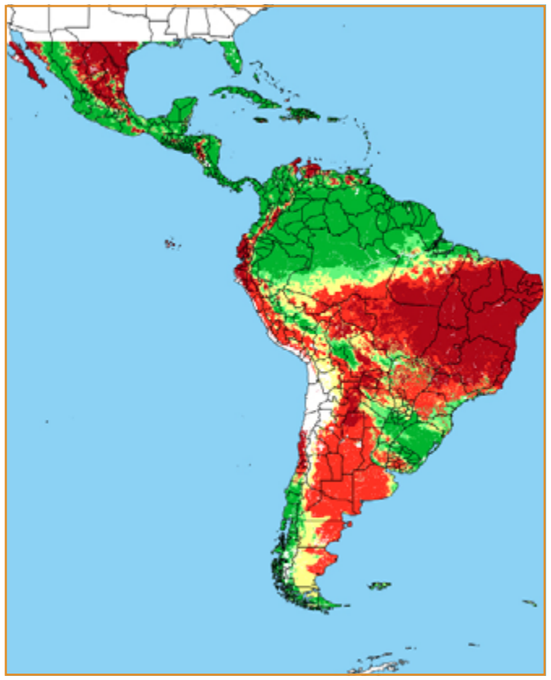
quarta-feira, 31 de julho



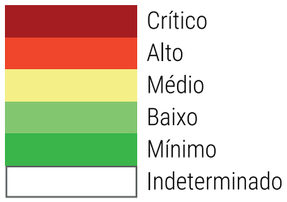
quinta-feira, 1 de agosto



sexta-feira, 2 de agosto



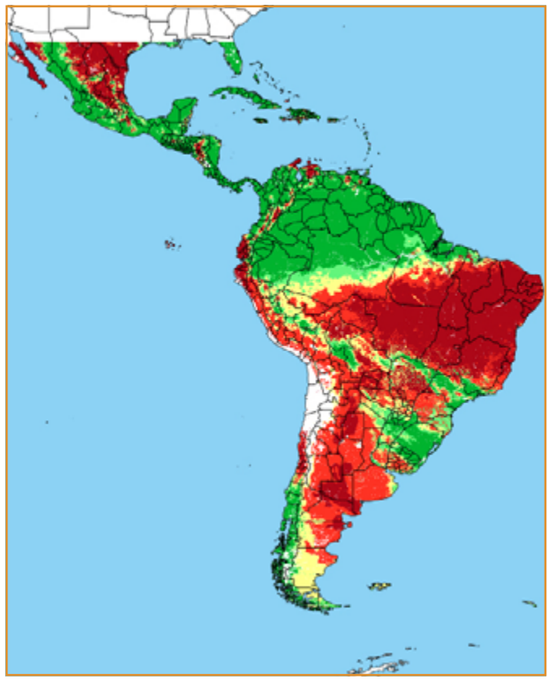
sábado, 3 de agosto



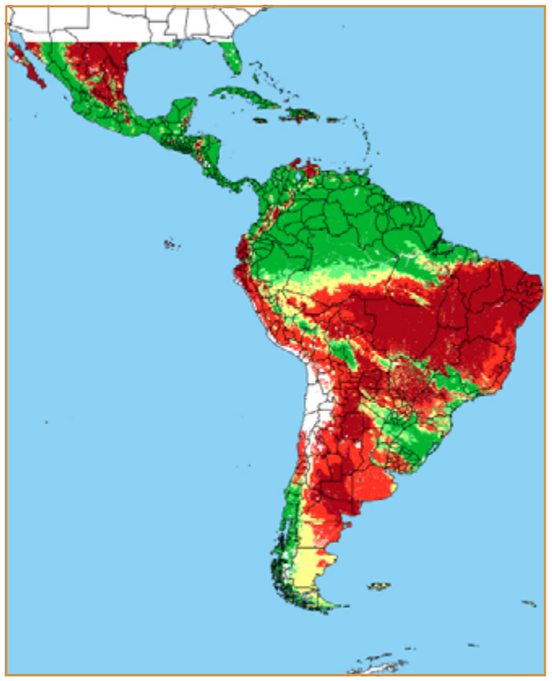
JULHO / 2019

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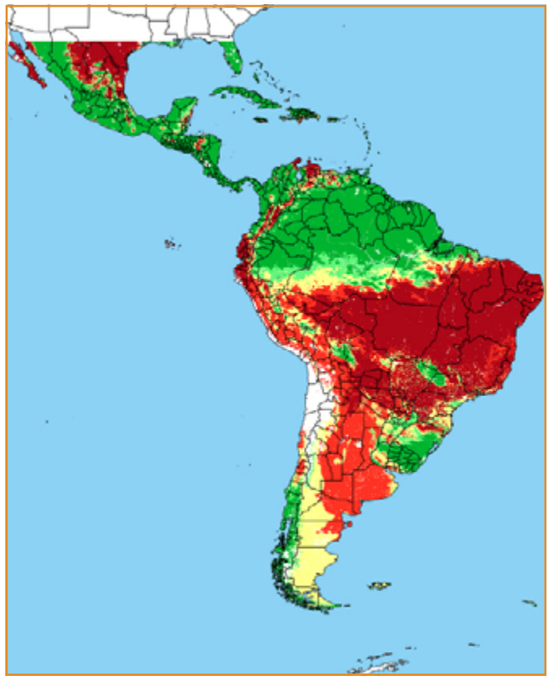
CALENDÁRIO JULIANO



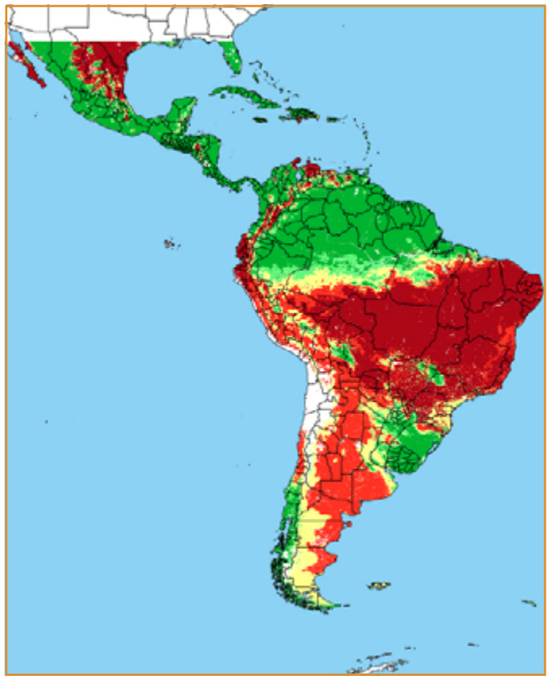
domingo, 4 de agosto



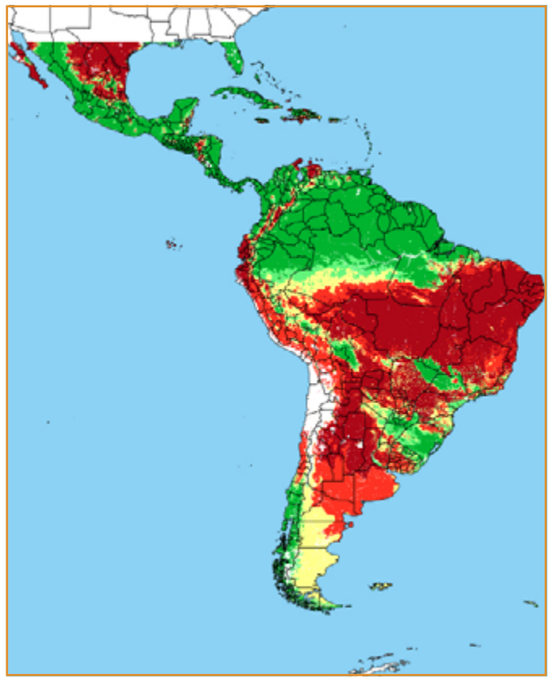
segunda-feira, 5 de agosto



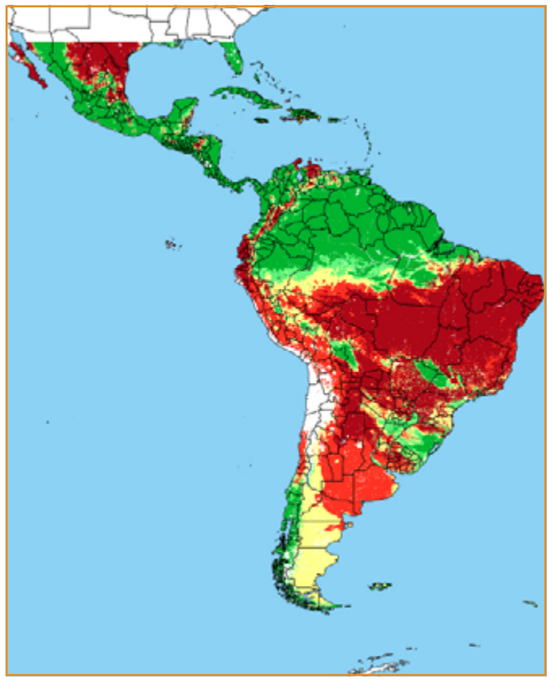
quinta-feira, 8 de agosto



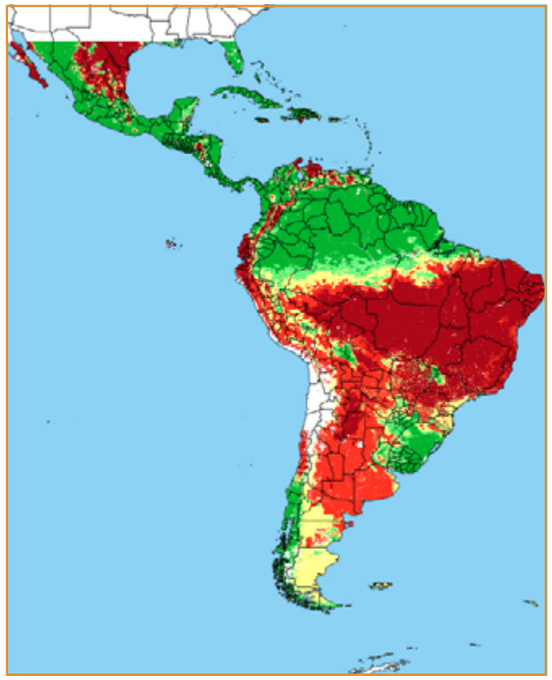
sexta-feira, 9 de agosto



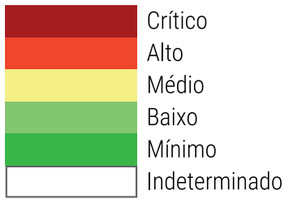
terça-feira, 6 de agosto



quarta-feira, 7 de agosto



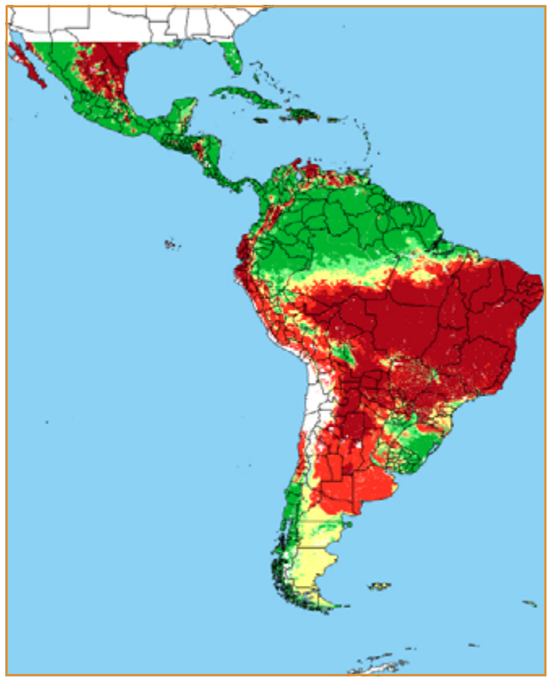
sábado, 10 de agosto



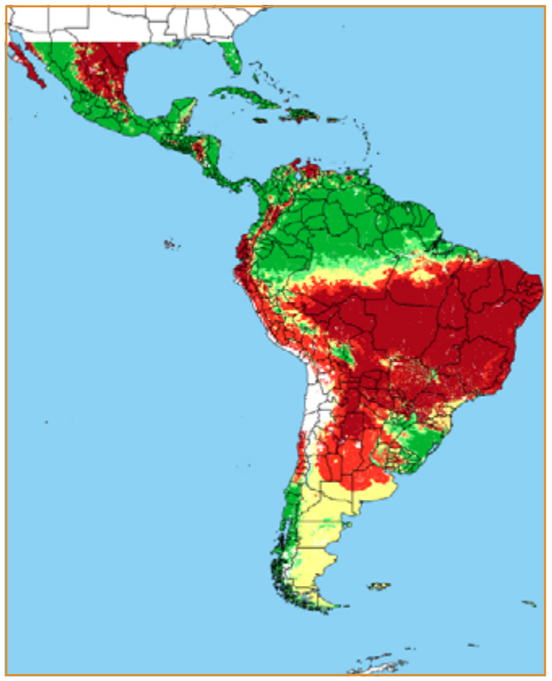
AGOSTO / 2019

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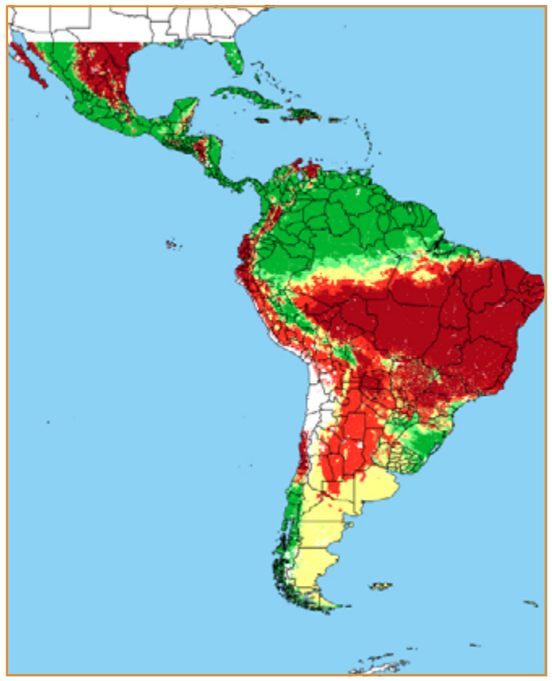
CALENDÁRIO JULIANO



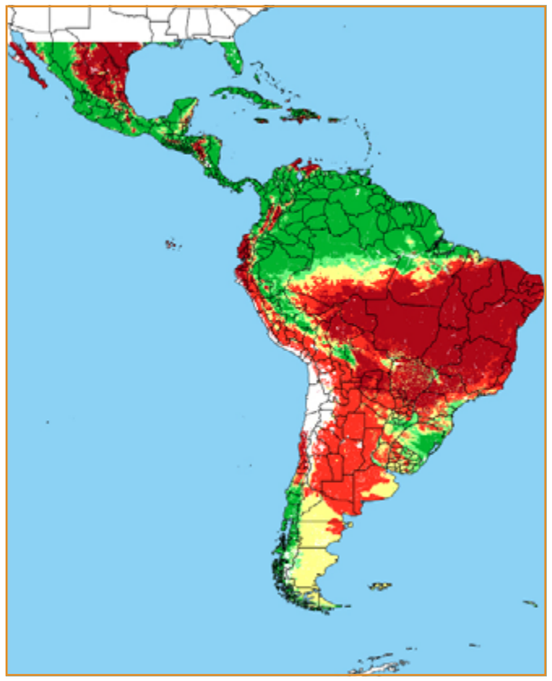
domingo, 11 de agosto



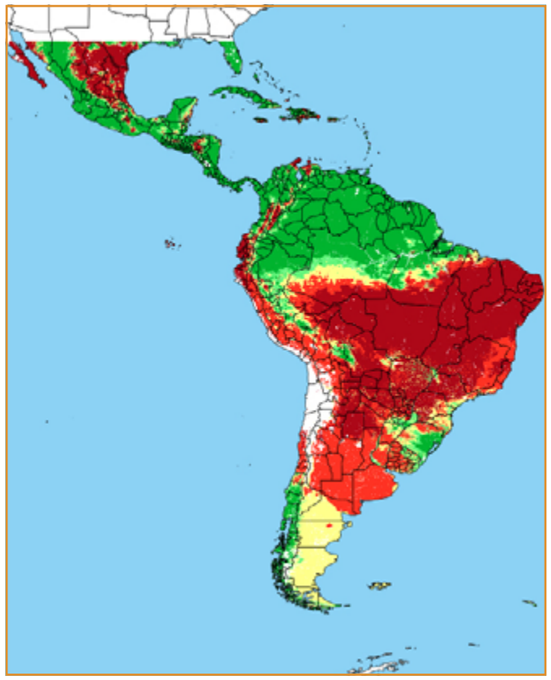
segunda-feira, 12 de agosto



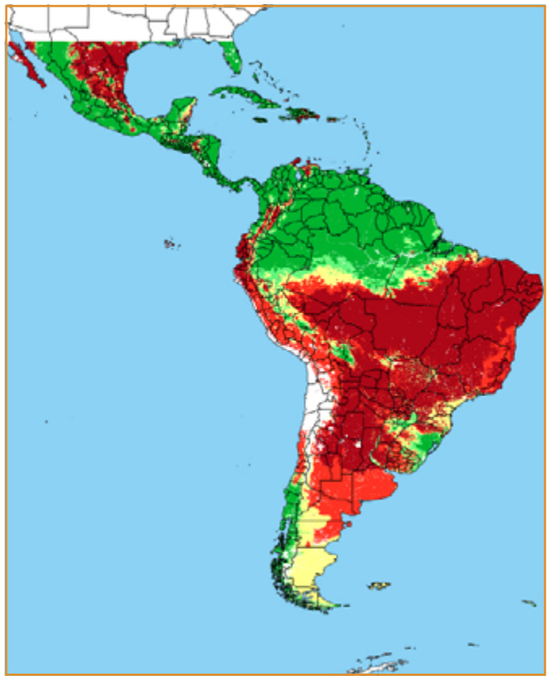
terça-feira, 13 de agosto



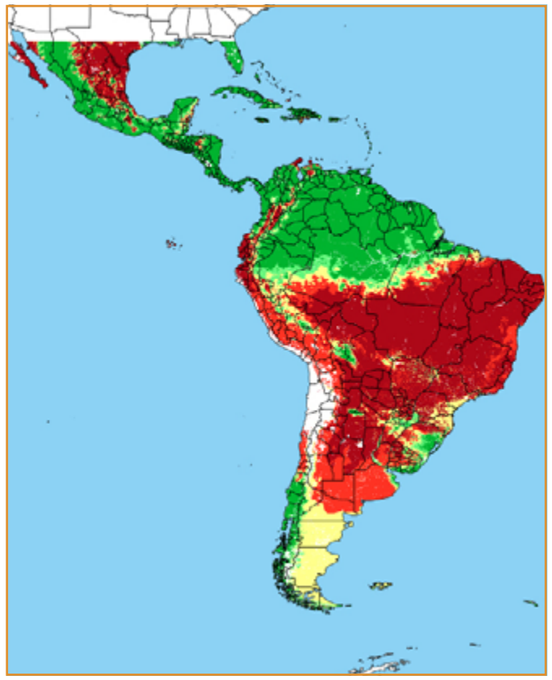
quarta-feira, 14 de agosto



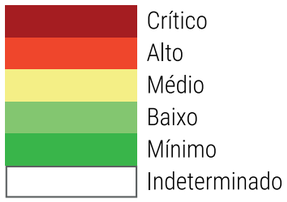
quinta-feira, 15 de agosto



sexta-feira, 16 de agosto



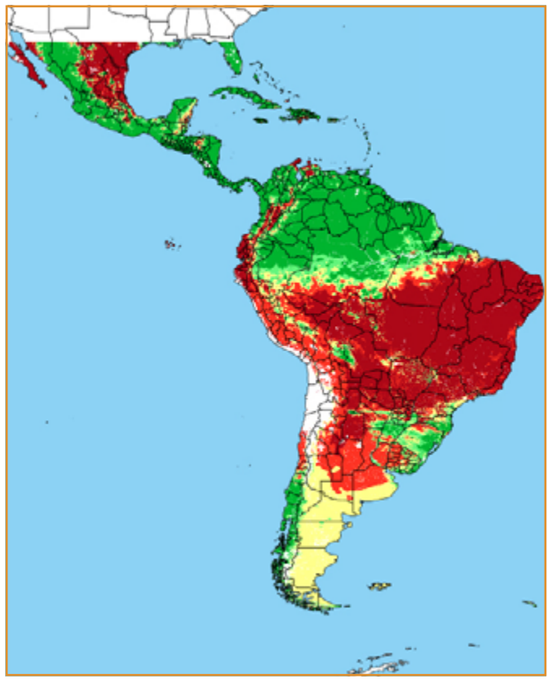
sábado, 17 de agosto



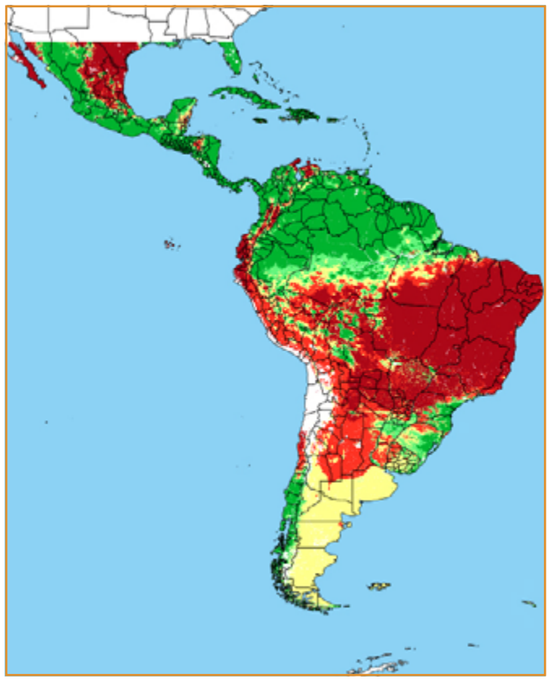
AGOSTO / 2019

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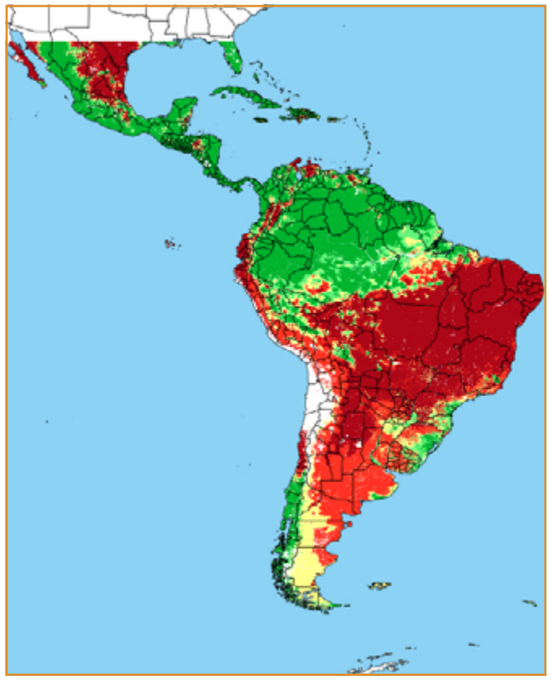
CALENDÁRIO JULIANO



