

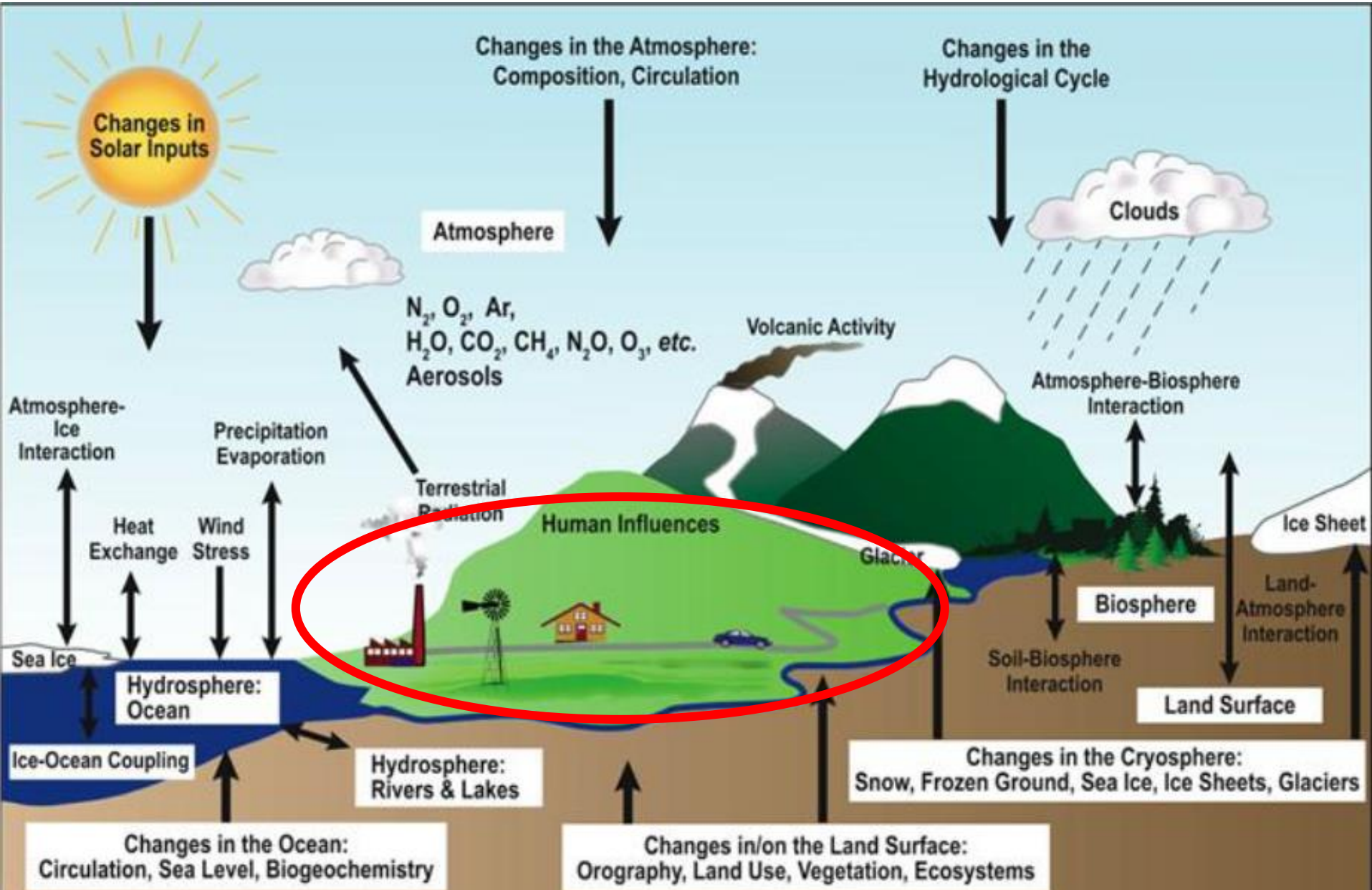
Panorama Climático em Ano de “La Niña”