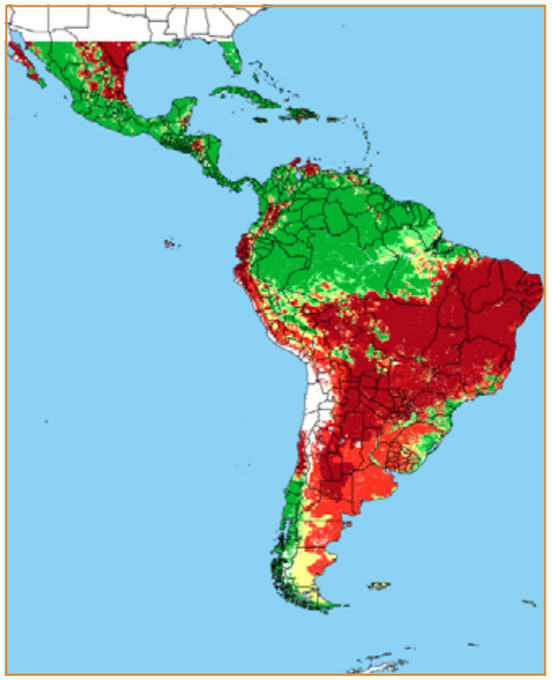
domingo, 18 de agosto



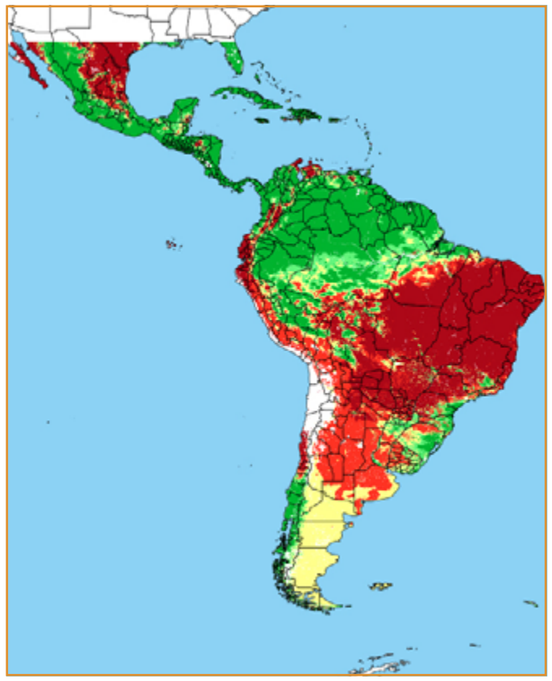
segunda-feira, 19 de agosto



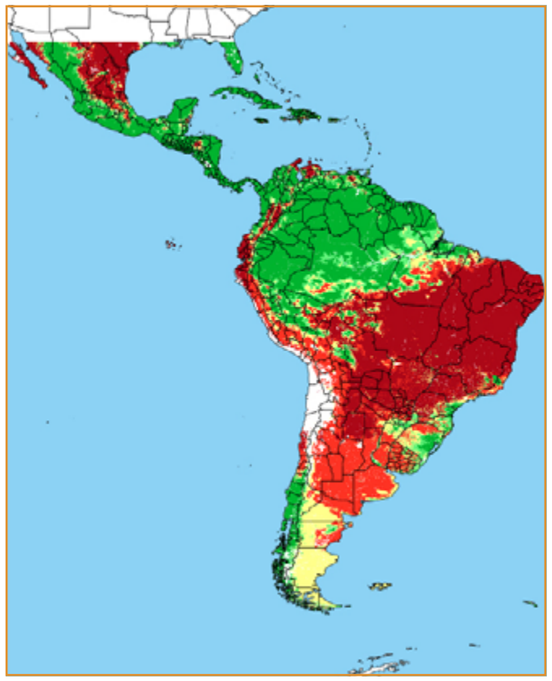
quinta-feira, 22 de agosto



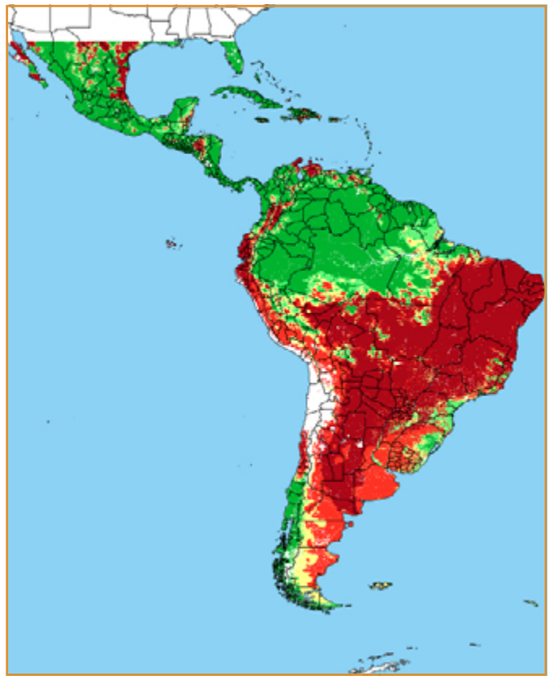
sexta-feira, 23 de agosto



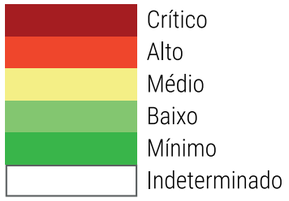
terça-feira, 20 de agosto



quarta-feira, 21 de agosto



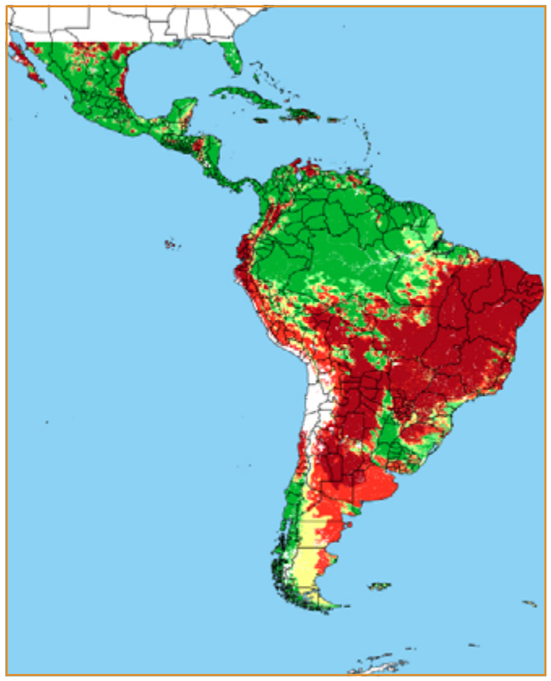
sábado, 24 de agosto



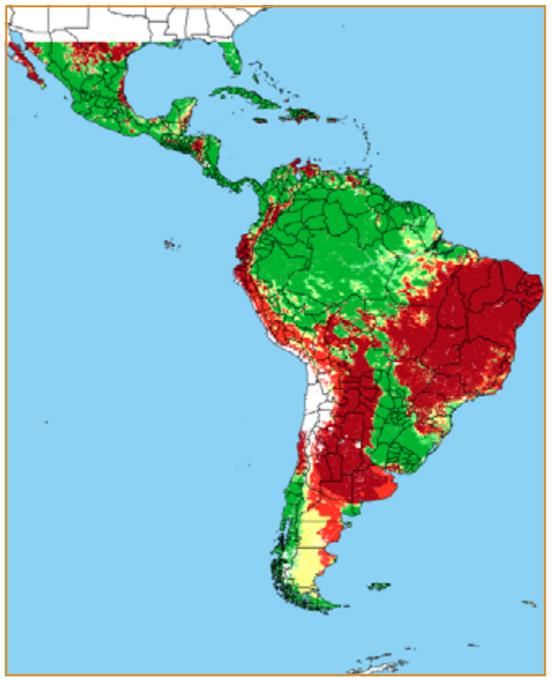
AGOSTO / 2019

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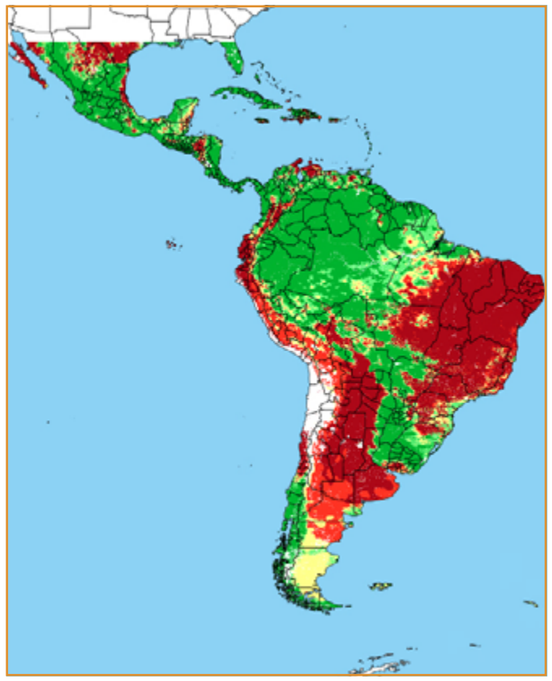
CALENDÁRIO JULIANO



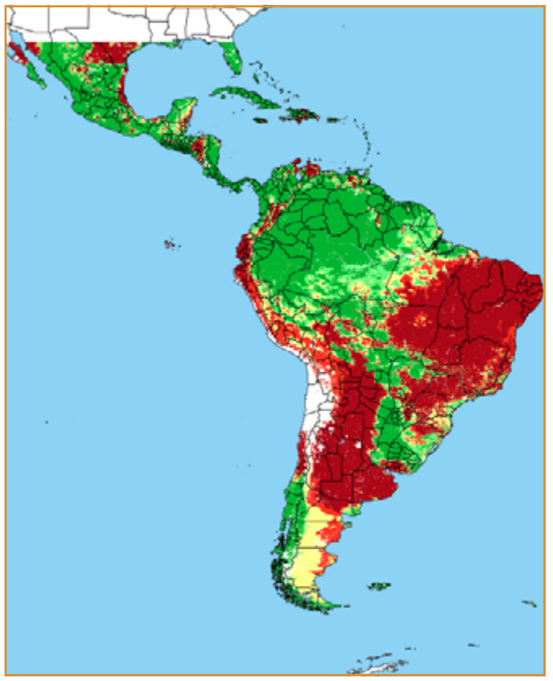
domingo, 25 de agosto



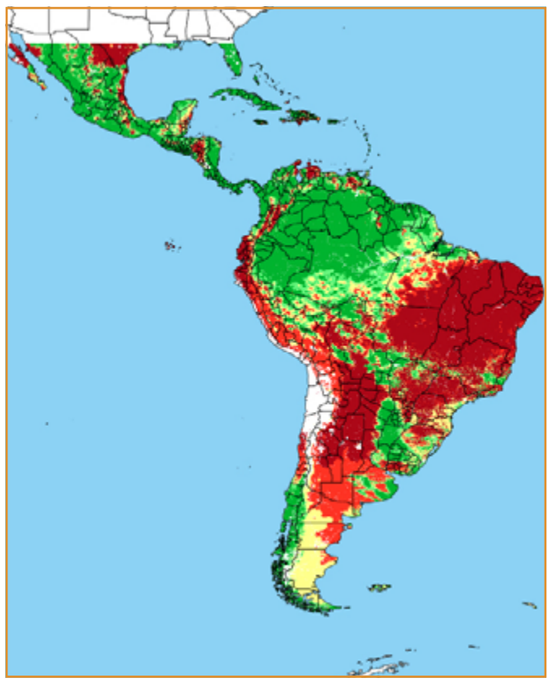
segunda-feira, 26 de agosto



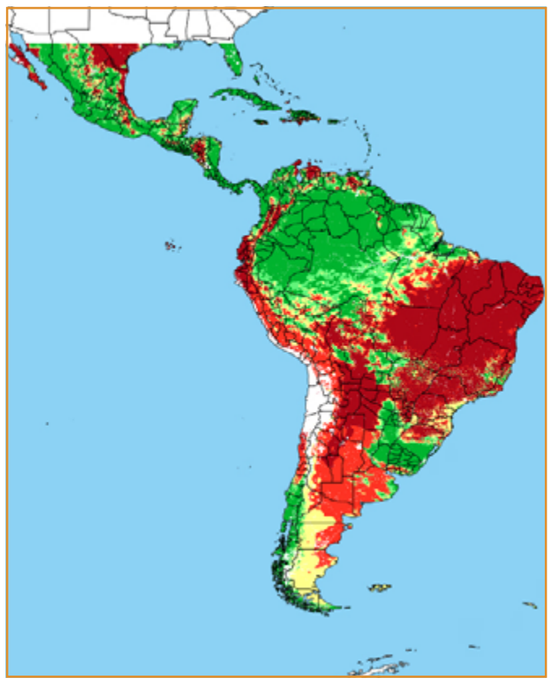
terça-feira, 27 de agosto



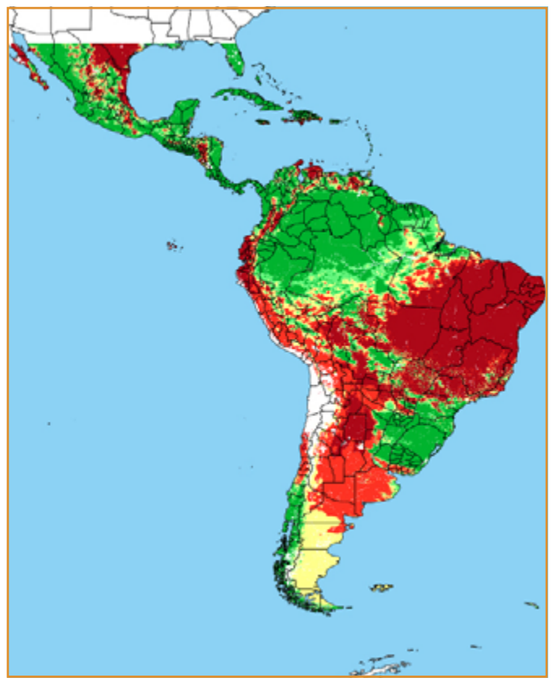
quarta-feira, 28 de agosto



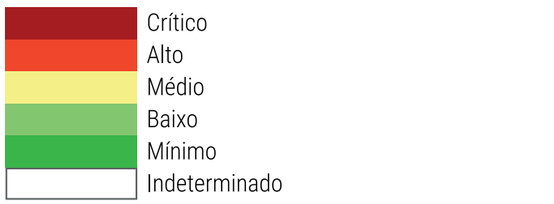
quinta-feira, 29 de agosto



sexta-feira, 30 de agosto



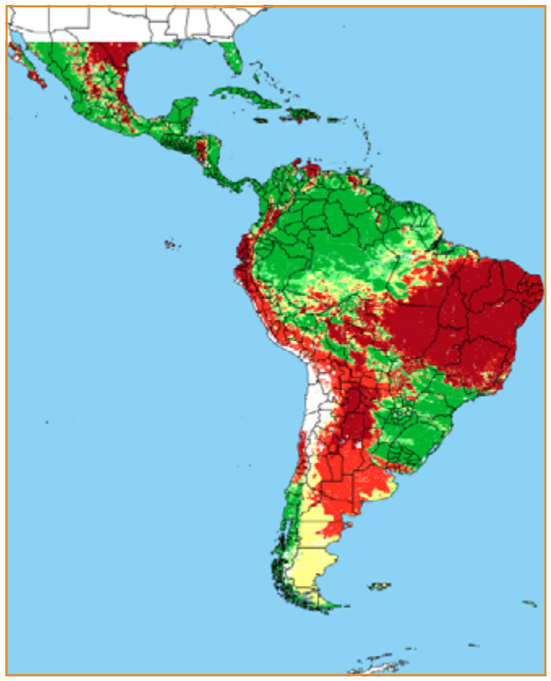
sábado, 31 de agosto



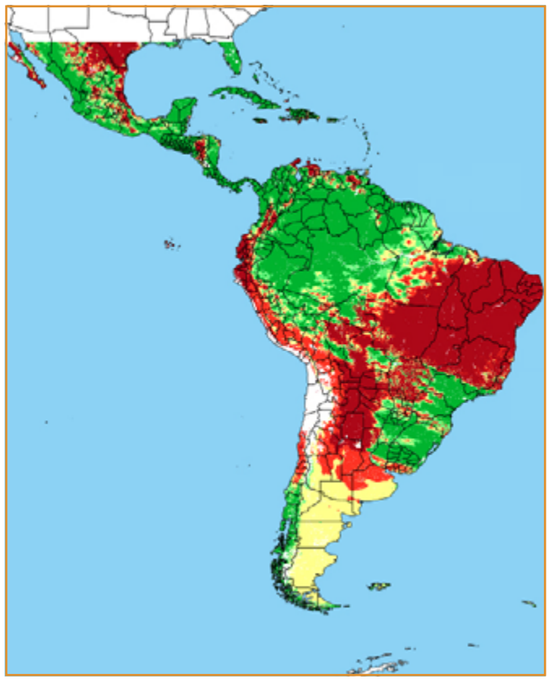
AGOSTO / 2019

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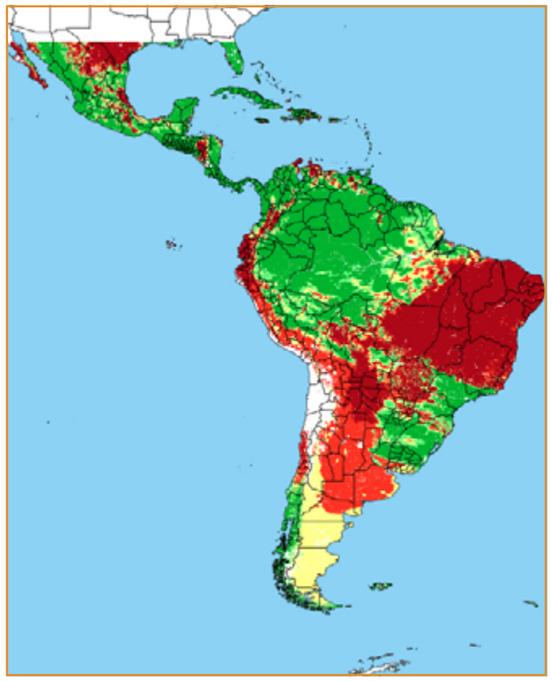
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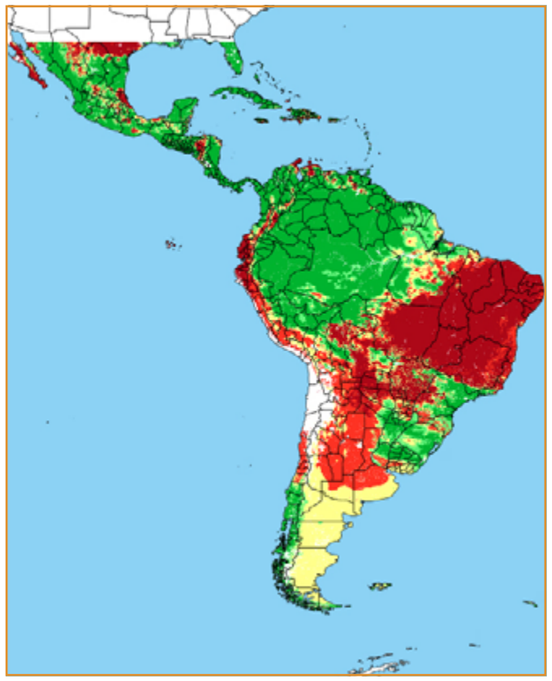
domingo, 1 de setembro



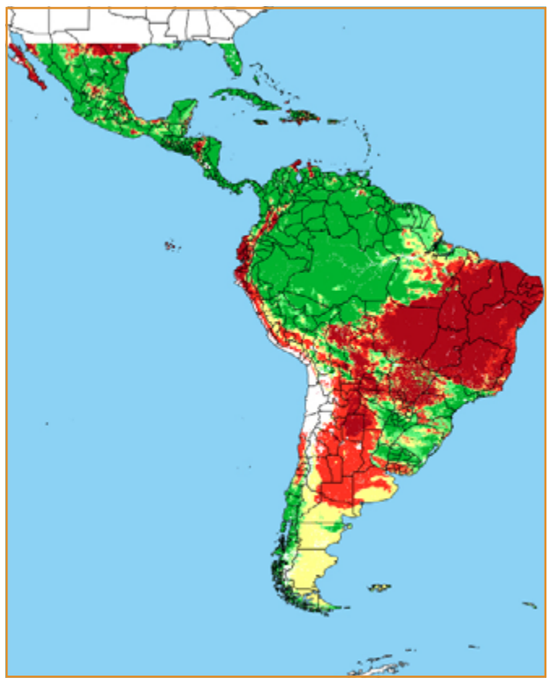
segunda-feira, 2 de setembro



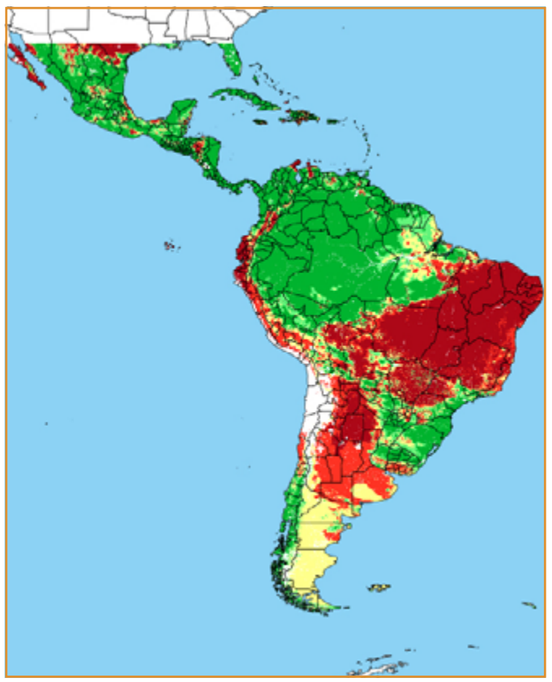
terça-feira, 3 de setembro



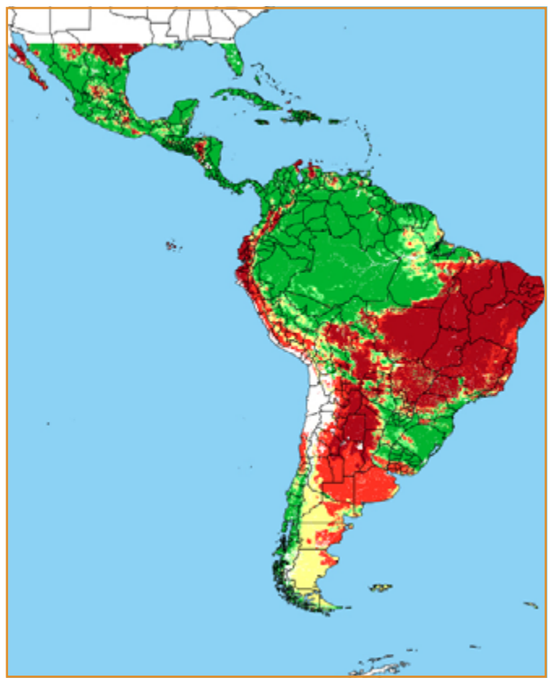
quarta-feira, 4 de setembro



quinta-feira, 5 de setembro



sexta-feira, 6 de setembro



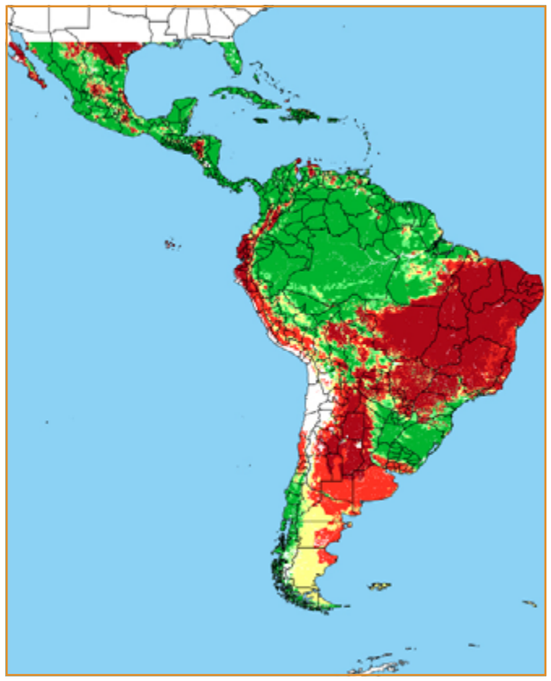
sábado, 7 de setembro



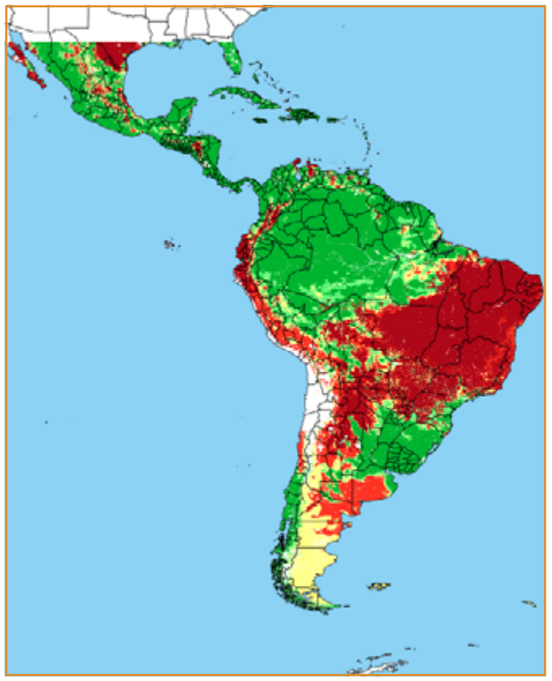
SETEMBRO / 2019

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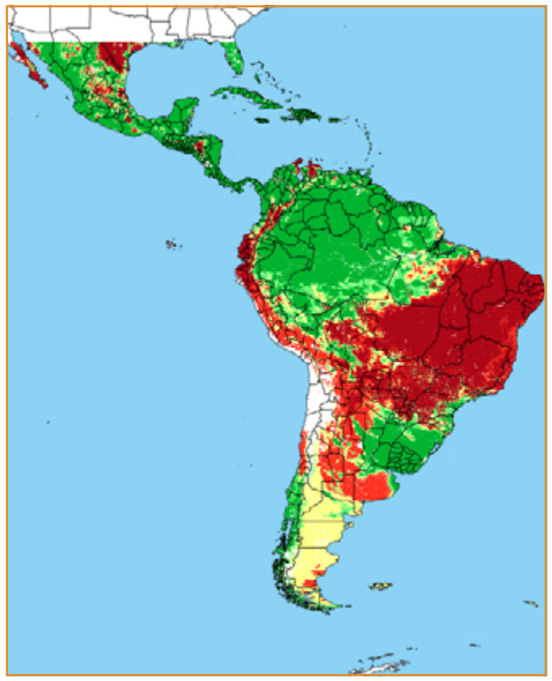
CALENDÁRIO JULIANO



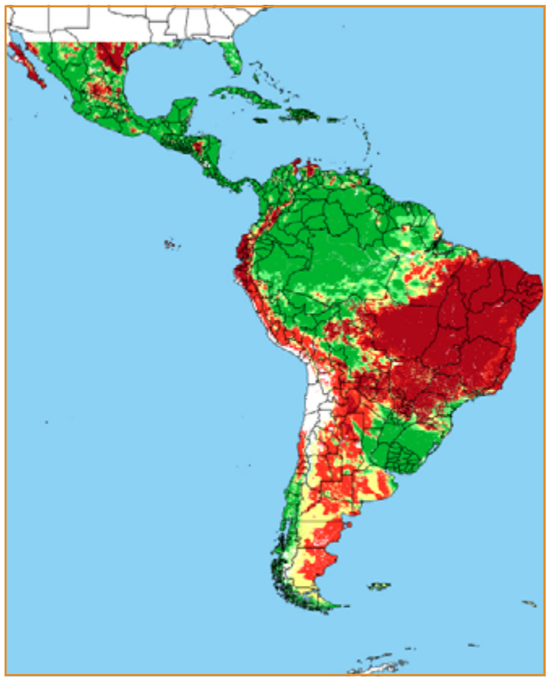
domingo, 8 de setembro



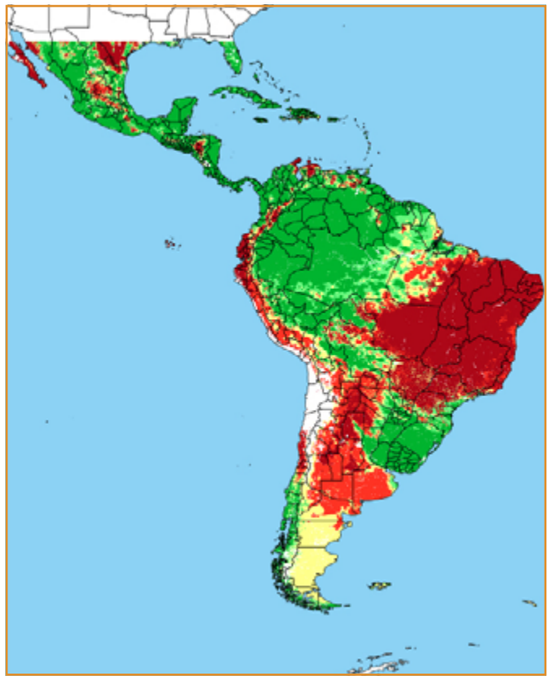
segunda-feira, 9 de setembro



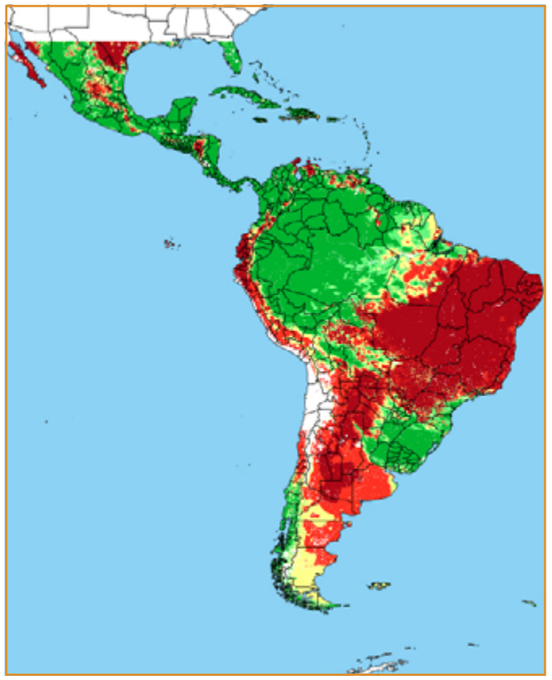
terça-feira, 10 de setembro



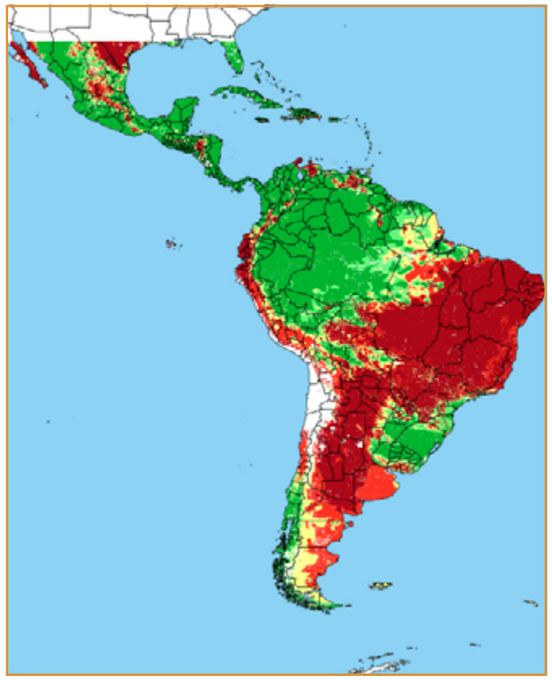
quarta-feira, 11 de setembro



quinta-feira, 12 de setembro



sexta-feira, 13 de setembro



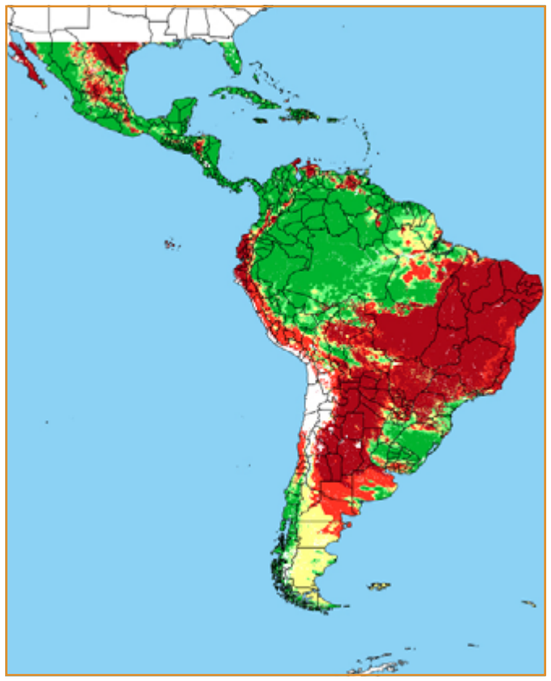
sábado, 14 de setembro

Crítico
Alto
Médio
Baixo
Mínimo
Indeterminado

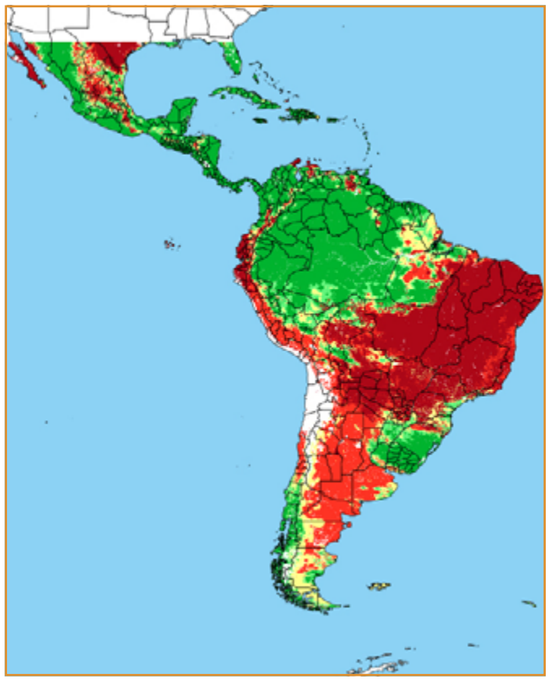
SETEMBRO / 2019

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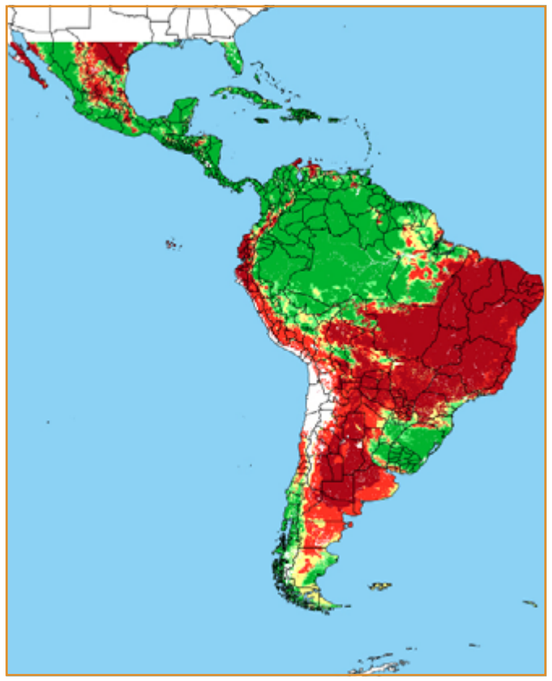
CALENDÁRIO JULIANO