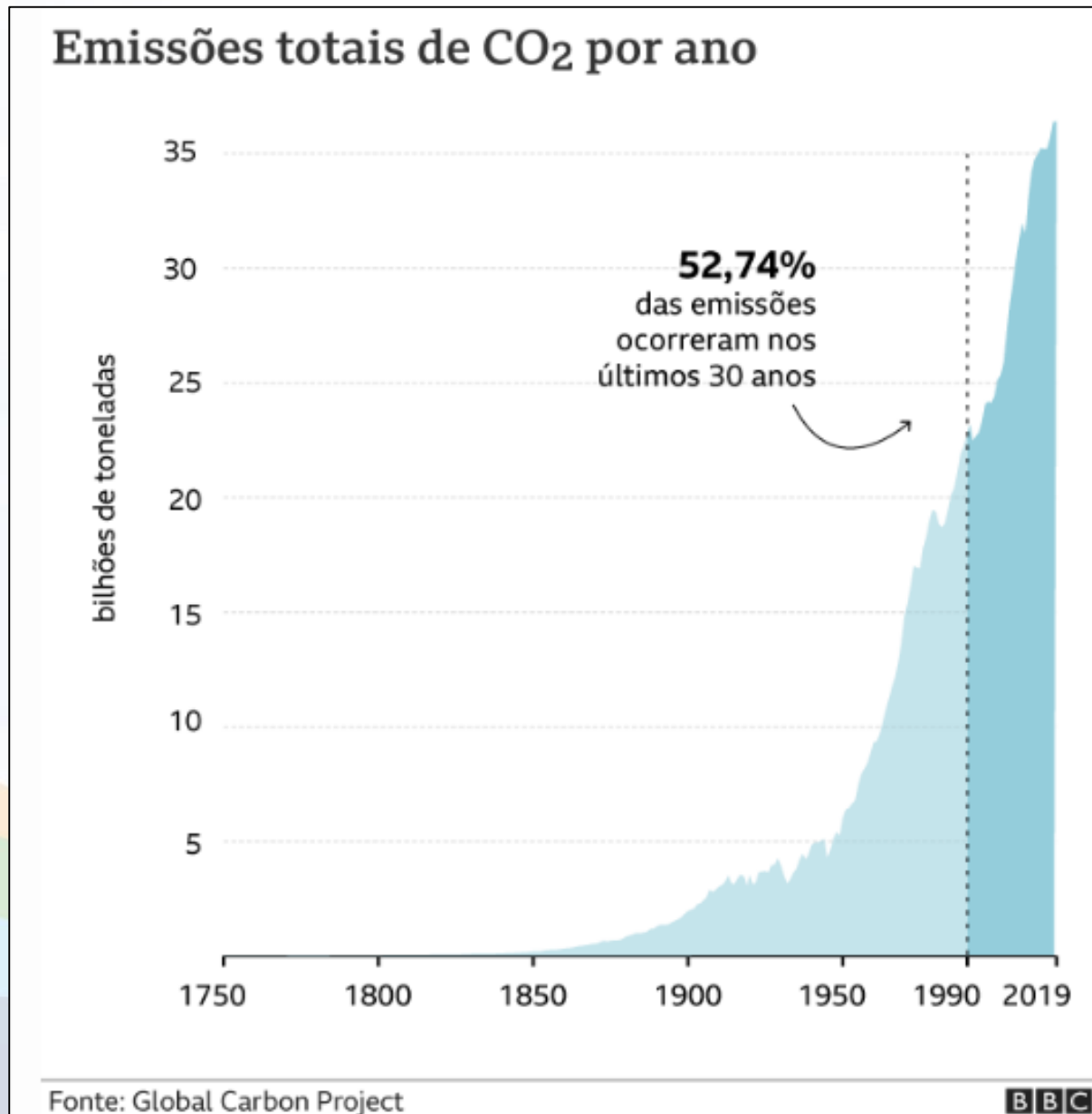
Marcelo E. Seluchi

CG de Operações e Modelagem
CEMADEN/MCTI

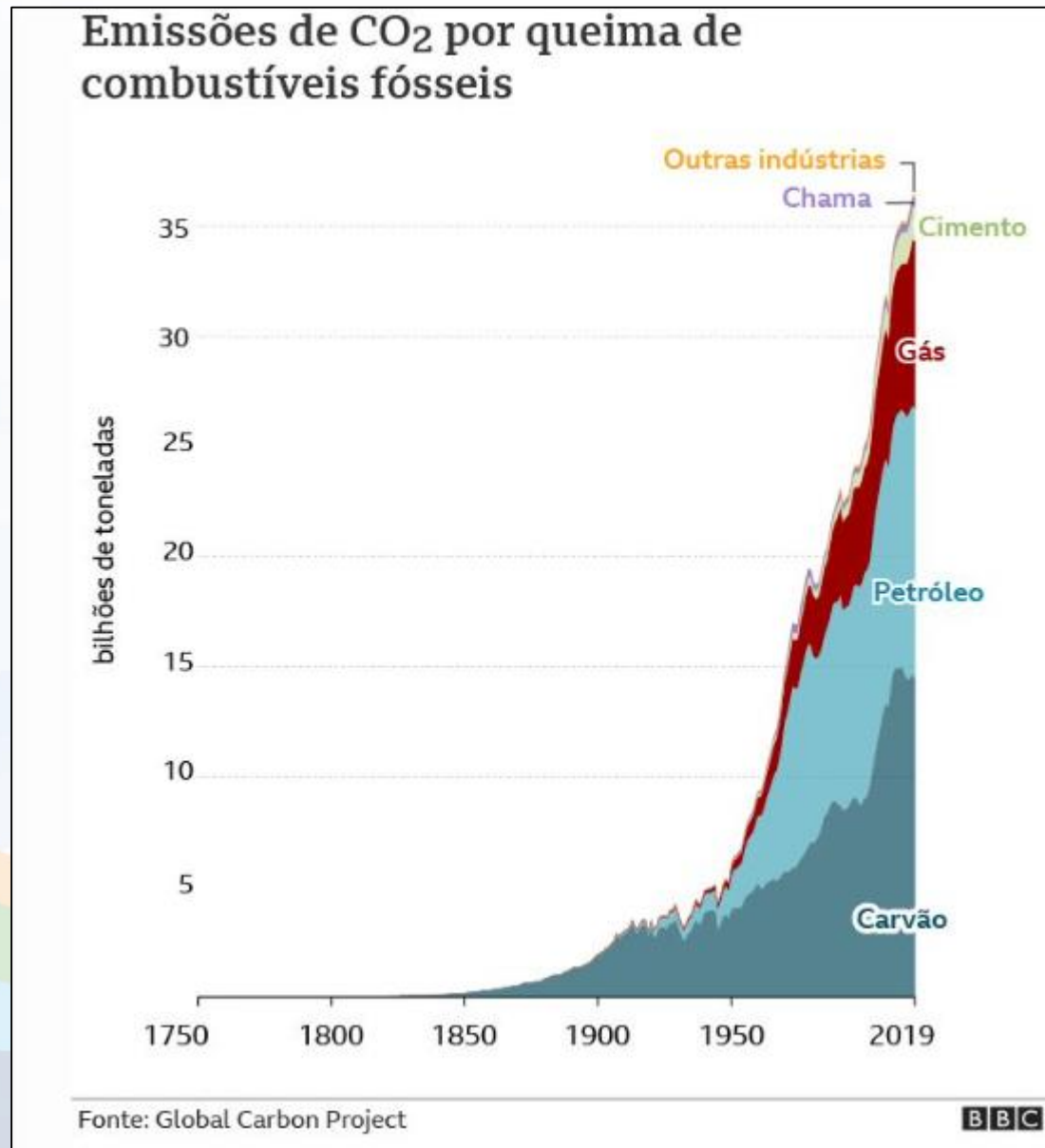
O sistema climático



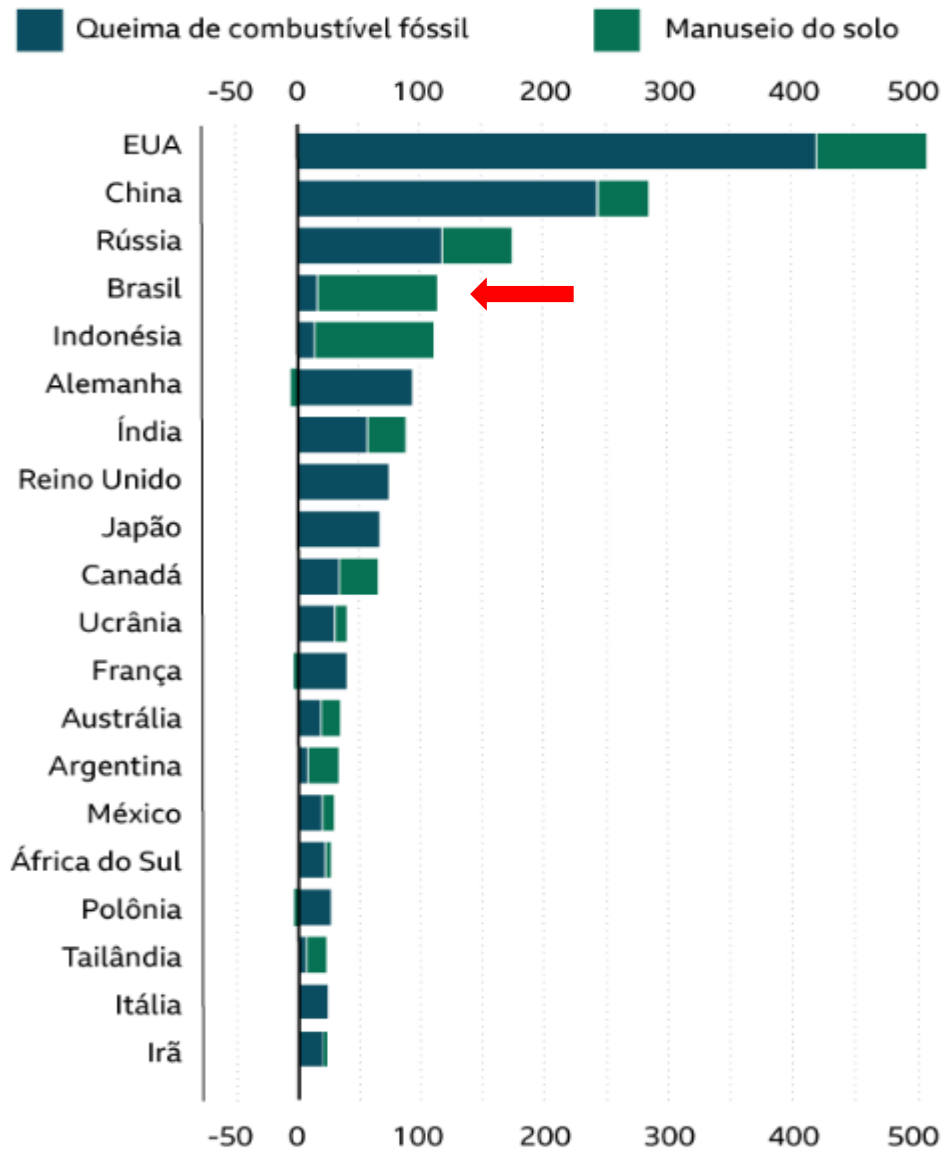
Evolução das emissões de gases de Efeito Estufa