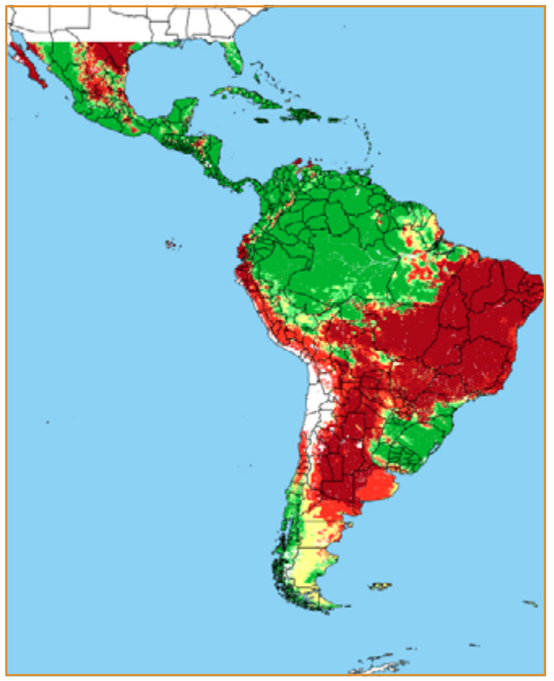
domingo, 15 de setembro



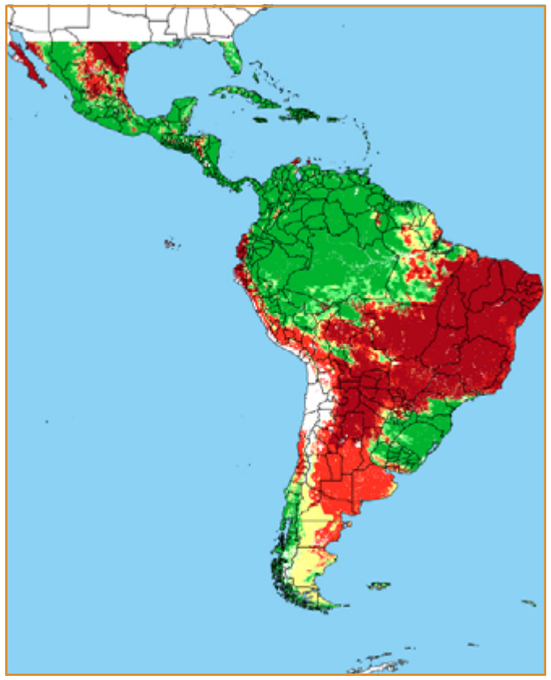
segunda-feira, 16 de setembro



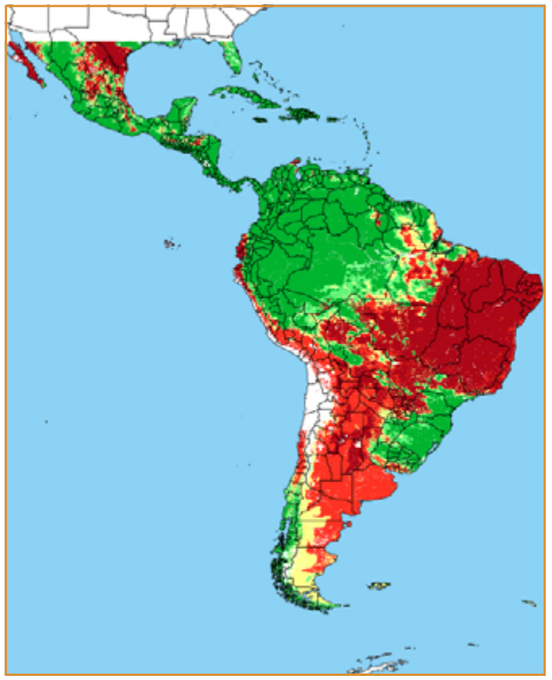
terça-feira, 17 de setembro



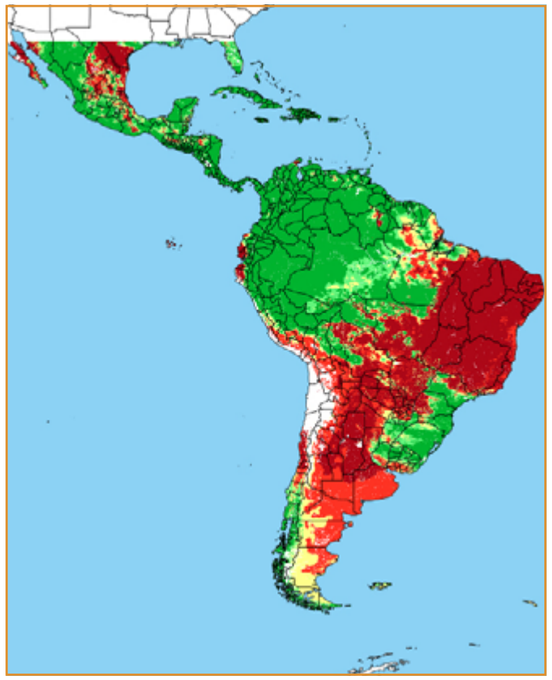
quarta-feira, 18 de setembro



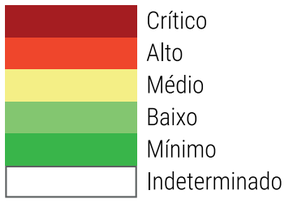
quinta-feira, 19 de setembro



sexta-feira, 20 de setembro



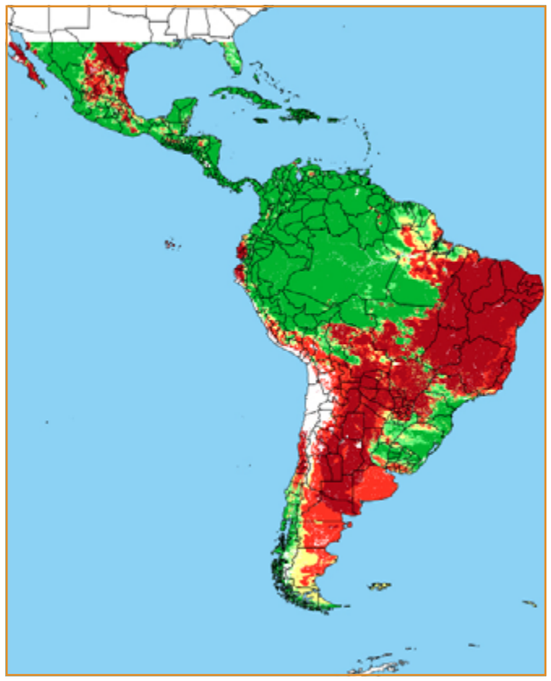
sábado, 21 de setembro



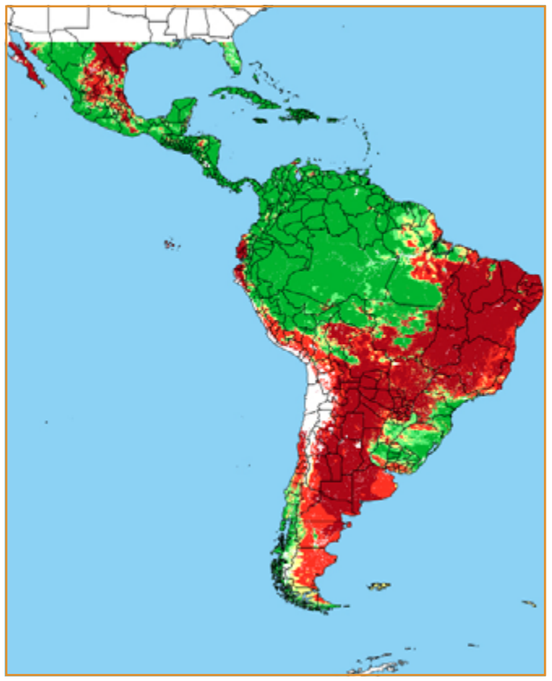
SETEMBRO / 2019

D	S	T	Q	Q	S	S
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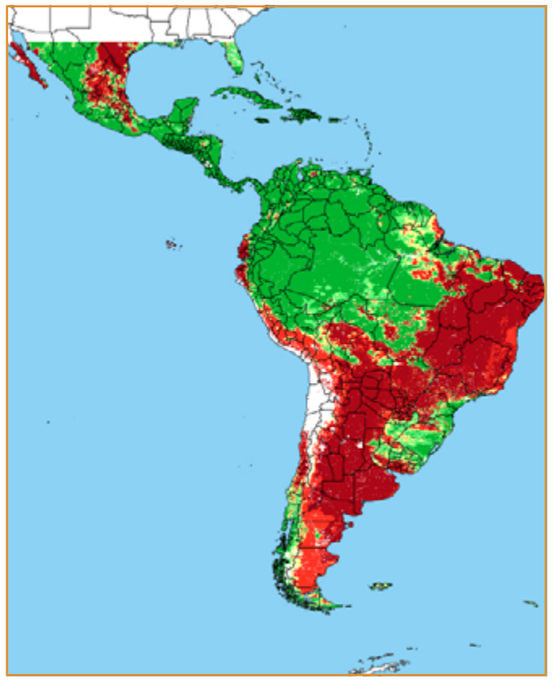
CALENDÁRIO JULIANO



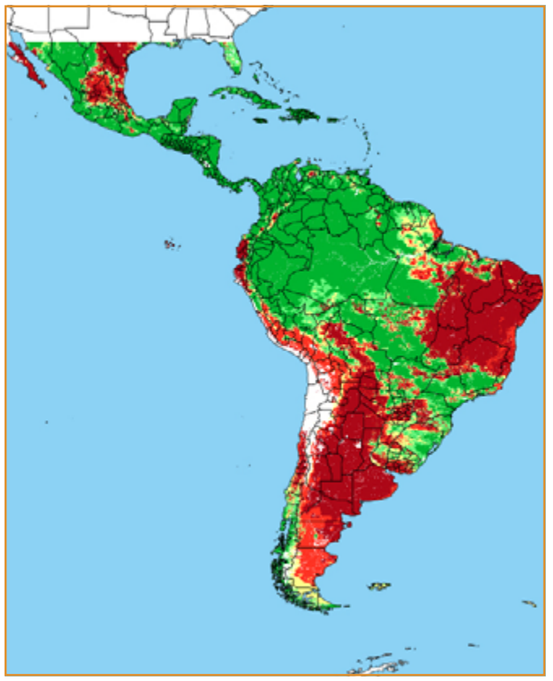
domingo, 22 de setembro



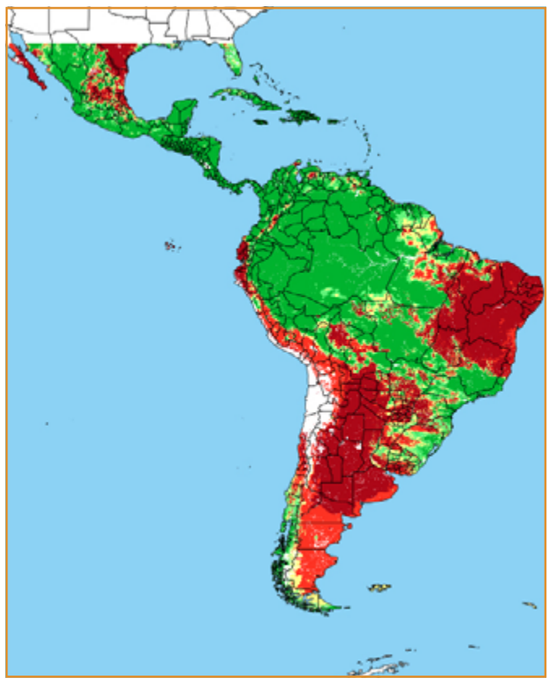
segunda-feira, 23 de setembro



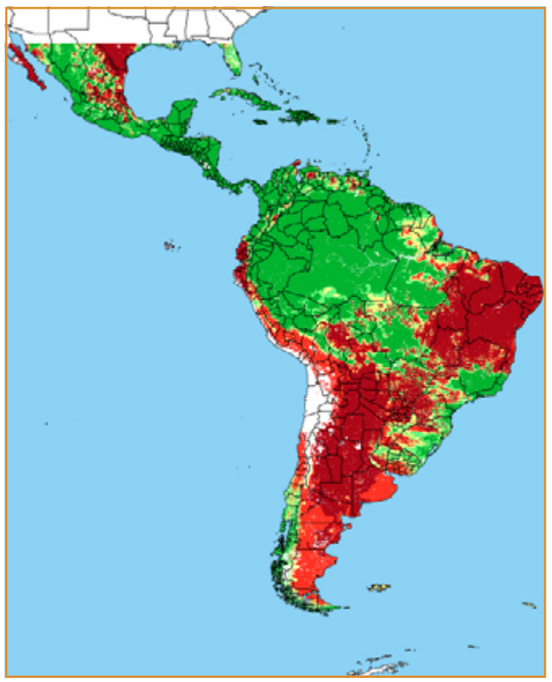
terça-feira, 24 de setembro



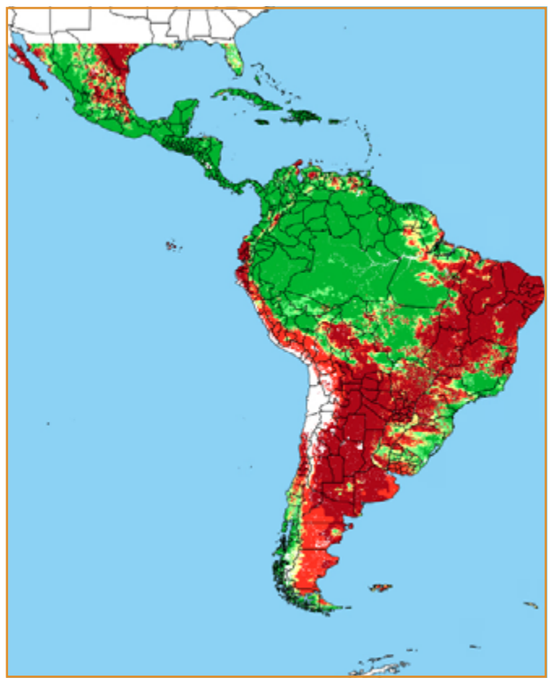
quarta-feira, 25 de setembro



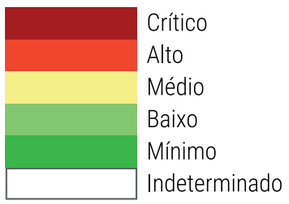
quinta-feira, 26 de setembro



sexta-feira, 27 de setembro



sábado, 28 de setembro



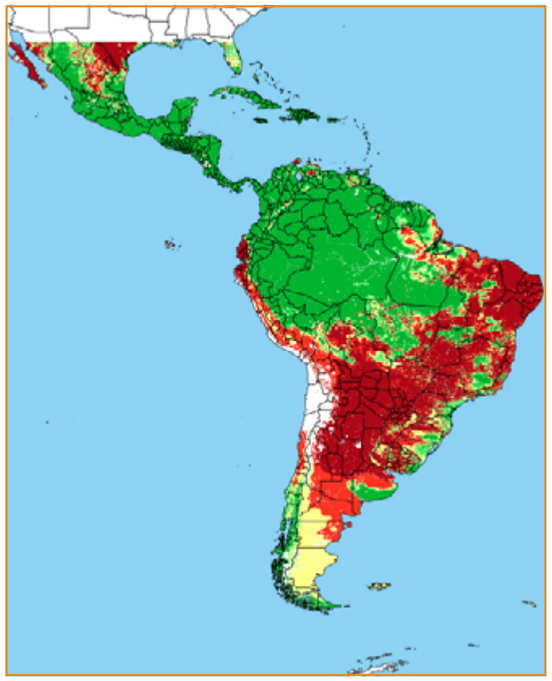
SETEMBRO / 2019

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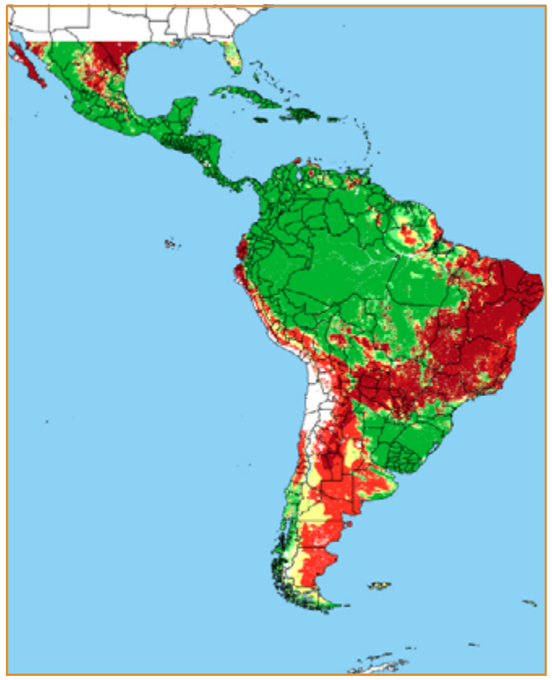
CALENDÁRIO JULIANO



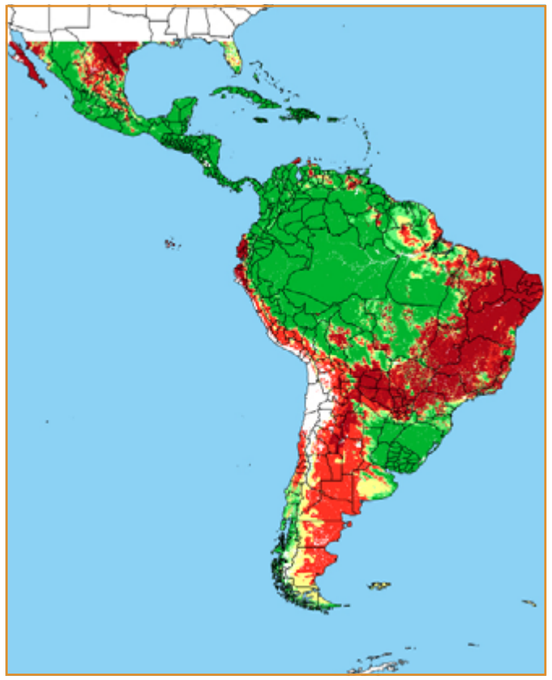
domingo, 29 de setembro



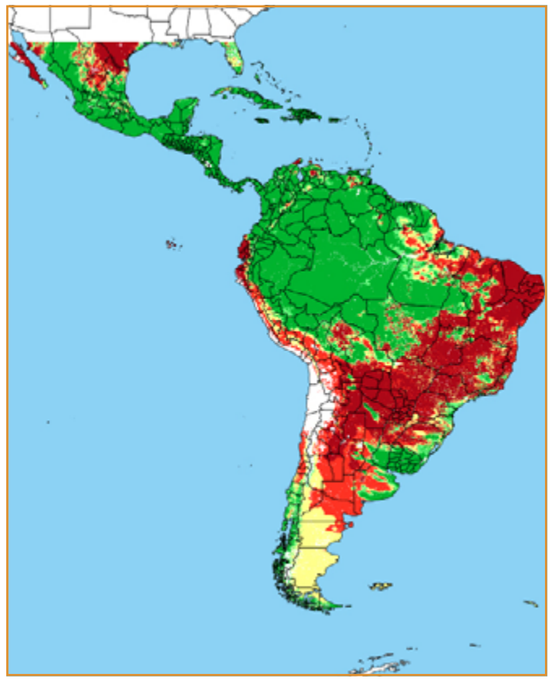
segunda-feira, 30 de setembro



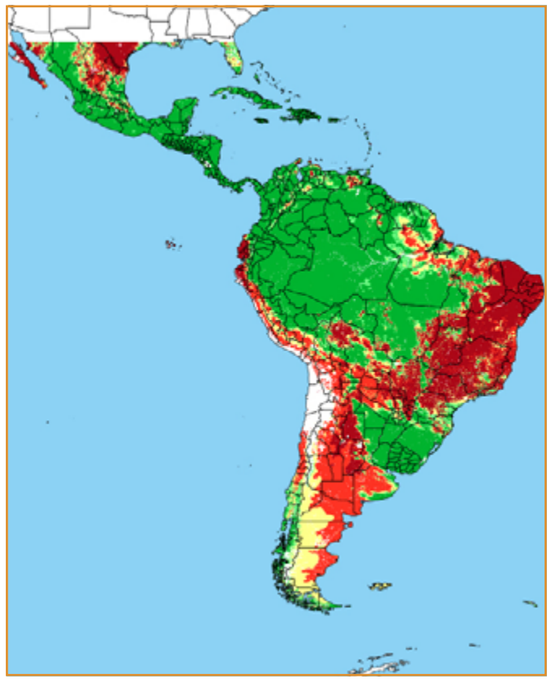
quinta-feira, 3 de outubro



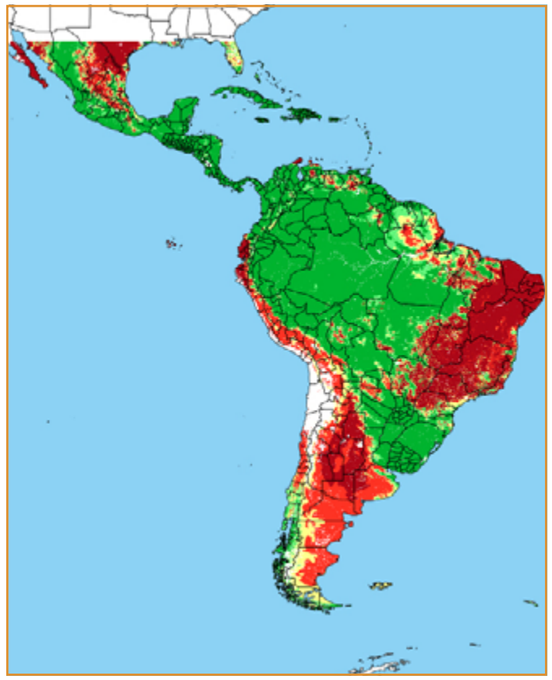
sexta-feira, 4 de outubro



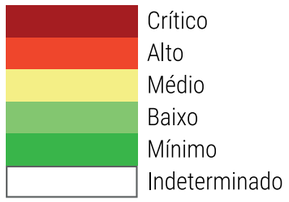
terça-feira, 1 de outubro



quarta-feira, 2 de outubro



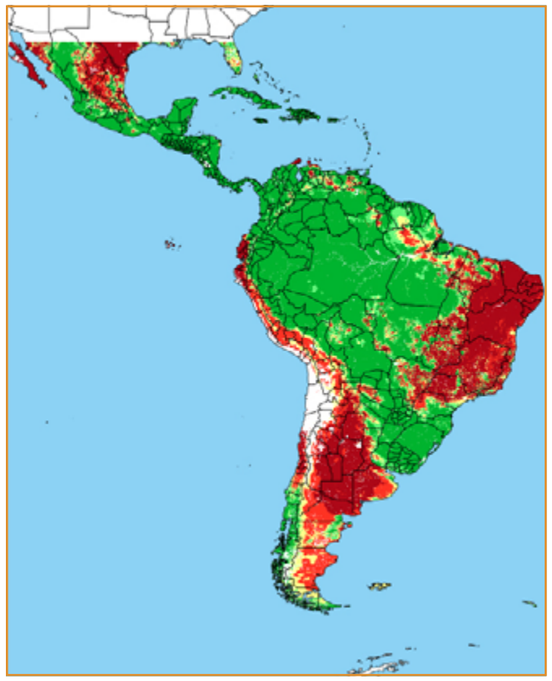
sábado, 5 de outubro



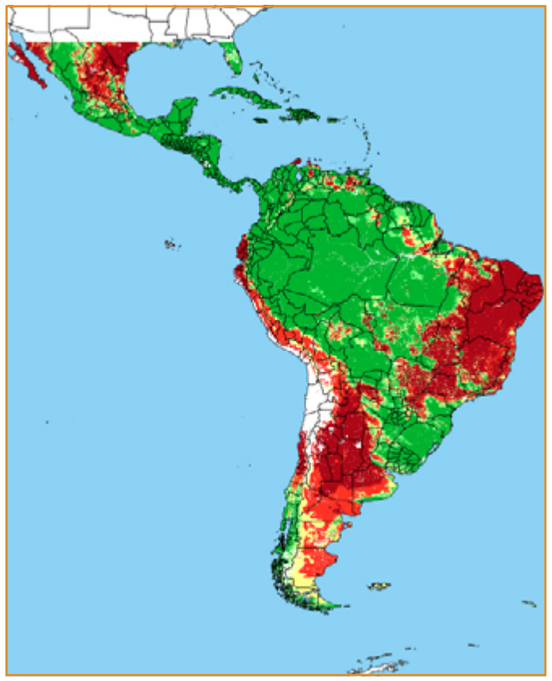
OUTUBRO / 2019

D	S	T	Q	Q	S	S
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CALENDÁRIO JULIANO

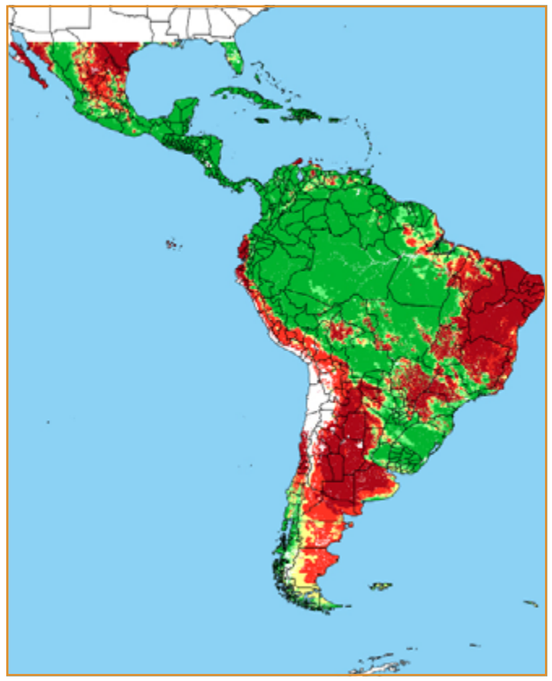


domingo, 6 de outubro

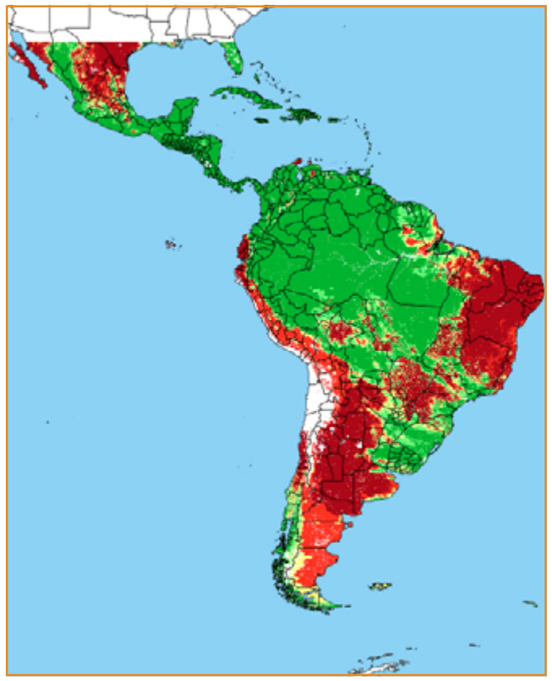


segunda-feira, 7 de outubro

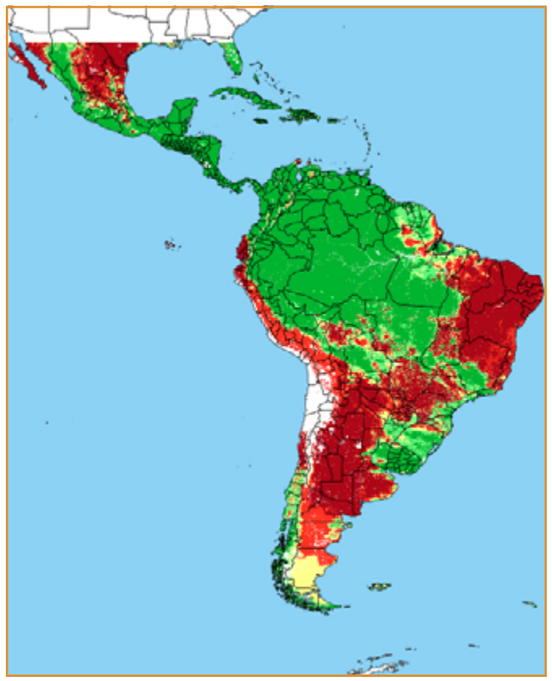
41ª SEMANA - OUTUBRO



terça-feira, 8 de outubro



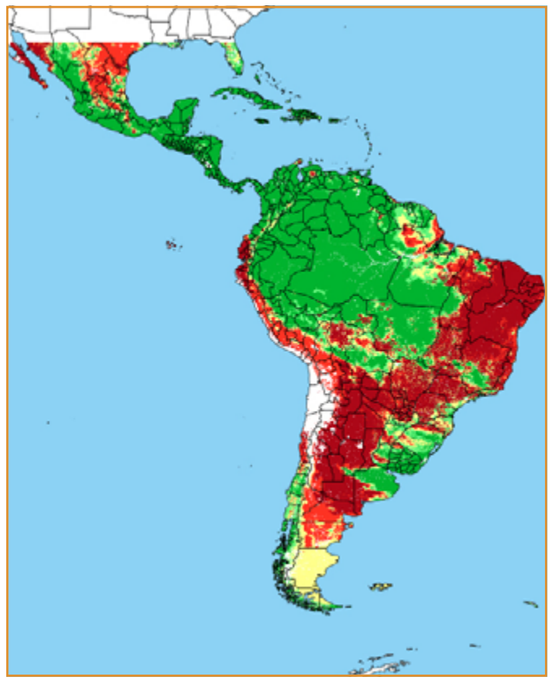
quarta-feira, 9 de outubro



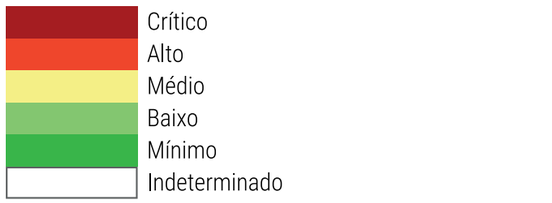
quinta-feira, 10 de outubro



sexta-feira, 11 de outubro



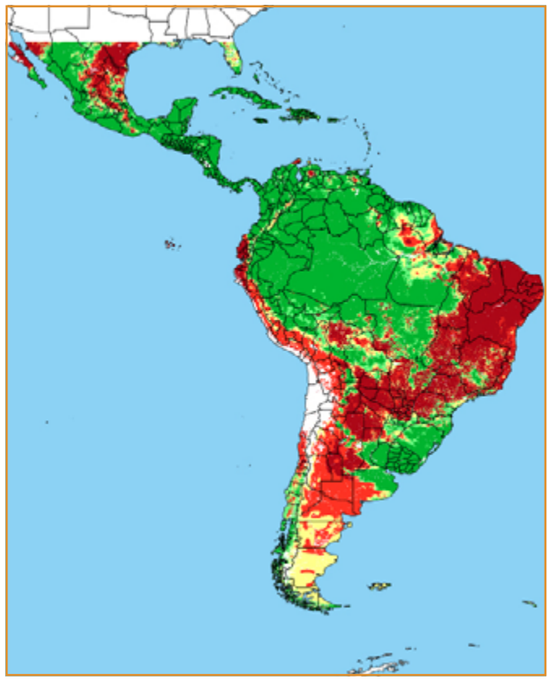
sábado, 12 de outubro



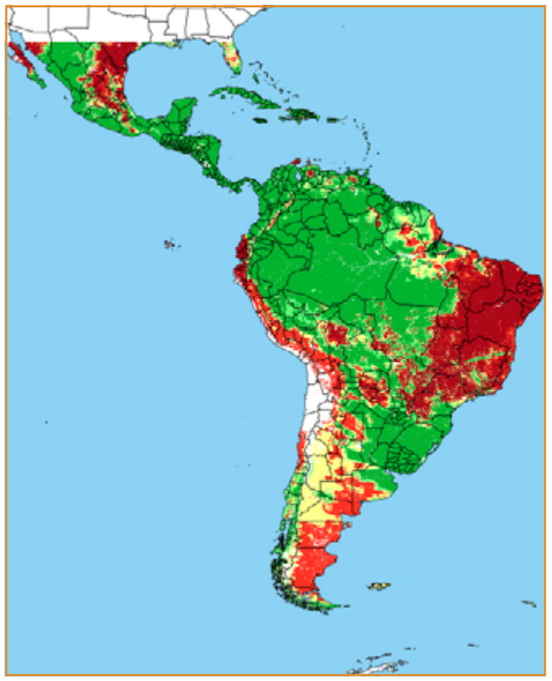
OUTUBRO / 2019

D	S	T	Q	Q	S	S
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CALENDÁRIO JULIANO



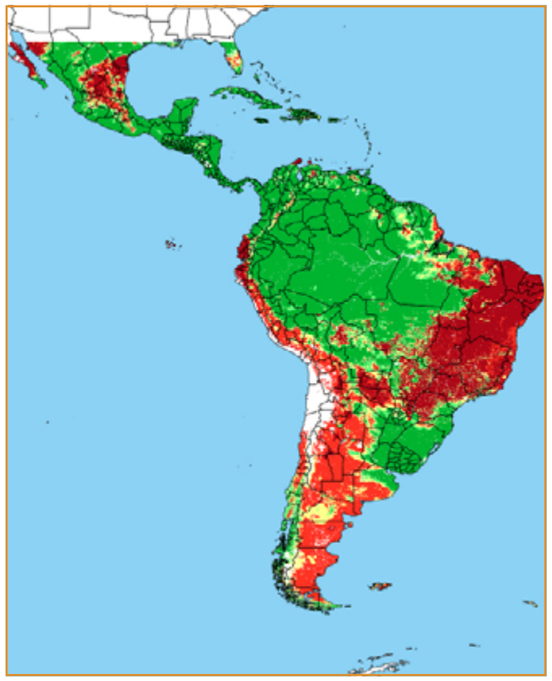
domingo, 13 de outubro



segunda-feira, 14 de outubro



terça-feira, 15 de outubro



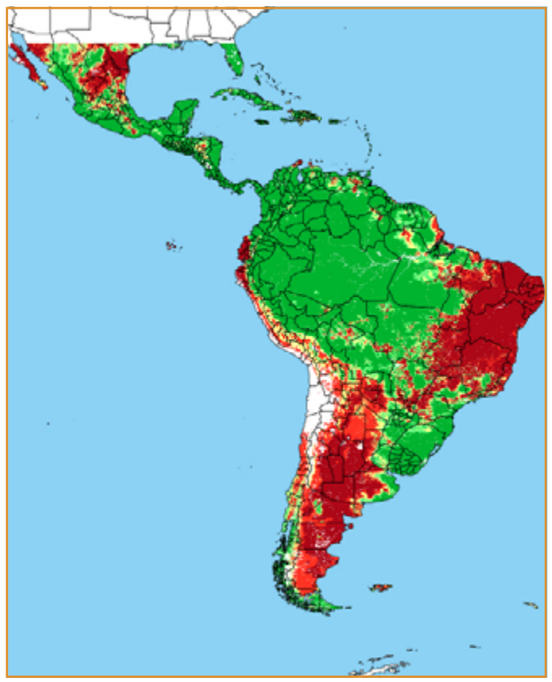
quarta-feira, 16 de outubro



quinta-feira, 17 de outubro



sexta-feira, 18 de outubro



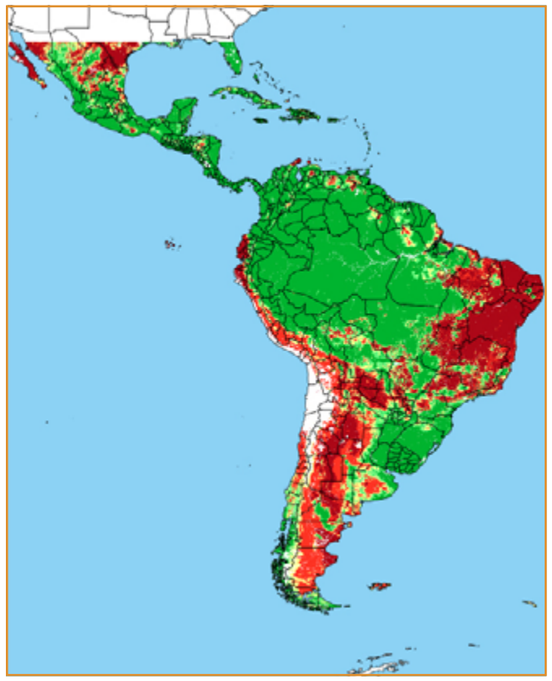
sábado, 19 de outubro

Crítico
Alto
Médio
Baixo
Mínimo
Indeterminado

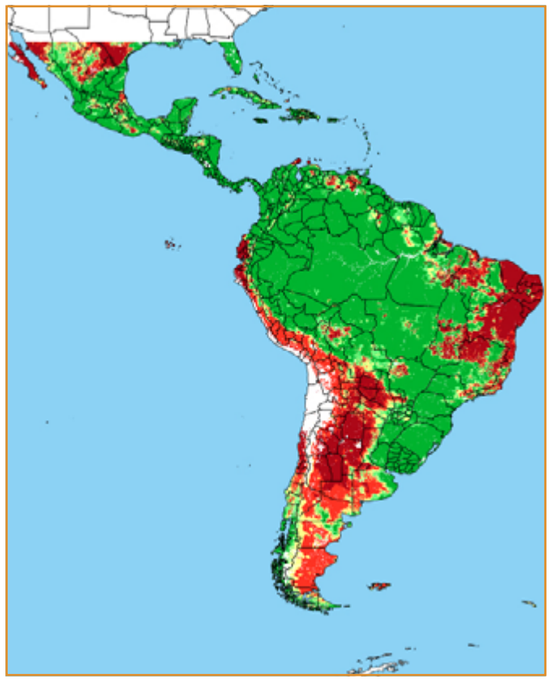
OUTUBRO / 2019

D	S	T	Q	Q	S	S
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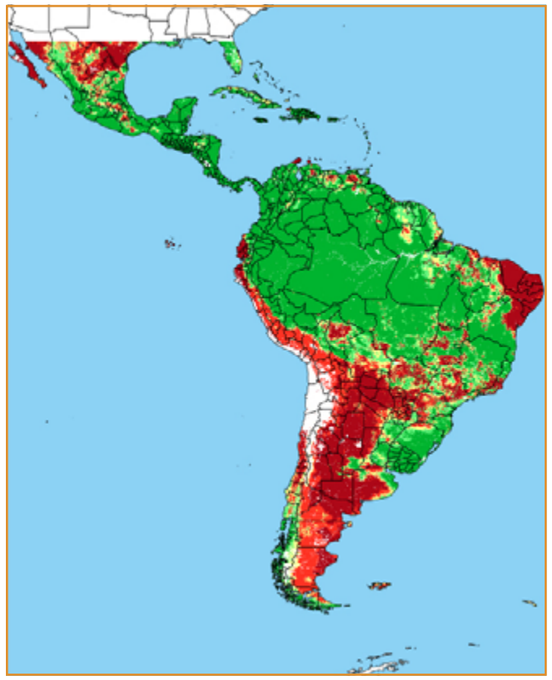
CALENDÁRIO JULIANO