Evolução das emissões de gases de Efeito Estufa



Países com maior acúmulo de emissões de CO2 1850-2021

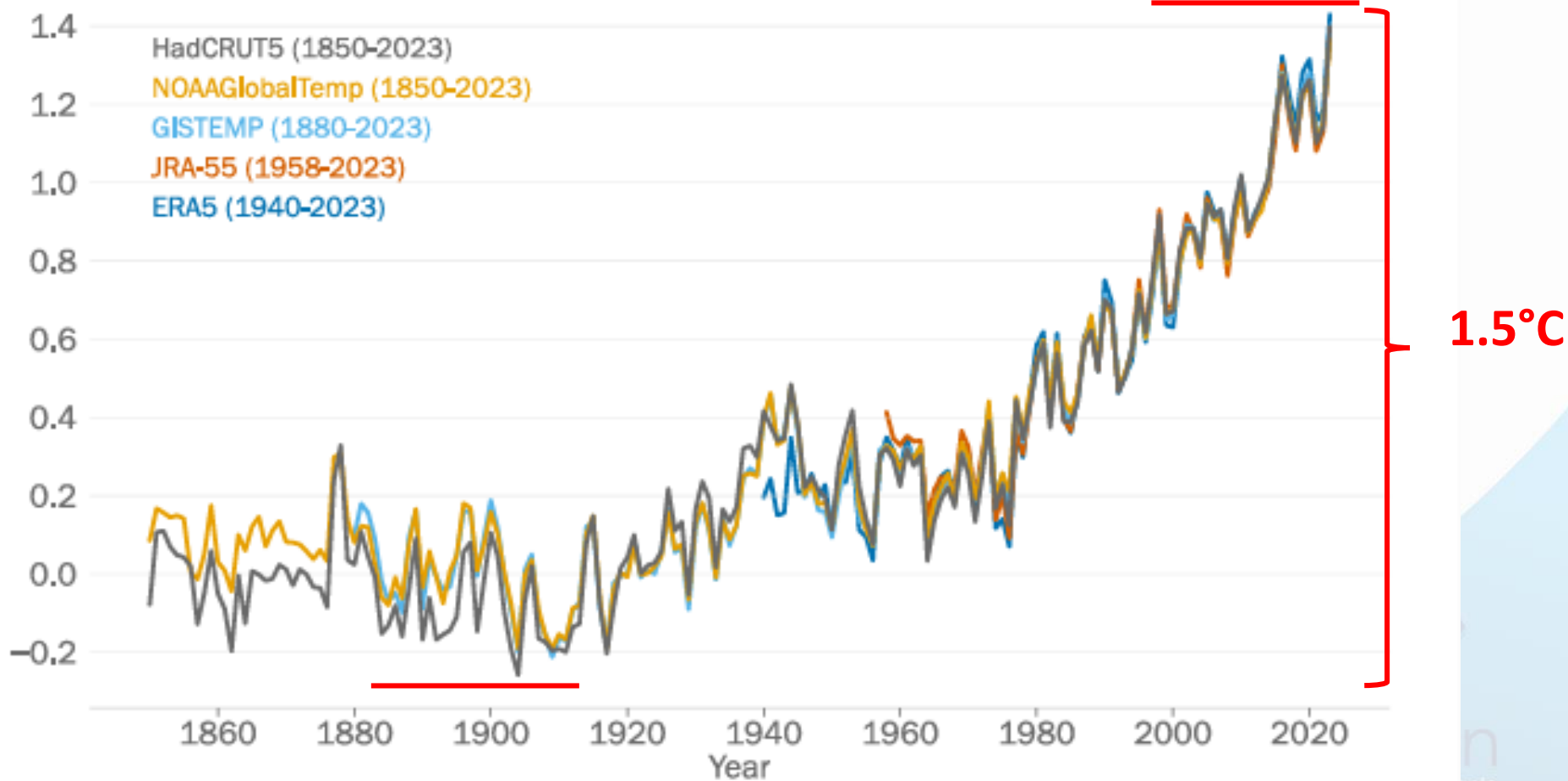


Fonte: Carbon Brief

BBC

Aumento da temperatura Global

Global Mean Temperature Difference (°C) Compared to 1850-1900 average

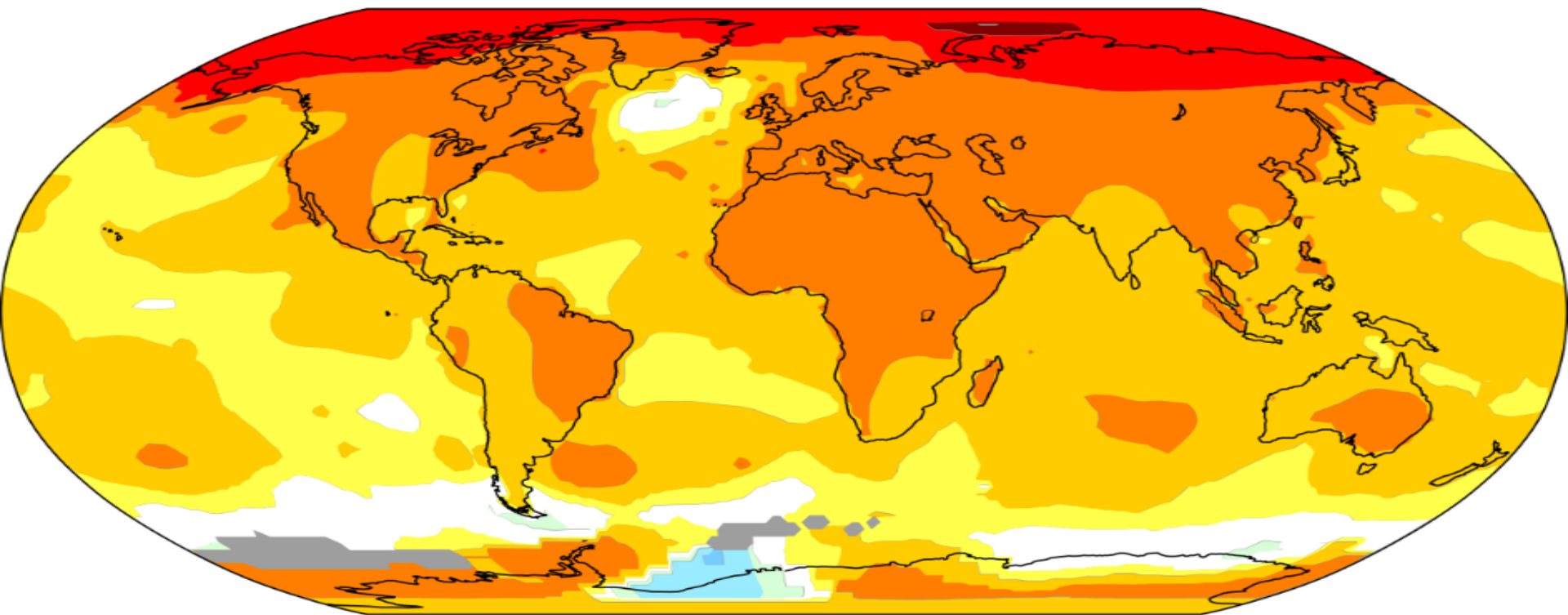


Created: 2023-11-23 22:22:00

1.5°C

Aumento da temperatura Global

Temperature change in the last 50 years



2011-2021 average vs 1956-1976 baseline (°C)



-1.0° -0.5° -0.2° +0.2° +0.5° +1.0° +2.0° +4.0°

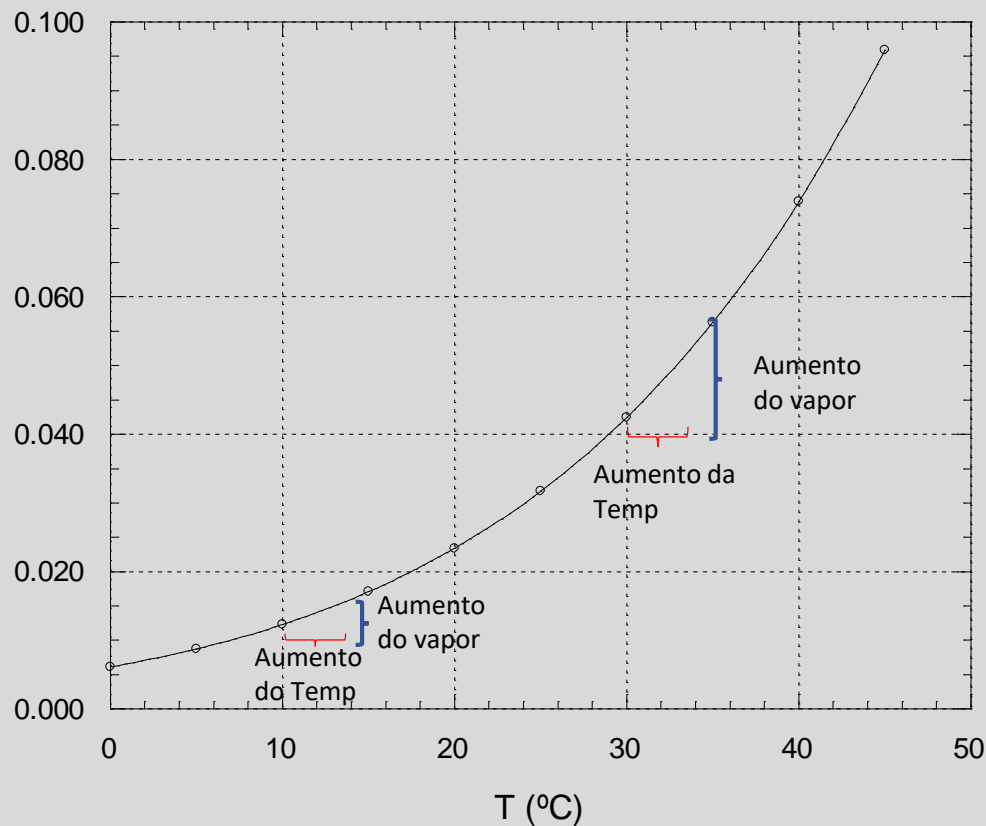
Conteúdo de vapor na atmosfera em função da temperatura