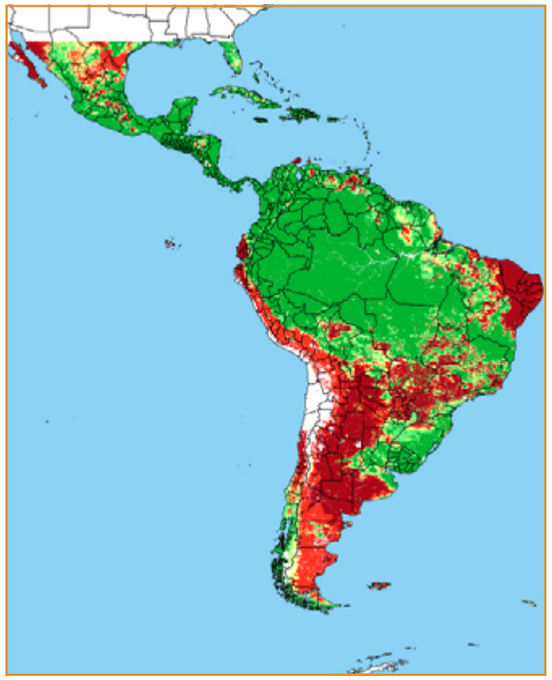
domingo, 20 de outubro



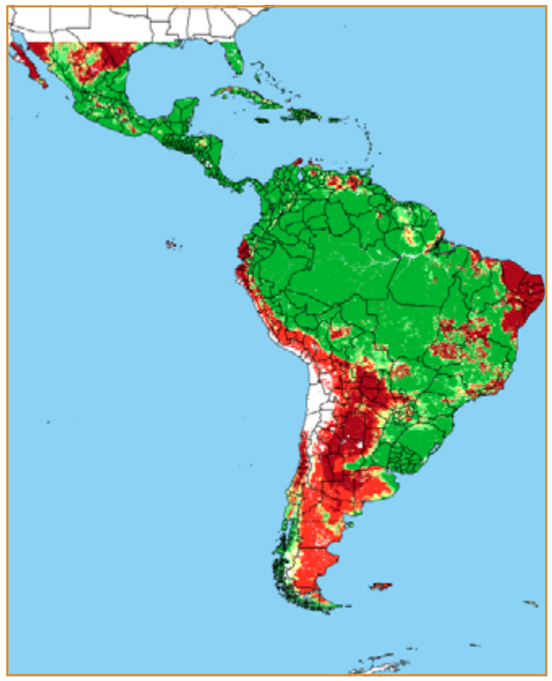
segunda-feira, 21 de outubro



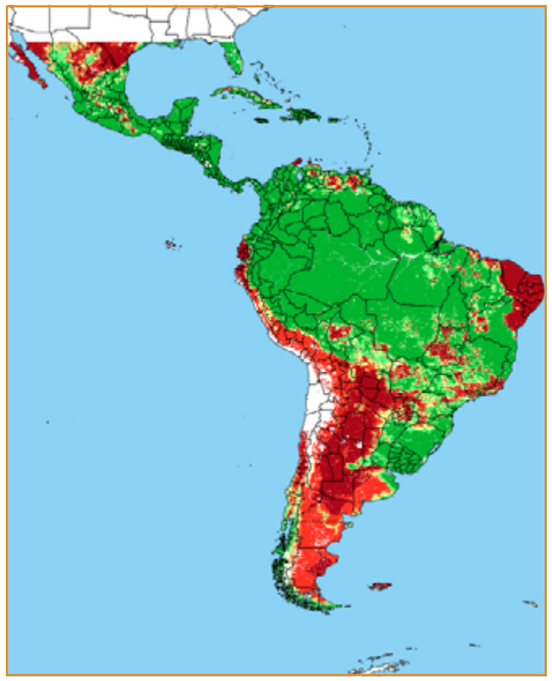
quinta-feira, 24 de outubro



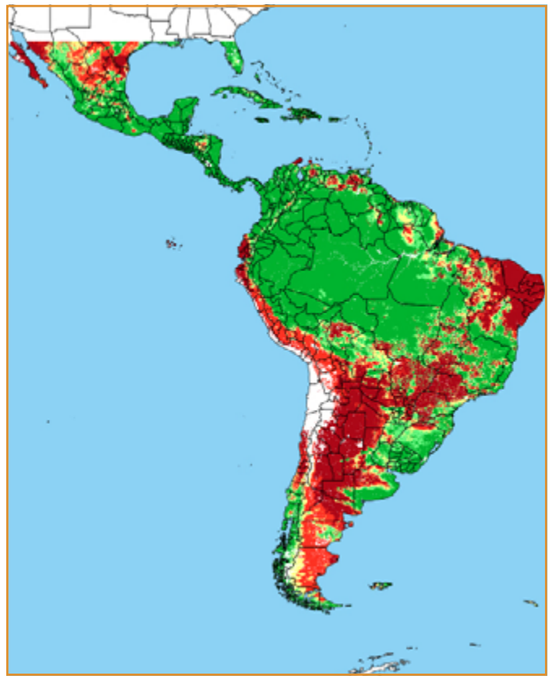
sexta-feira, 25 de outubro



terça-feira, 22 de outubro



quarta-feira, 23 de outubro



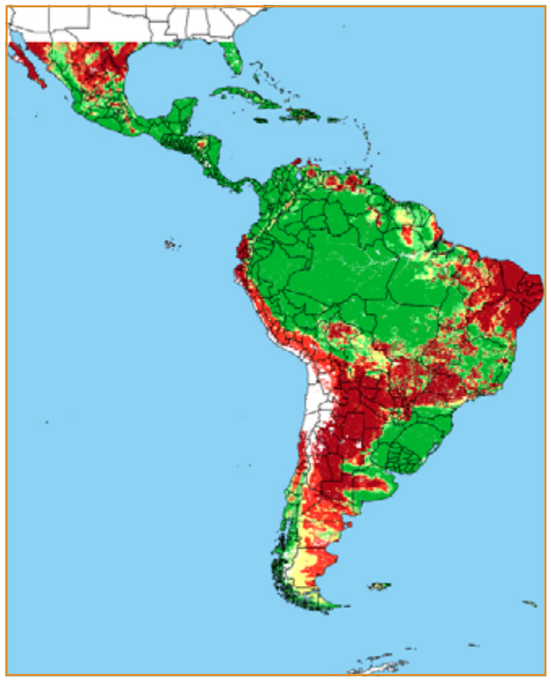
sábado, 26 de outubro

Crítico
Alto
Médio
Baixo
Mínimo
Indeterminado

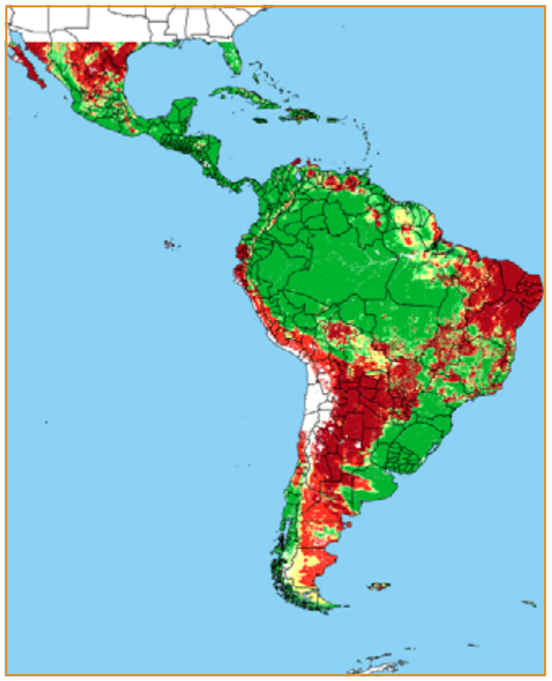
OUTUBRO / 2019

D	S	T	Q	Q	S	S
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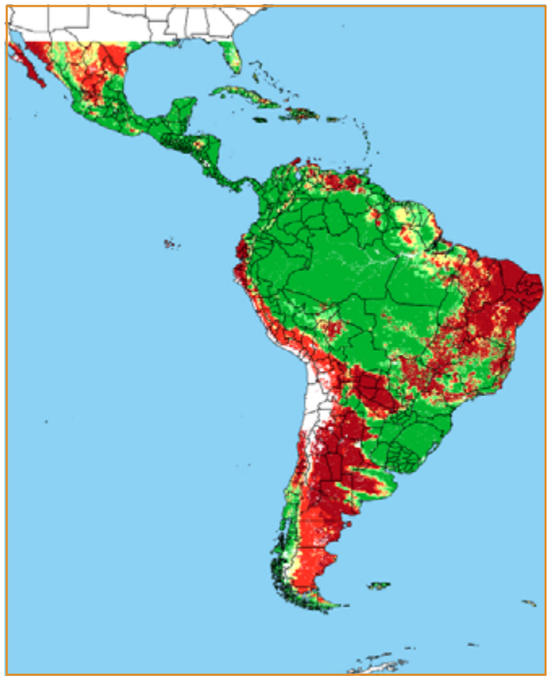
CALENDÁRIO JULIANO



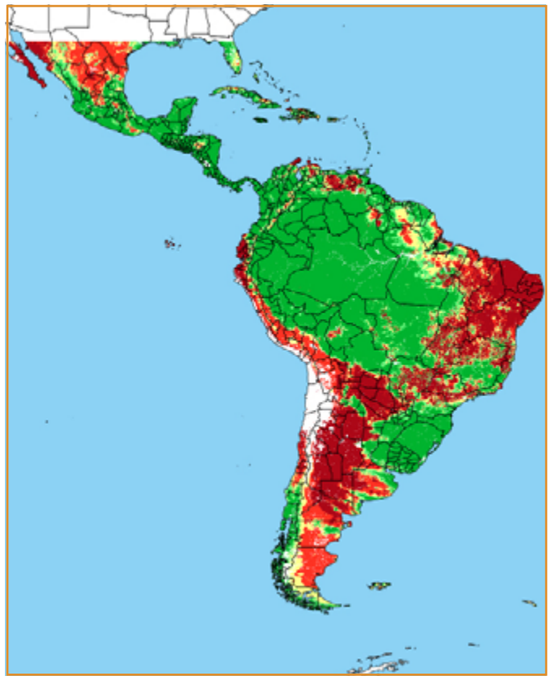
domingo, 27 de outubro



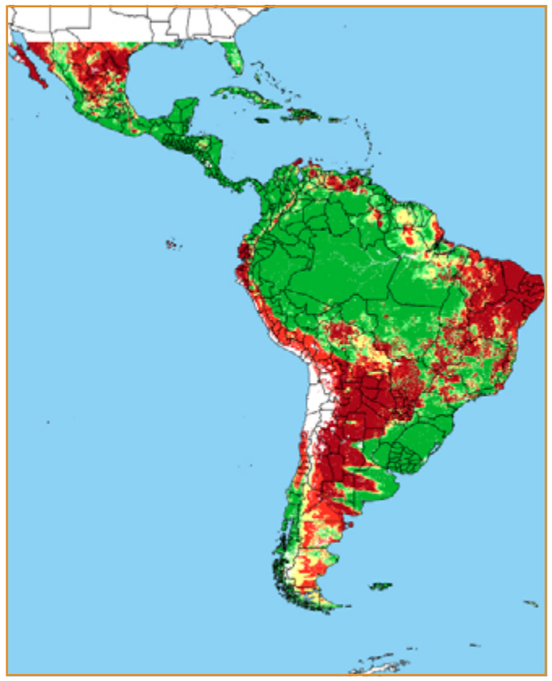
segunda-feira, 28 de outubro



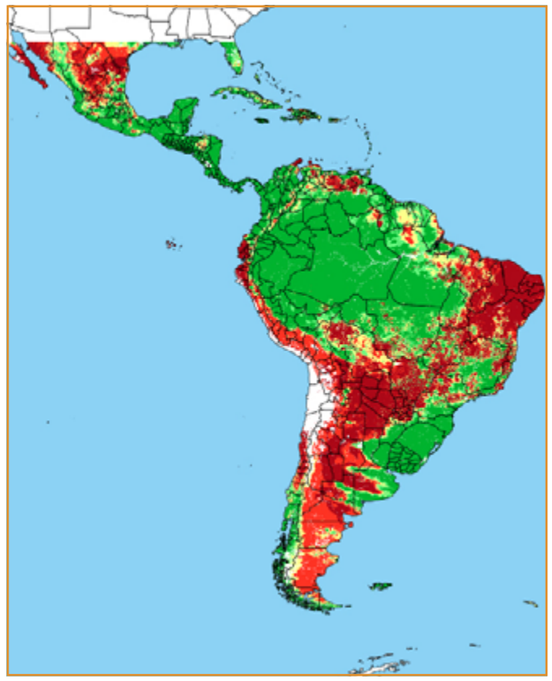
quinta-feira, 31 de outubro



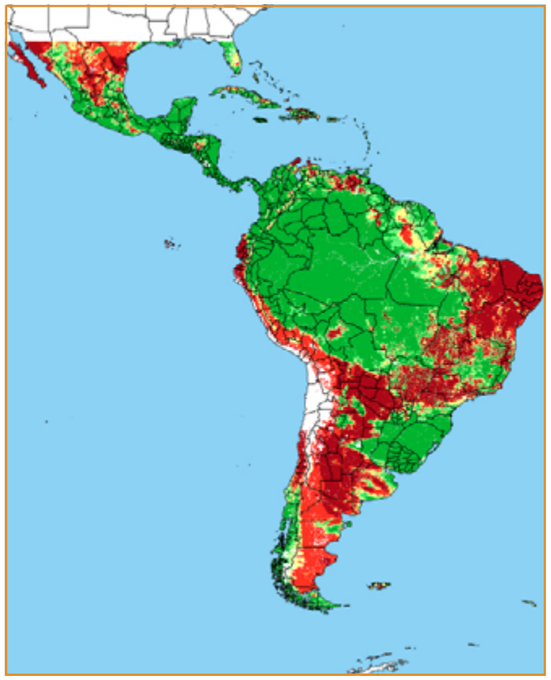
sexta-feira, 1 de novembro



terça-feira, 29 de outubro



quarta-feira, 30 de outubro



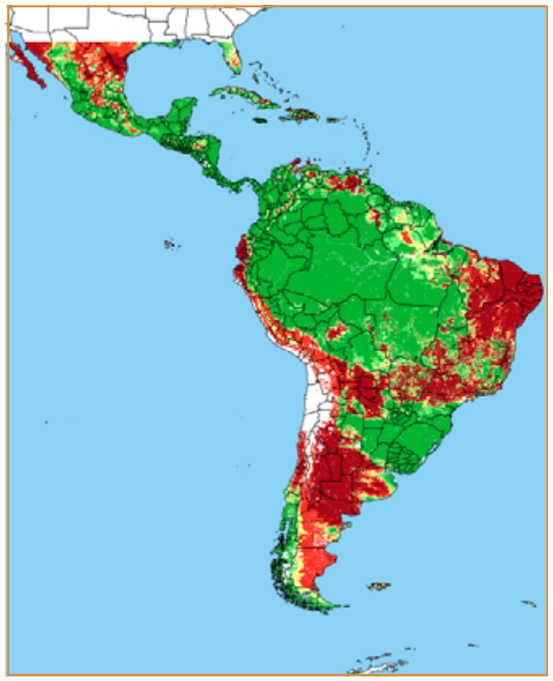
sábado, 2 de novembro

Crítico
Alto
Médio
Baixo
Mínimo
Indeterminado

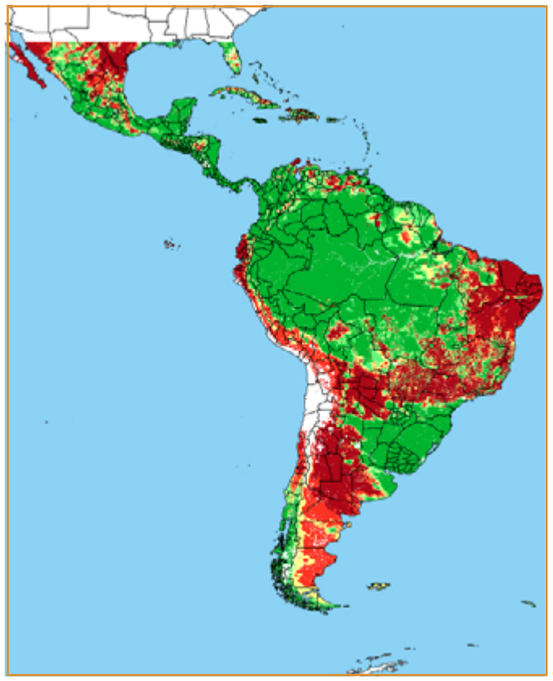
OUTUBRO / 2019

D	S	T	Q	Q	S	S
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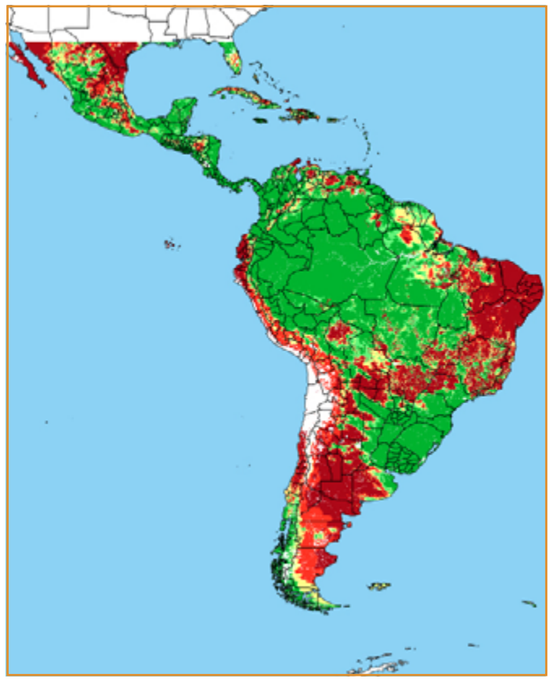
CALENDÁRIO JULIANO



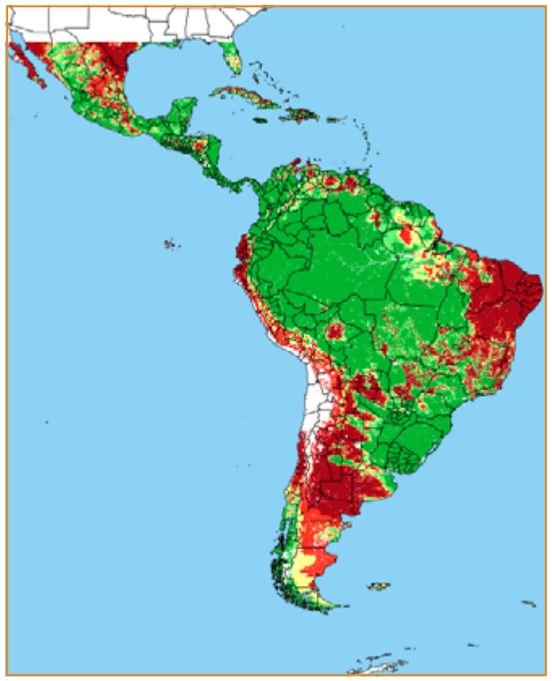
domingo, 3 de novembro



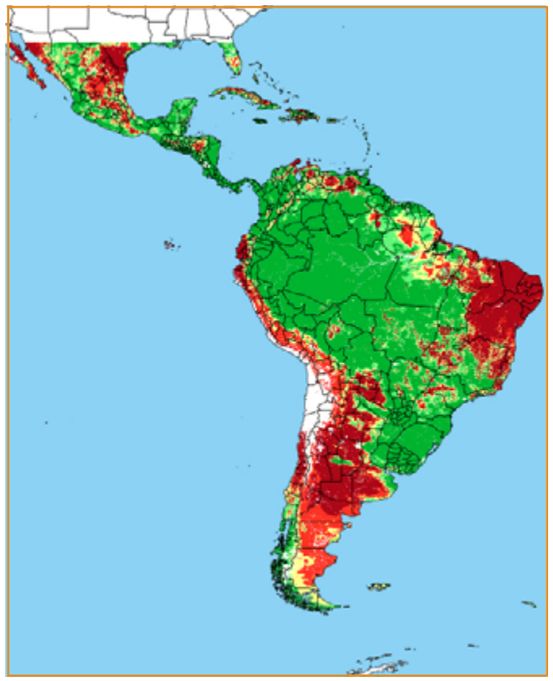
segunda-feira, 4 de novembro



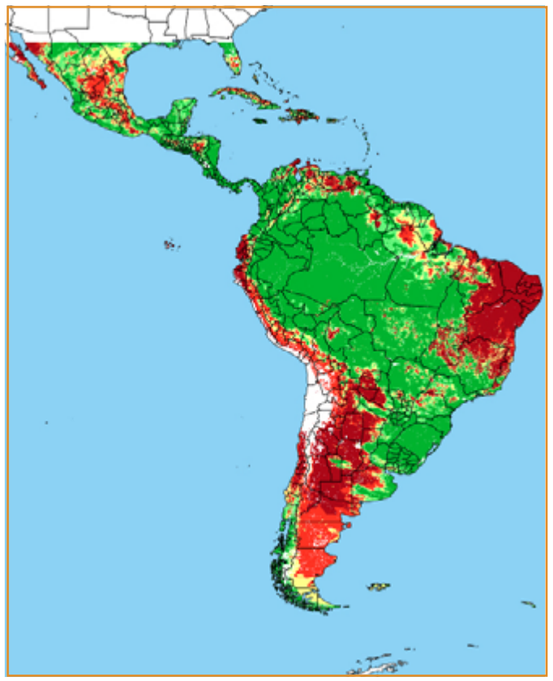
terça-feira, 5 de novembro



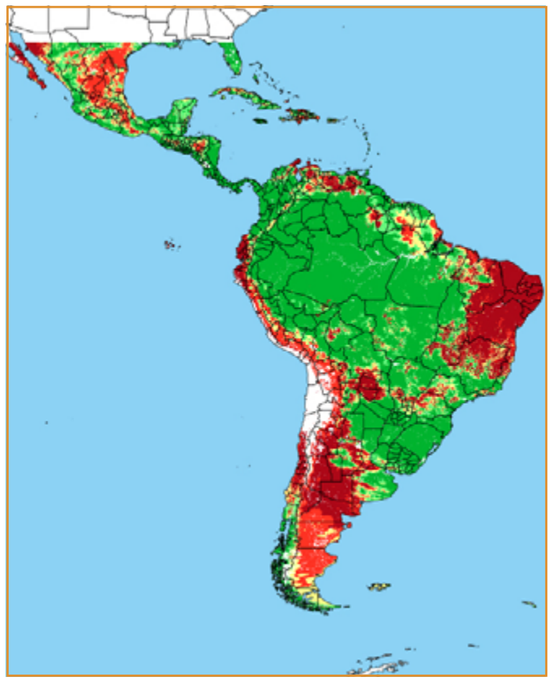
quarta-feira, 6 de novembro



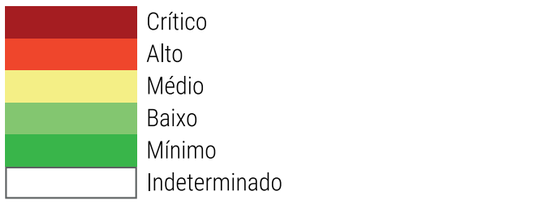
quinta-feira, 7 de novembro



sexta-feira, 8 de novembro



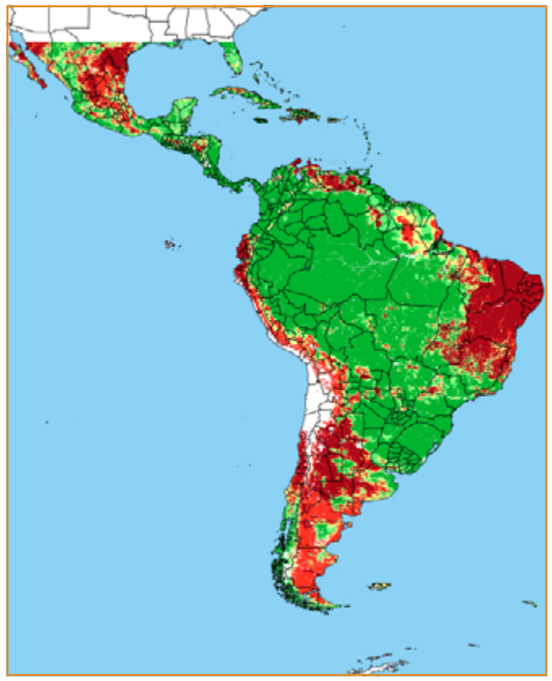
sábado, 9 de novembro



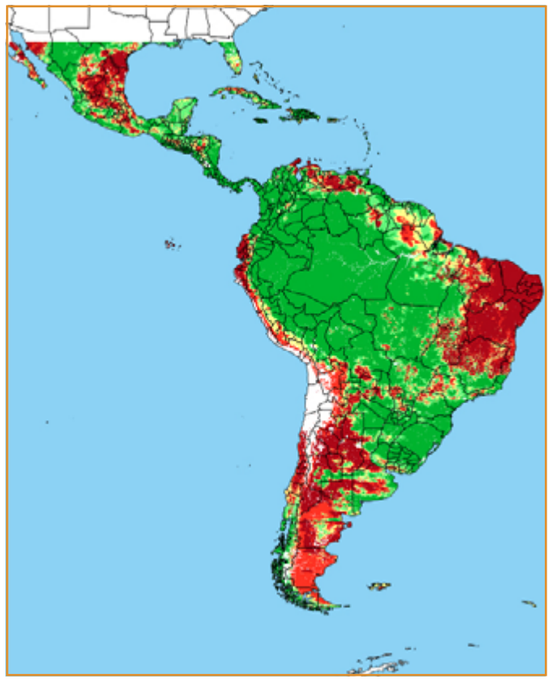
NOVEMBRO / 2019

D	S	T	Q	Q	S	S
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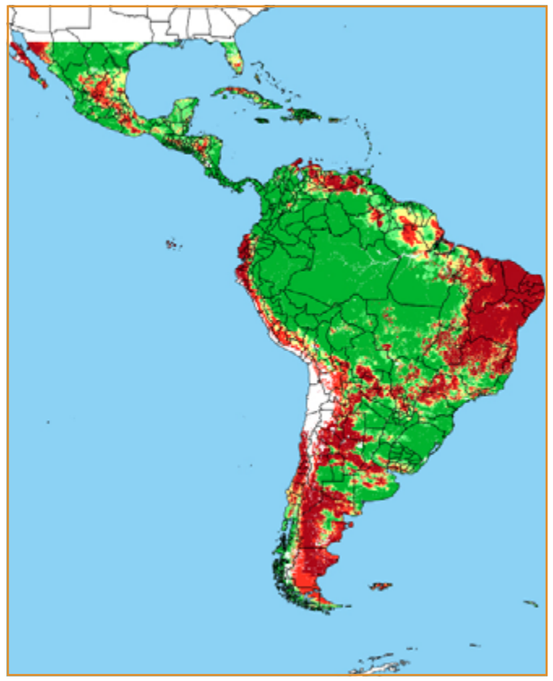
CALENDÁRIO JULIANO



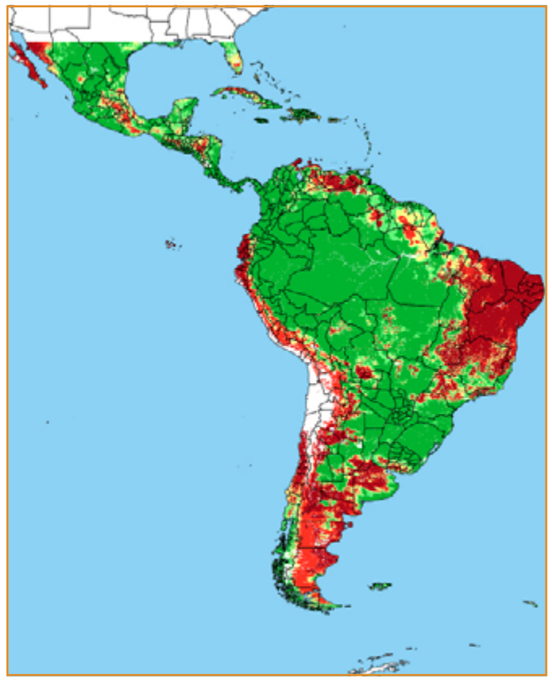
domingo, 10 de novembro



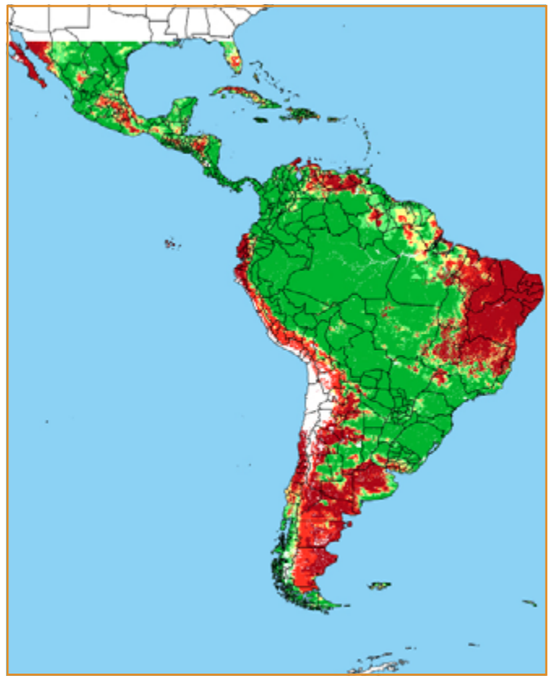
segunda-feira, 11 de novembro



terça-feira, 12 de novembro



quarta-feira, 13 de novembro



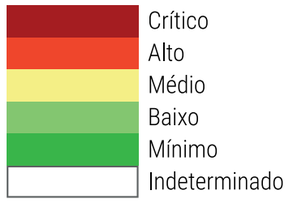
quinta-feira, 14 de novembro



sexta-feira, 15 de novembro



sábado, 16 de novembro



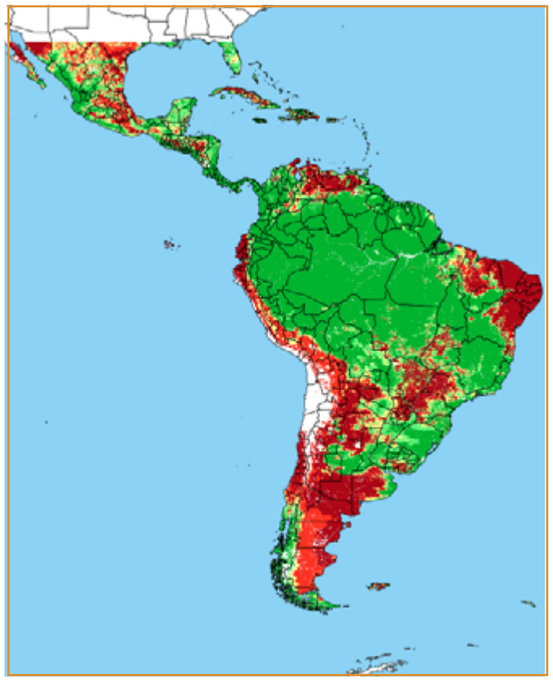
NOVEMBRO / 2019

D	S	T	Q	Q	S	S
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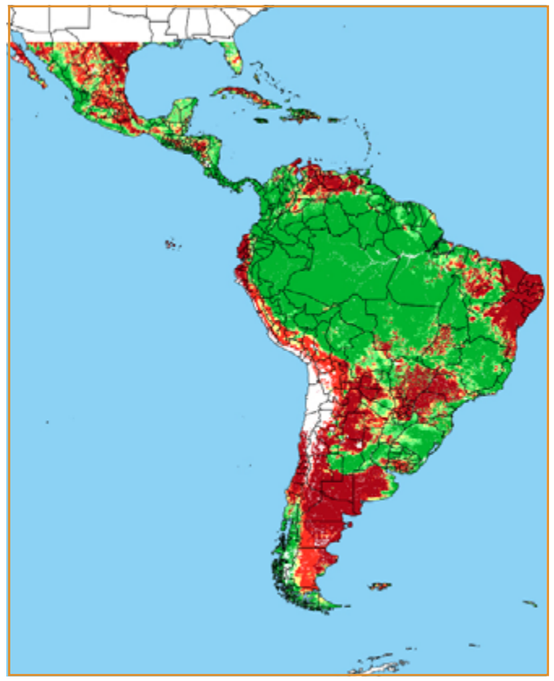
CALENDÁRIO JULIANO



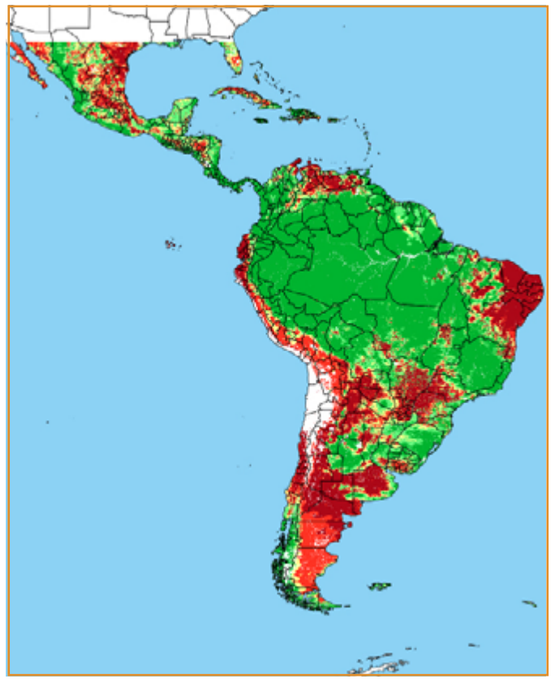
domingo, 17 de novembro



segunda-feira, 18 de novembro



terça-feira, 19 de novembro



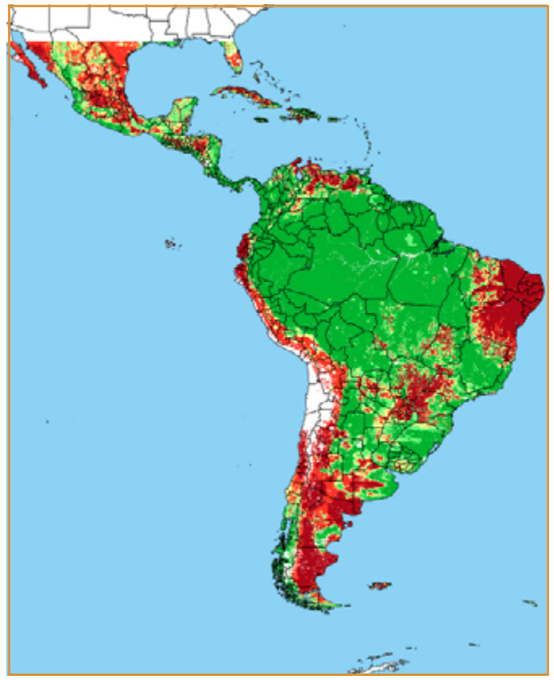
quarta-feira, 20 de novembro



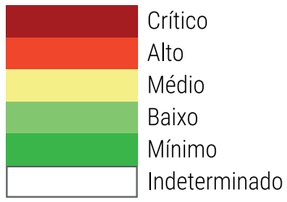
quinta-feira, 21 de novembro



sexta-feira, 22 de novembro



sábado, 23 de novembro



NOVEMBRO / 2019

D	S	T	Q	Q	S	S
					305	306
307	308	309	310	311	312	313
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CALENDÁRIO JULIANO



domingo, 24 de novembro



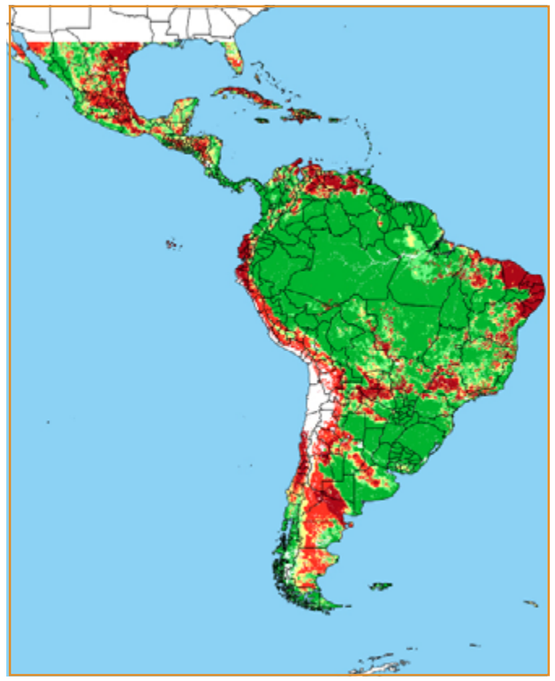
segunda-feira, 25 de novembro



quinta-feira, 28 de novembro



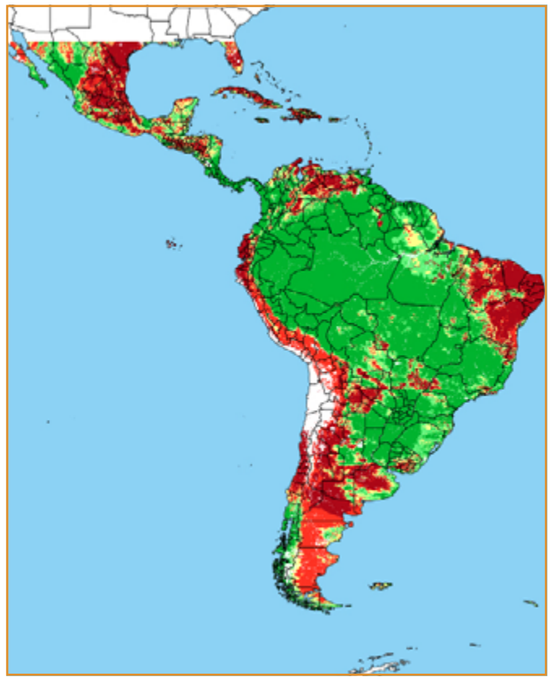
sexta-feira, 29 de novembro



terça-feira, 26 de novembro



quarta-feira, 27 de novembro



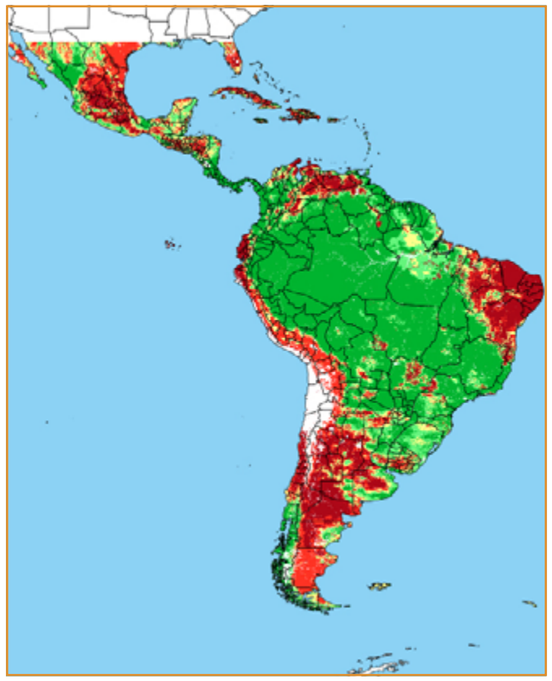
sábado, 30 de novembro

Crítico
Alto
Médio
Baixo
Mínimo
Indeterminado

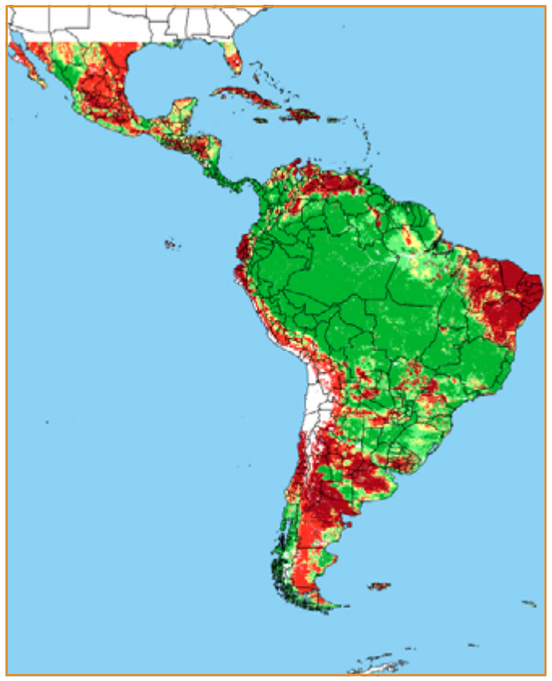
NOVEMBRO / 2019

D	S	T	Q	Q	S	S
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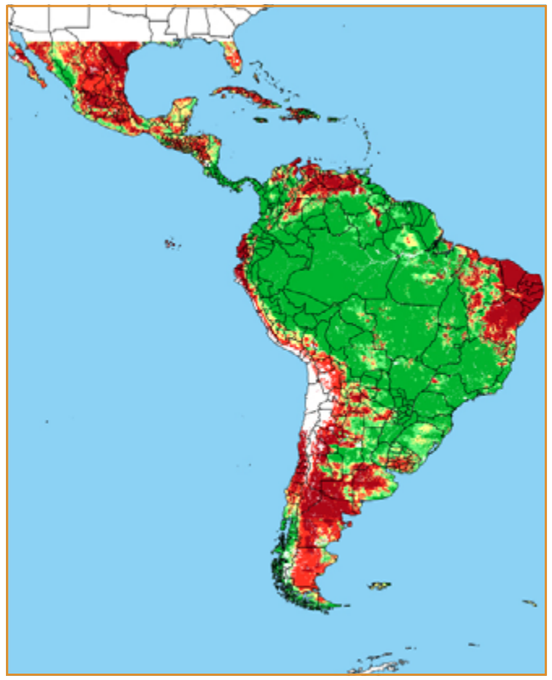
CALENDÁRIO JULIANO