(Leis da termodinâmica do S. XVIII)

$$e_s = A \cdot \exp \frac{17,3 \cdot t}{237,3 + t}$$

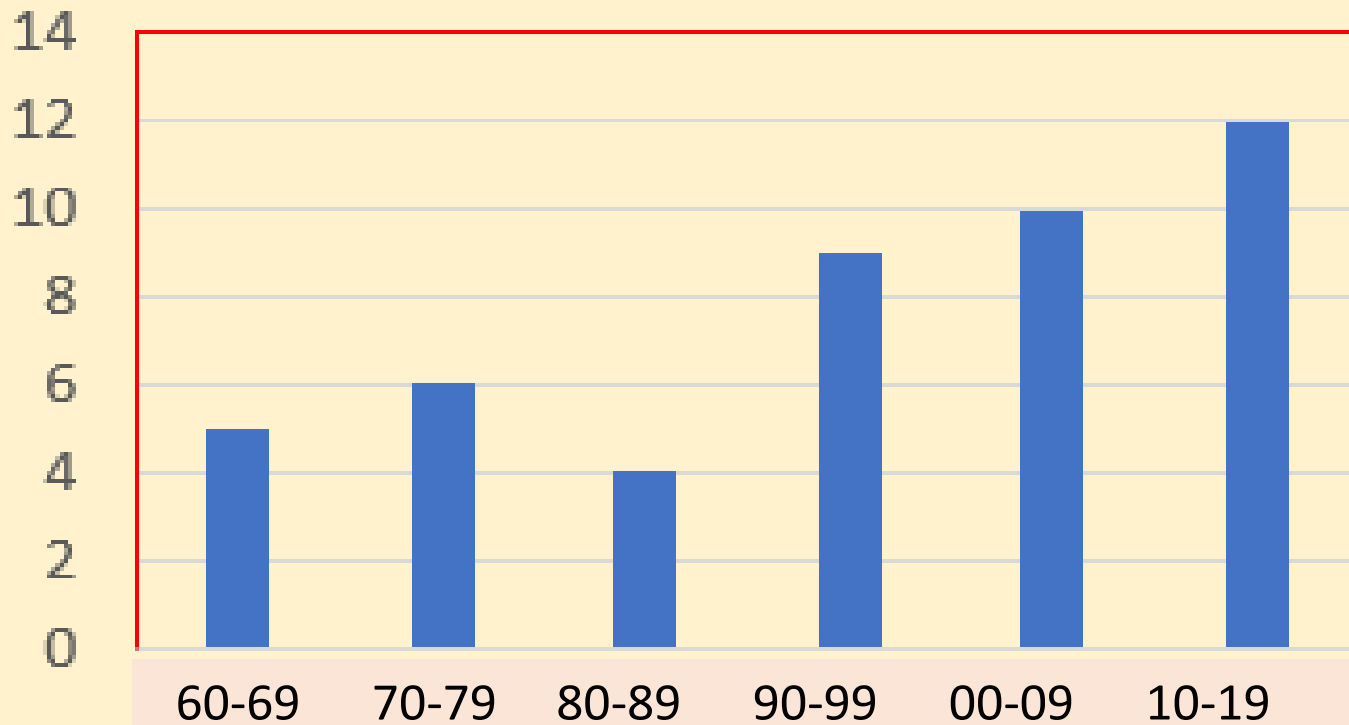
Água precipitável

Presion de vapor del agua (liq) en funcion de la temperatura



Relação entre temperatura e umidade do ar Chuvas mais intensas??

Dias com chuva acima de 80mm
em Belo Horizonte



Tendência de extremos climáticos de precipitação

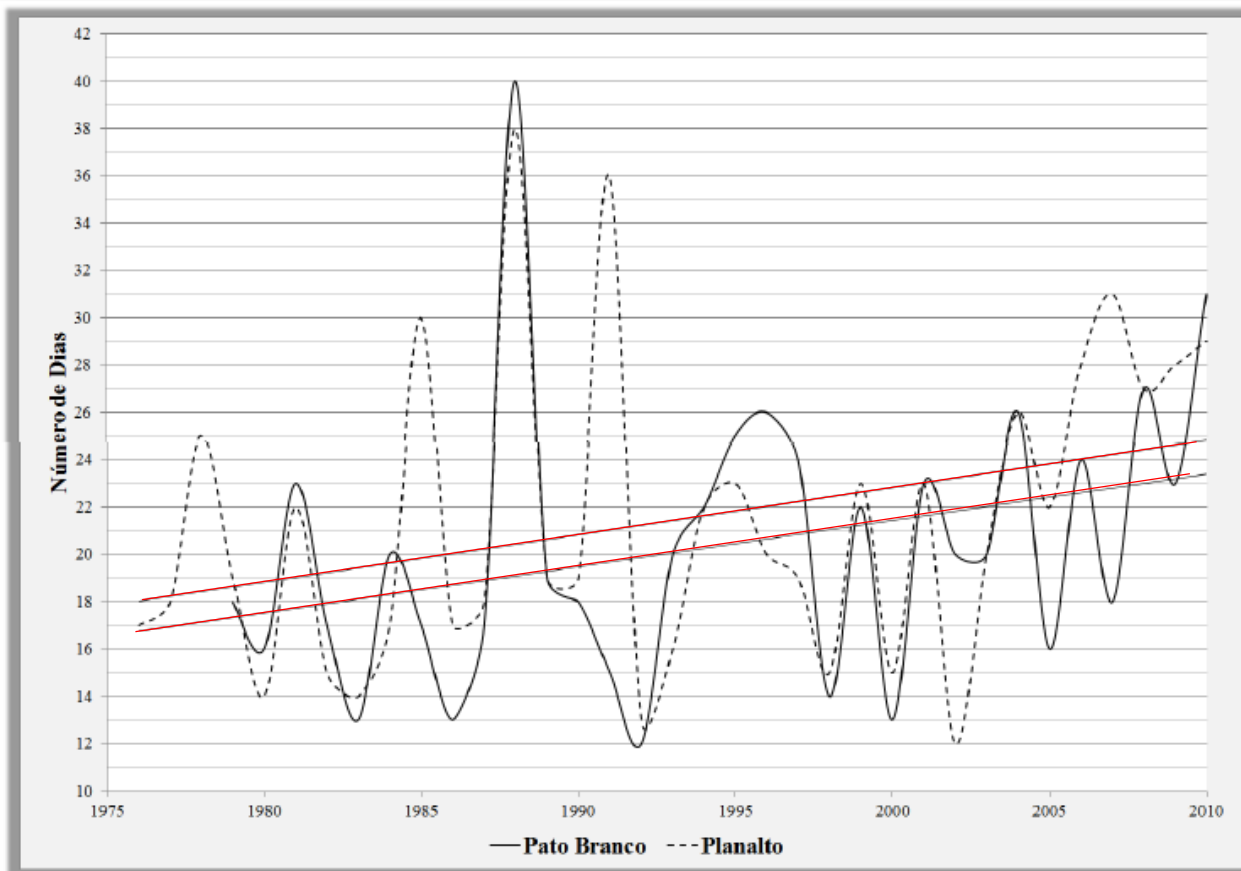
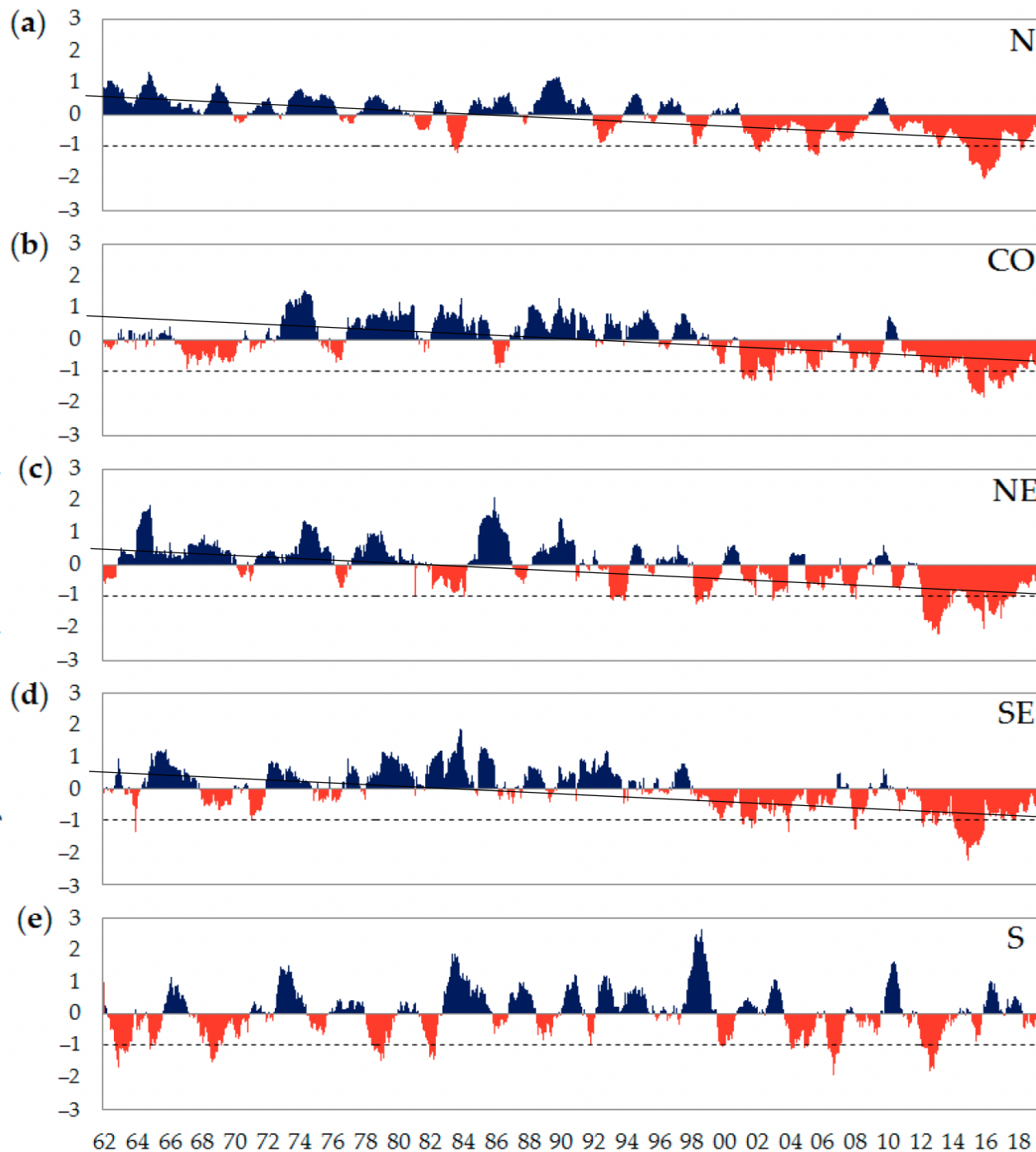