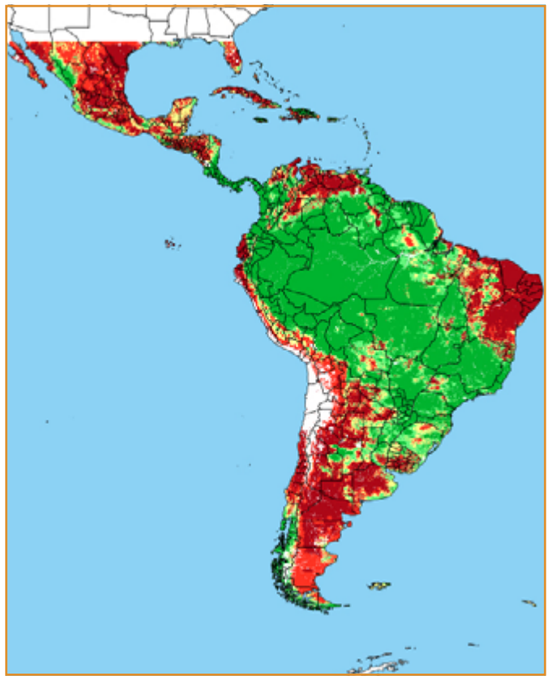
domingo, 1 de dezembro



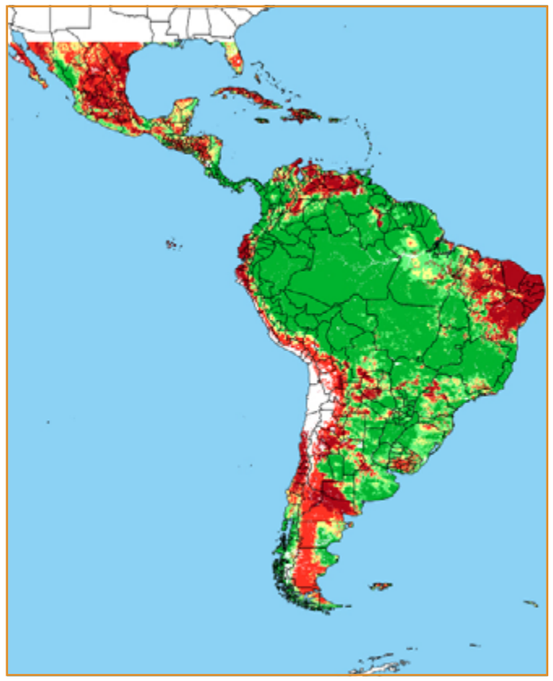
segunda-feira, 2 de dezembro



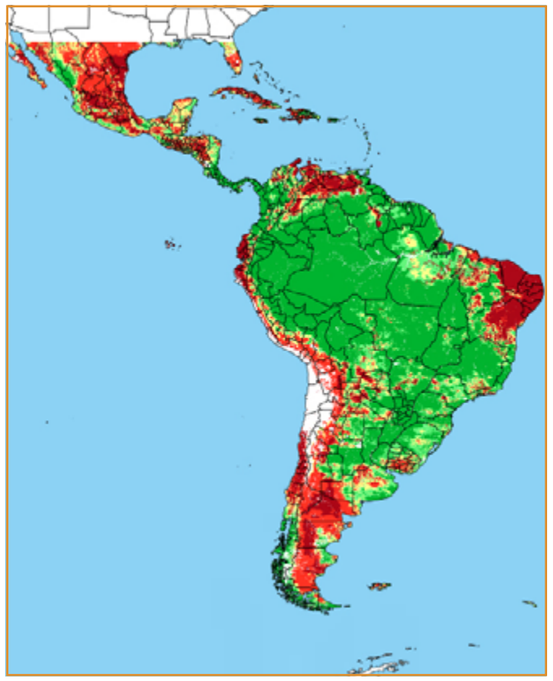
quinta-feira, 5 de dezembro



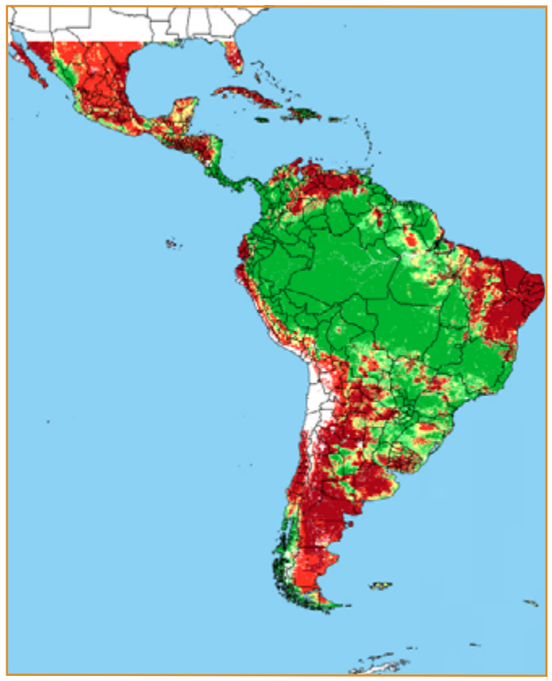
sexta-feira, 6 de dezembro



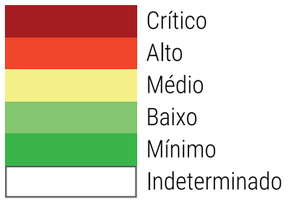
terça-feira, 3 de dezembro



quarta-feira, 4 de dezembro



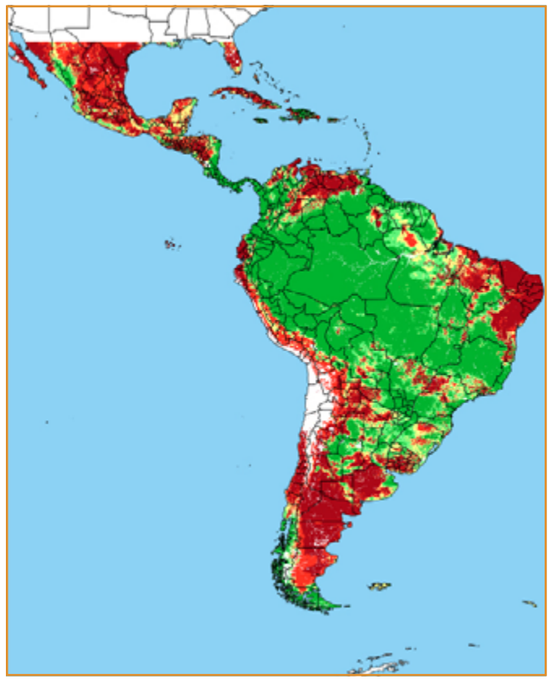
sábado, 7 de dezembro



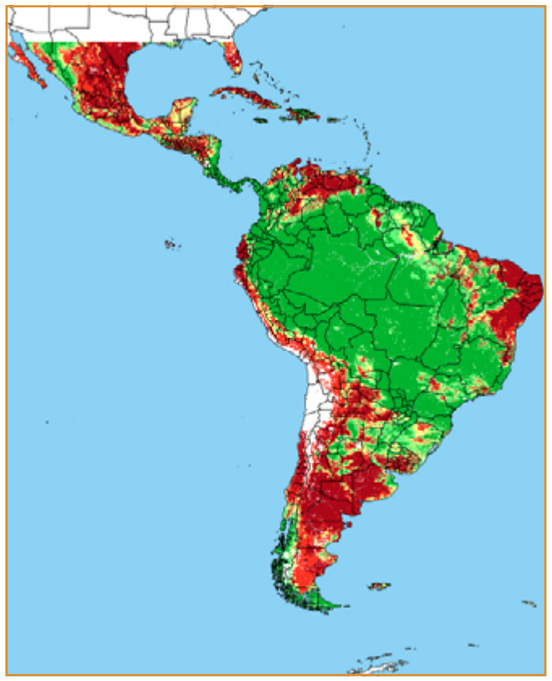
DEZEMBRO / 2019

D	S	T	Q	Q	S	S
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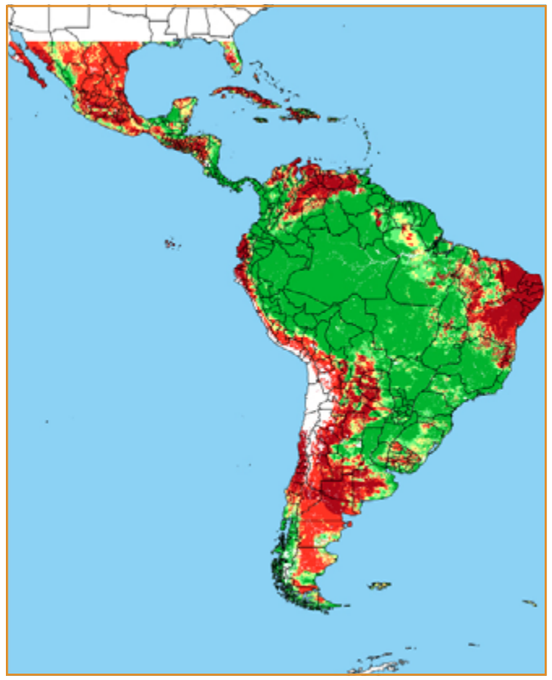
CALENDÁRIO JULIANO



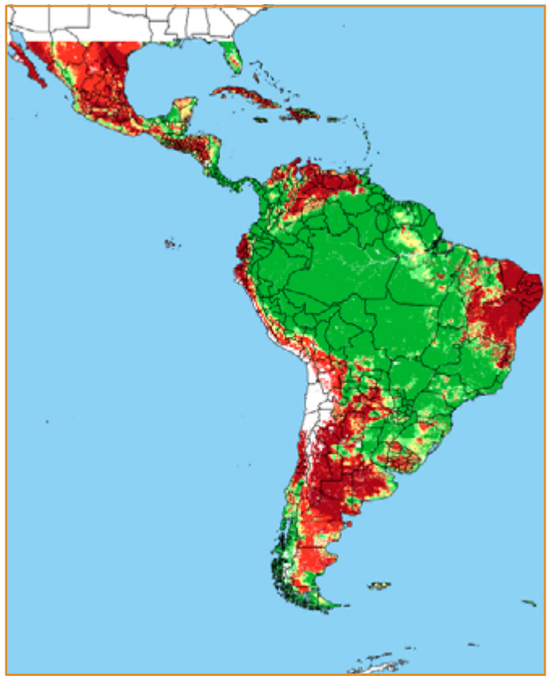
domingo, 8 de dezembro



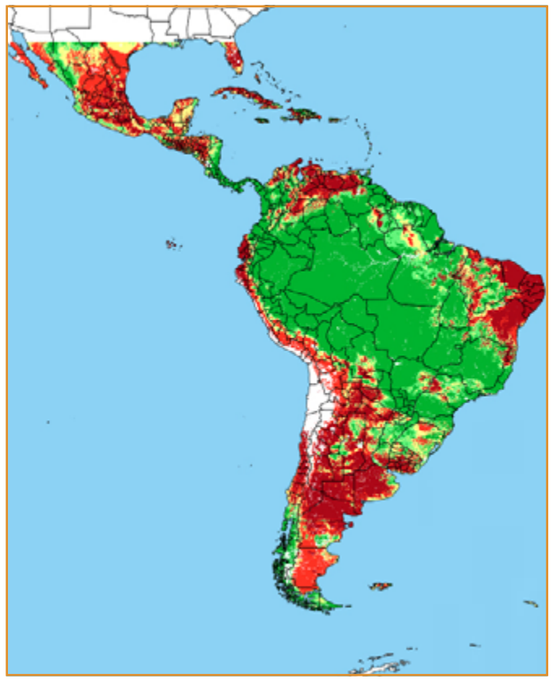
segunda-feira, 9 de dezembro



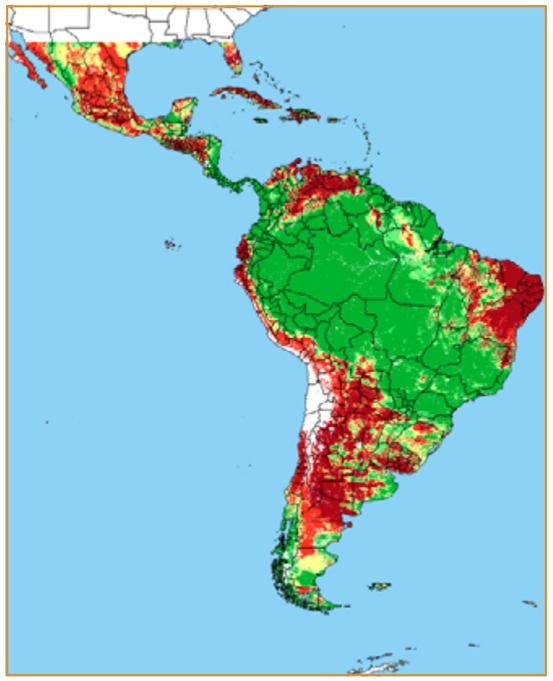
quinta-feira, 12 de dezembro



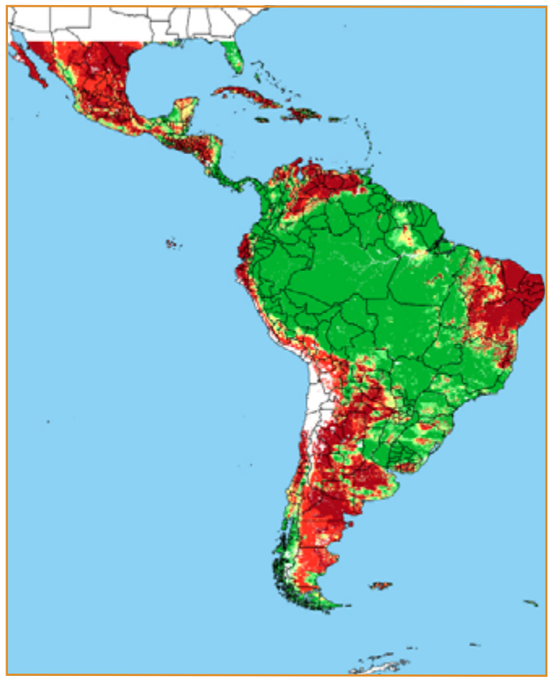
sexta-feira, 13 de dezembro



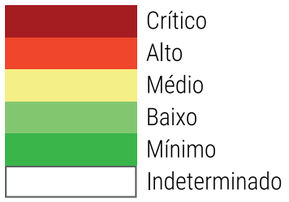
terça-feira, 10 de dezembro



quarta-feira, 11 de dezembro



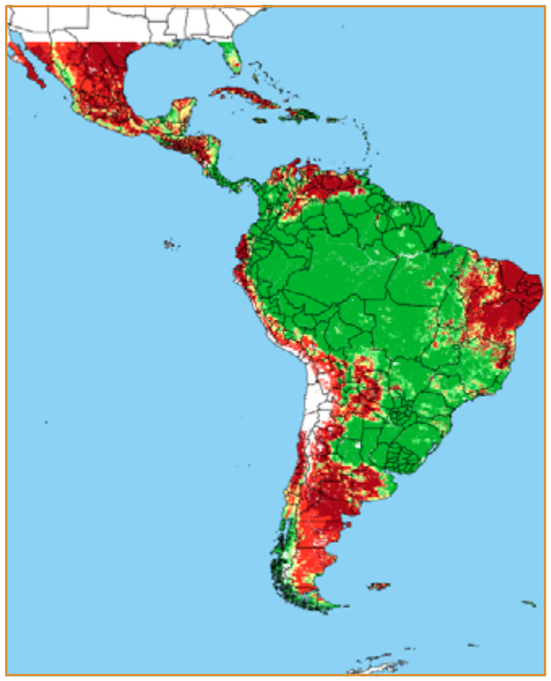
sábado, 14 de dezembro



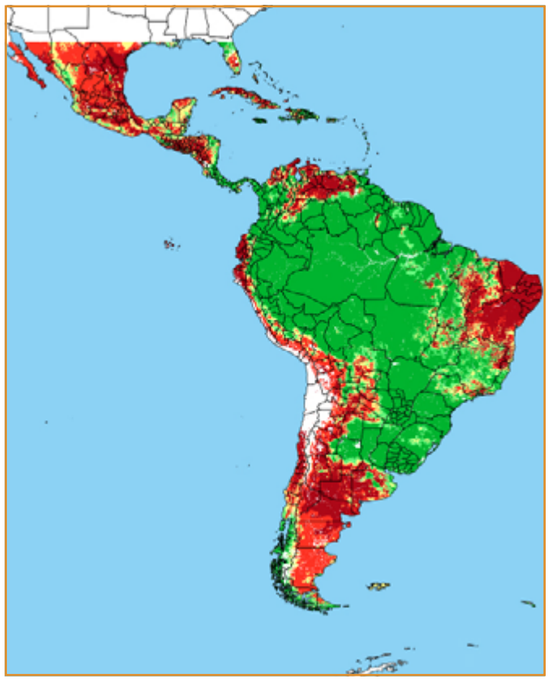
DEZEMBRO / 2019

D	S	T	Q	Q	S	S
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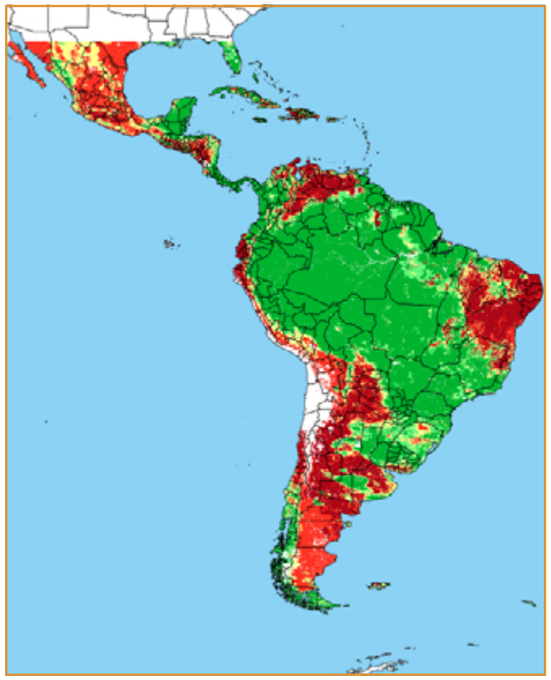
CALENDÁRIO JULIANO



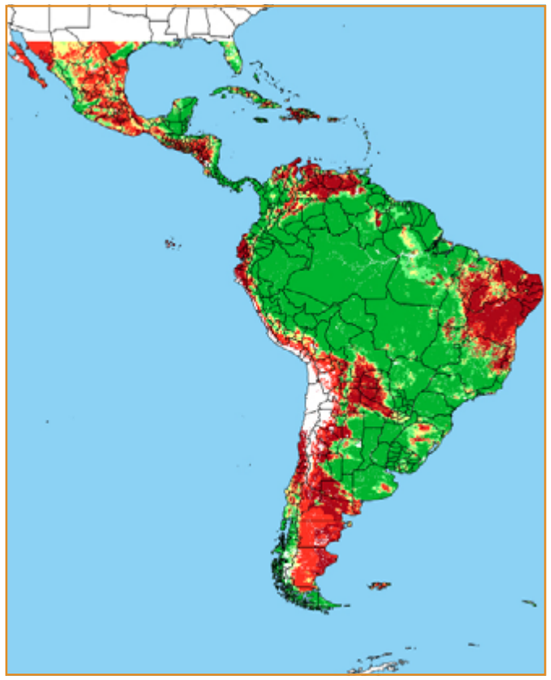
domingo, 15 de dezembro



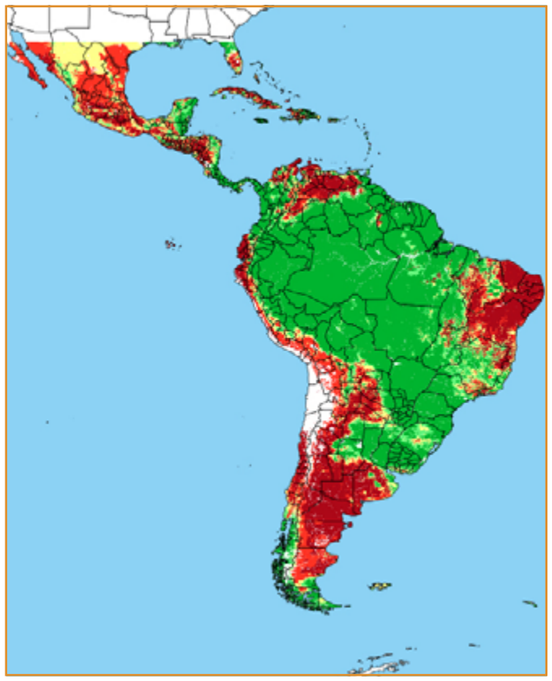
segunda-feira, 16 de dezembro



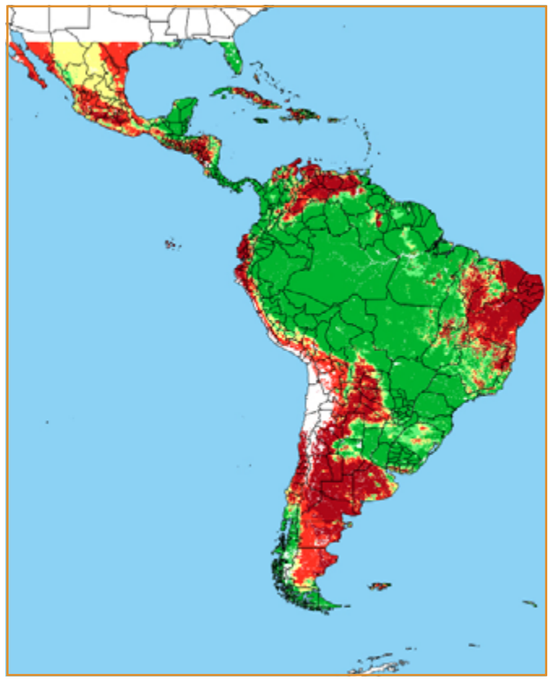
quinta-feira, 19 de dezembro



sexta-feira, 20 de dezembro



terça-feira, 17 de dezembro



quarta-feira, 18 de dezembro



sábado, 21 de dezembro

Crítico
Alto
Médio
Baixo
Mínimo
Indeterminado

DEZEMBRO / 2019

D	S	T	Q	Q	S	S
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CALENDÁRIO JULIANO



domingo, 22 de dezembro



segunda-feira, 23 de dezembro



terça-feira, 24 de dezembro



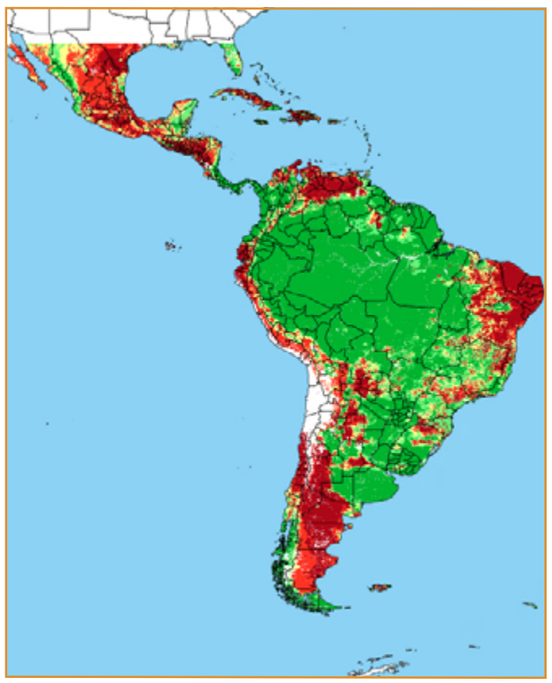
quarta-feira, 25 de dezembro



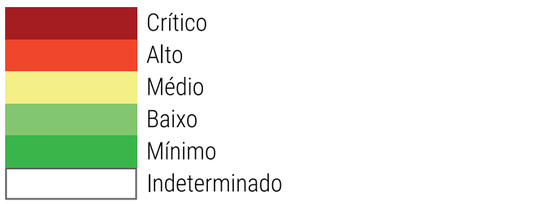
quinta-feira, 26 de dezembro



sexta-feira, 27 de dezembro



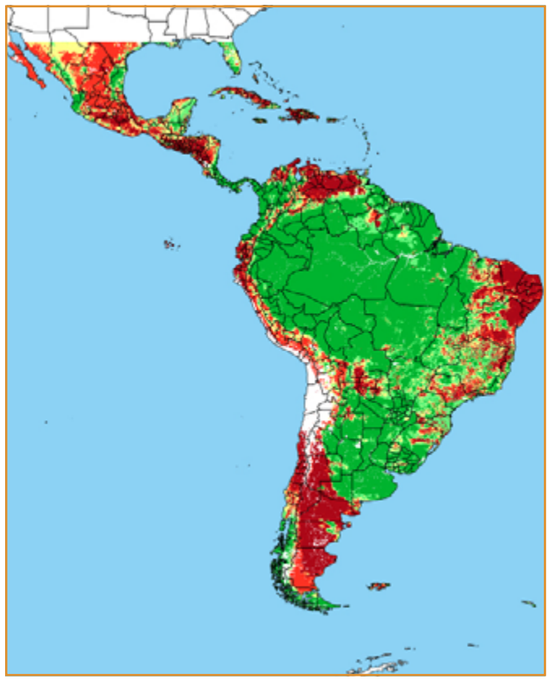
sábado, 28 de dezembro



DEZEMBRO / 2019

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



domingo, 29 de dezembro



segunda-feira, 30 de dezembro

quinta-feira, 4 de janeiro

sexta-feira, 5 de janeiro



terça-feira, 31 de dezembro

sábado, 6 de janeiro

Crítico
Alto
Médio
Baixo
Mínimo
Indeterminado

DEZEMBRO / 2019

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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Projeto Monitoramento Ambiental por Satélites no Bioma Amazônia

FUNDO AMAZÔNIA

BNDES

MINISTÉRIO DO PLANEJAMENTO, DESENVOLVIMENTO E GESTÃO

MINISTÉRIO DO MEIO AMBIENTE

GOVERNO FEDERAL