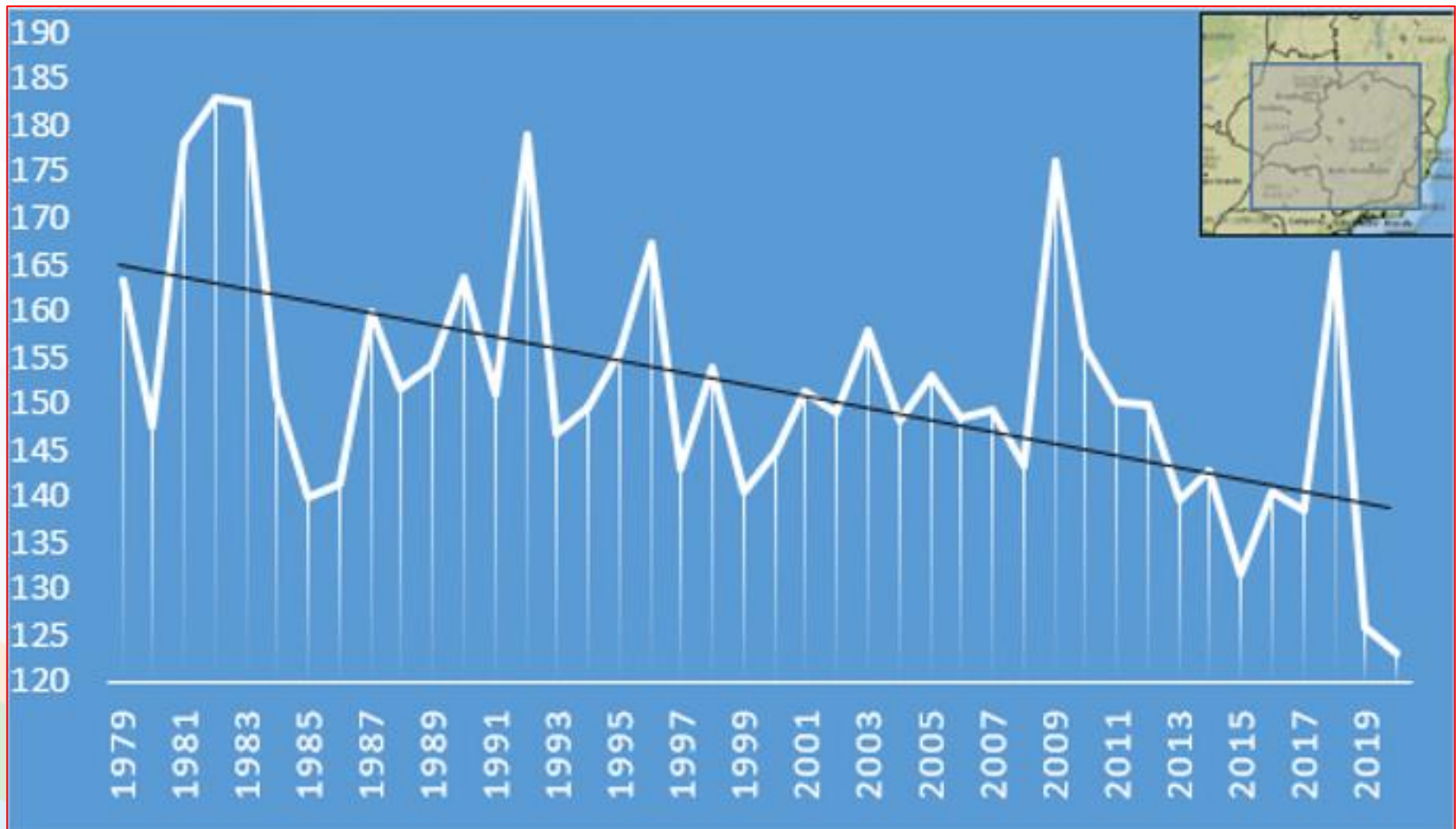
Figura 8 - Evolução temporal do indicador de extremo climático de precipitação CDD (dia/ano) nas estações Pato Branco (linha cheia) e Planalto (linha tracejada).

Monthly time series (1962 – 2019) of 12 – month SPI



Varição mensal do SPI-12 de 1962-2019 para as regiões do Brasil: (a) N: Norte; (b) CO: Centro Oeste; (c) NE: Nordeste; (d) SE: Sudeste, e (e) Sul. (Cunha et al 2019)

Duração (dias) da estação chuvosa



A estação chuvosa encurtou 25 dias nos últimos 40 anos!!

Evolução do calor nos Oceanos

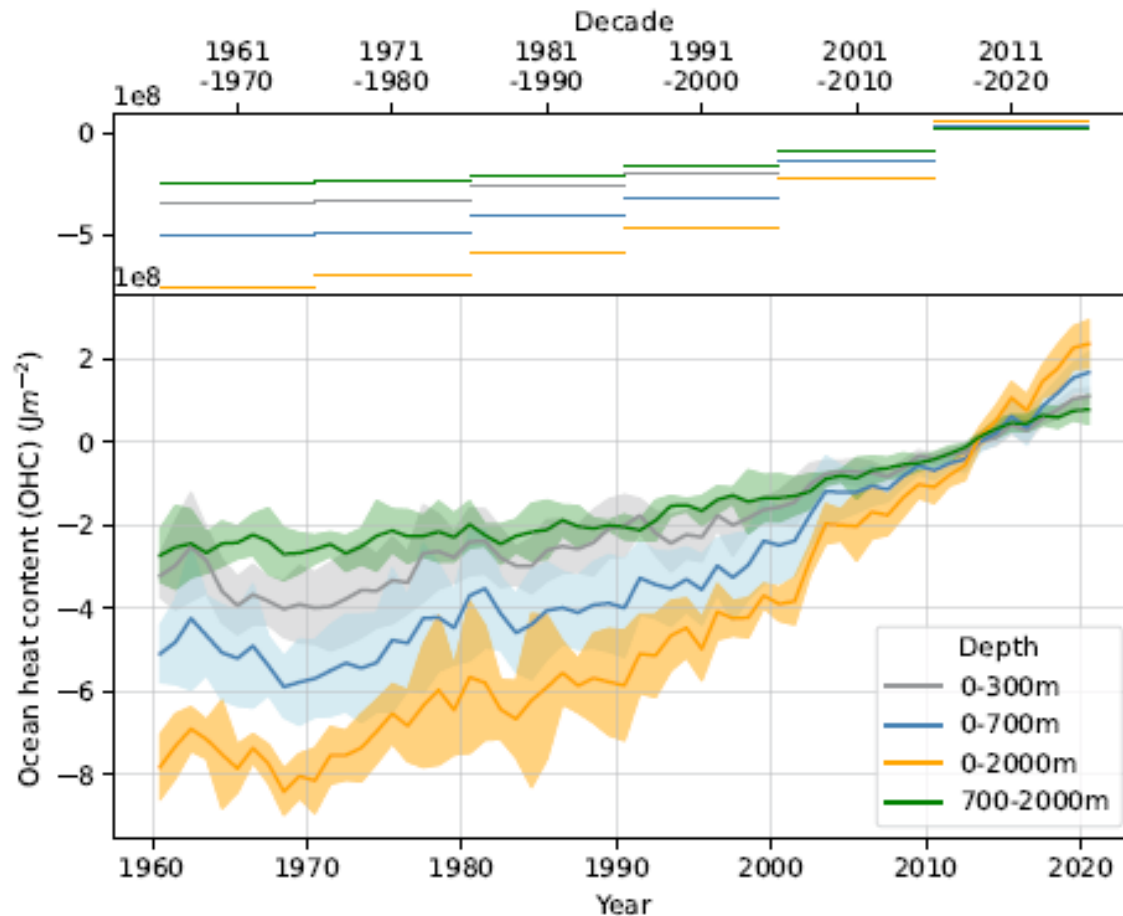
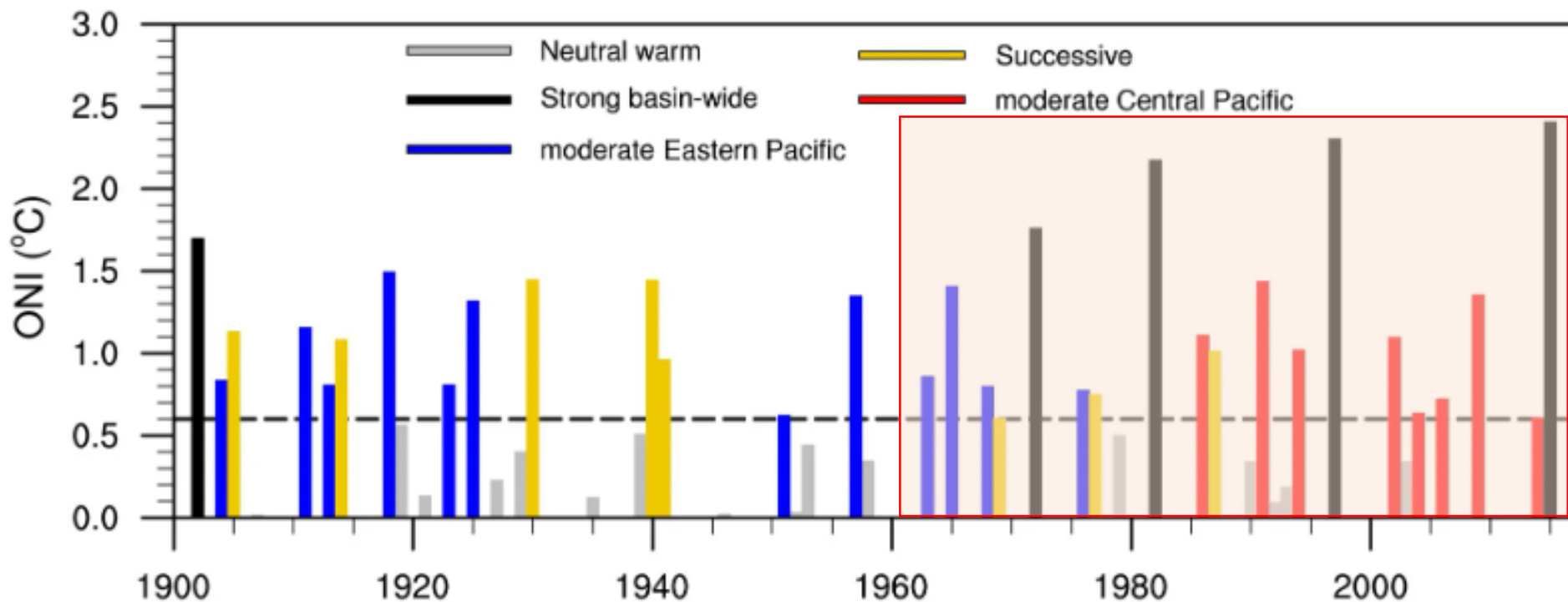


Figure 9. The 1960-2020 ensemble mean by decade (top) and time series and ensemble standard deviation (2-sigma, shaded) of global ocean heat content anomalies relative to the 2005-2017 climatology for the 0-300m (grey), 0-700m (blue), 0-2000m (yellow) and 700-2000m depth layer (green). Updated from von Schuckmann et al., 2020.

Frequência e intensidade de eventos do “El Niño”



Tipos El Niño (codificados por cor pela localização e força do início) de 1901 a 2017.

Projeções do IPCC (CMIP 6) Grupo de Trabalho 1 IPCC (2021)

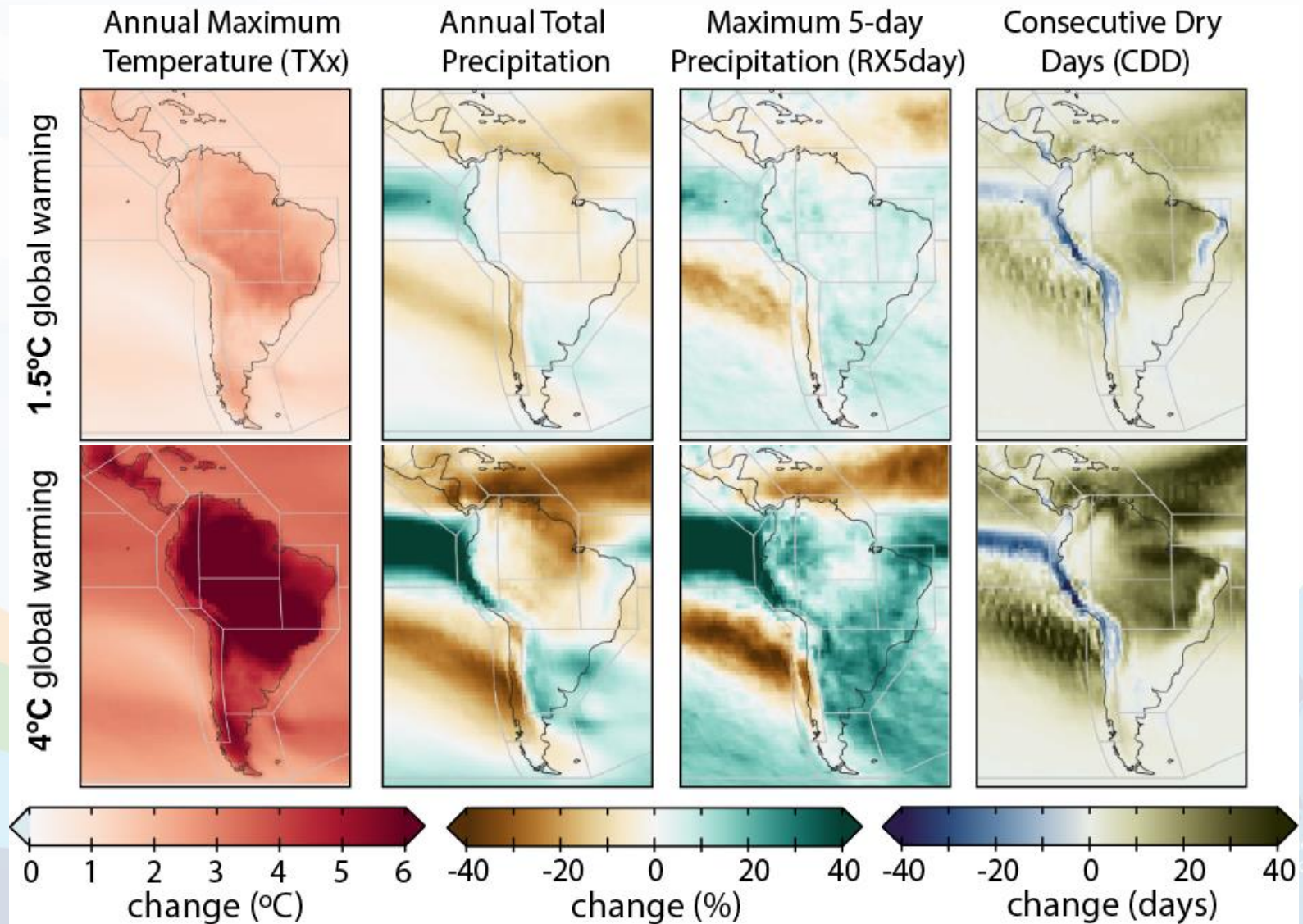
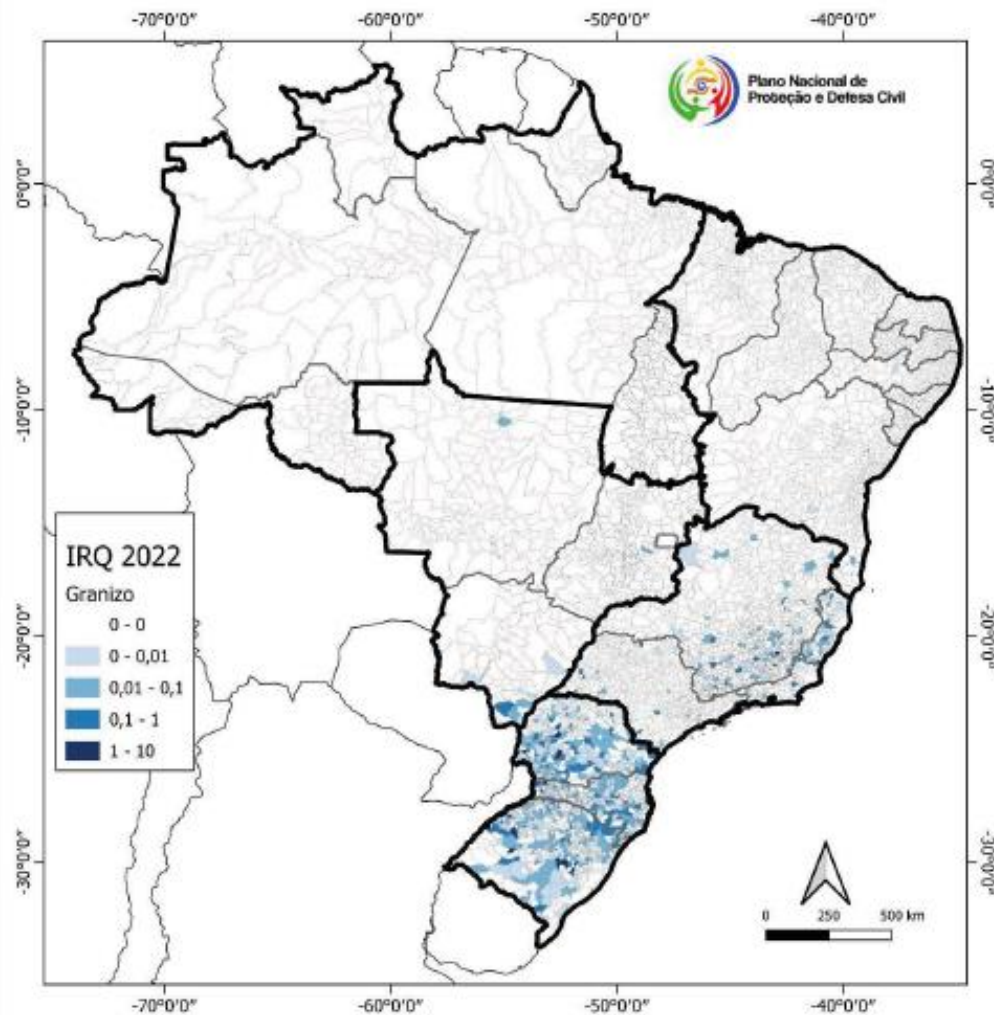
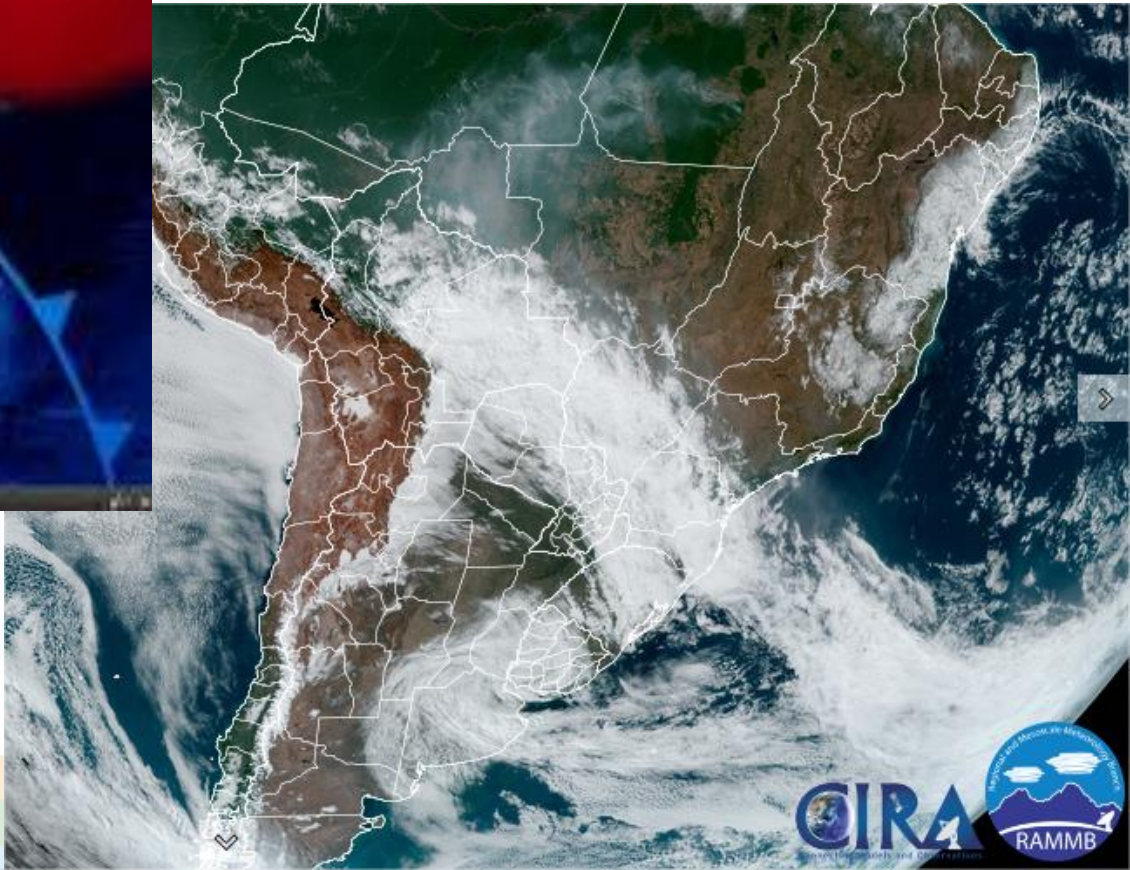


Figura 18 – Mapa do Índice de Risco Qualitativo (IRQ) de Granizo



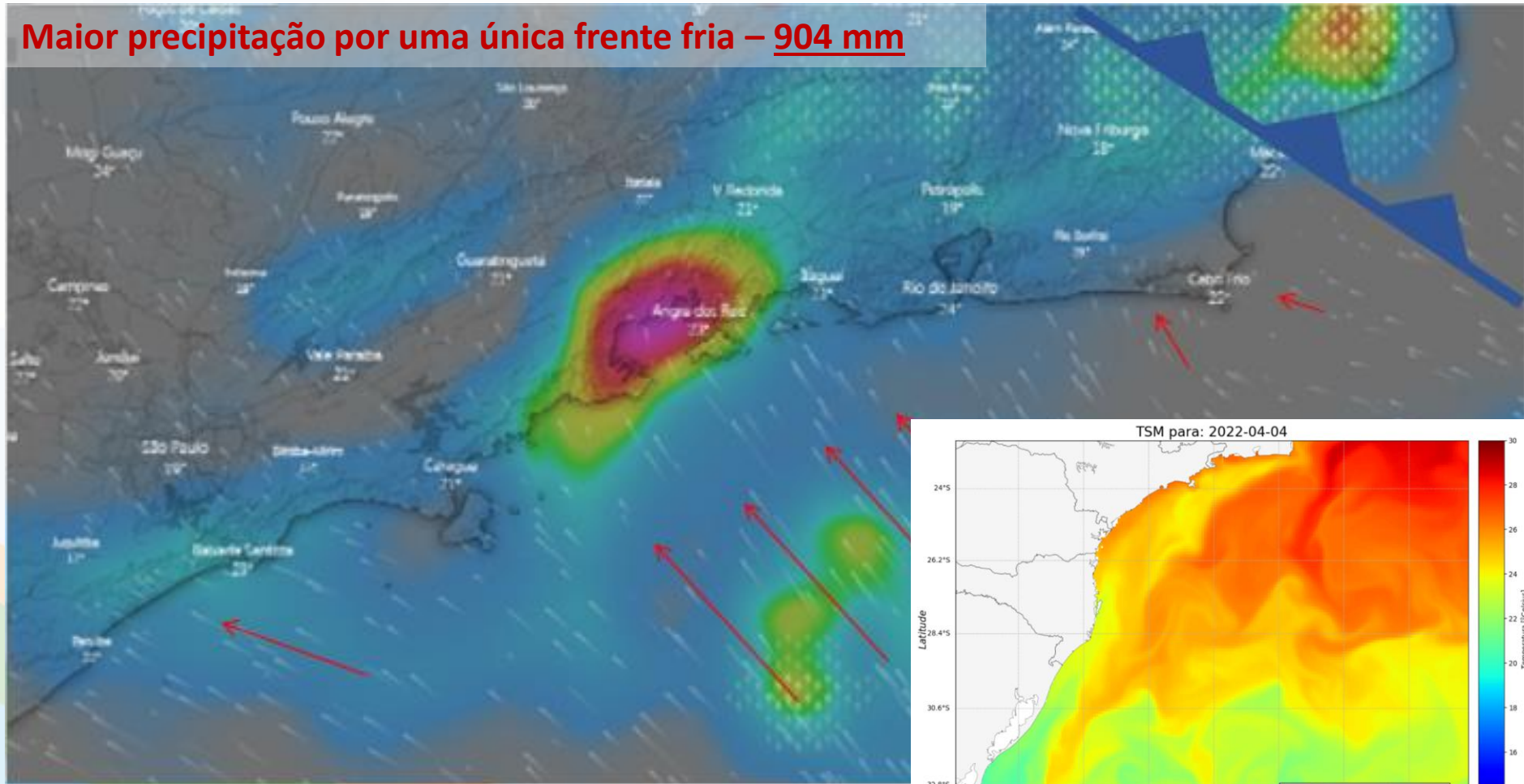
Frentes atmosféricas



Chuvas em Angra dos Reis-RJ

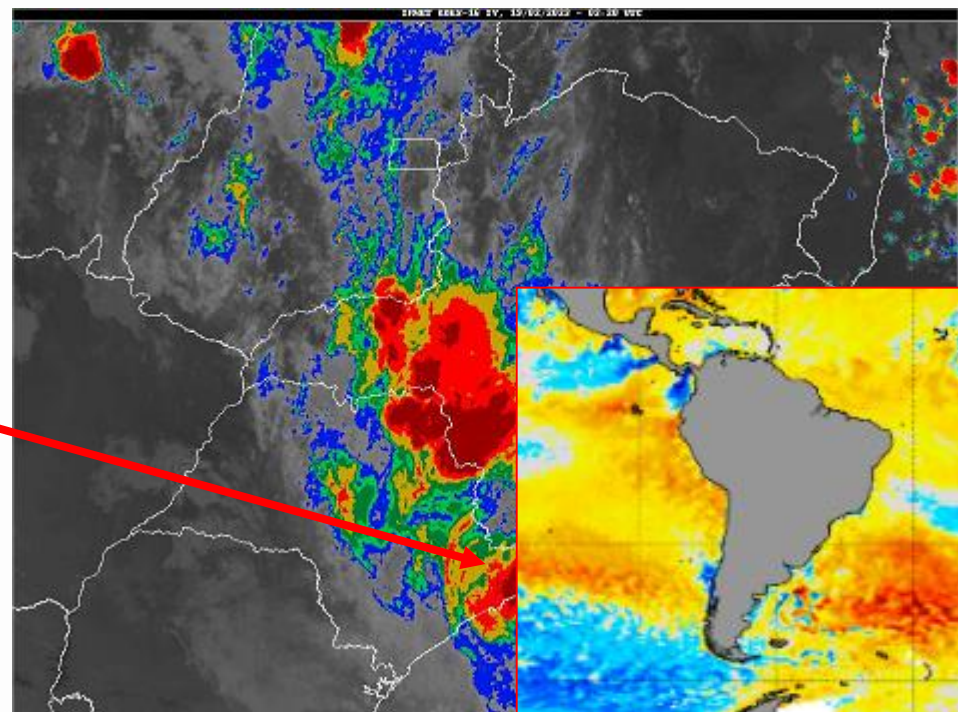
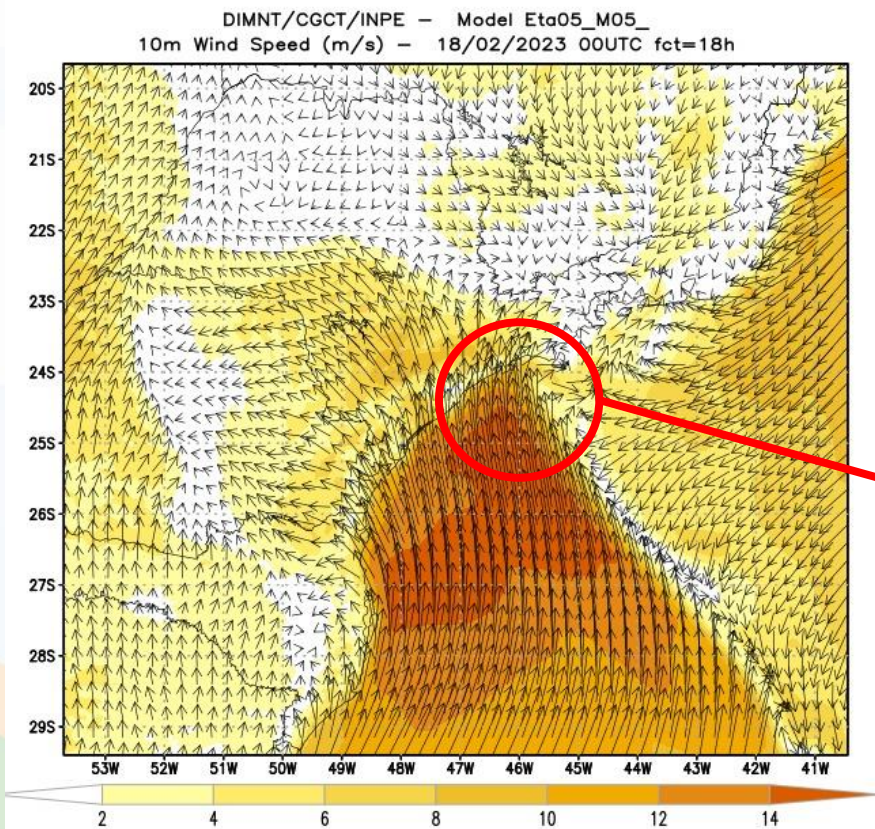
02 de abril de 2022

Maior precipitação por uma única frente fria – 904 mm



e Alertas de Desastres Naturais

Chuvas de São Sebastião-SP



Frente fria combinada com ventos perpendiculares à costa
Maior precipitação registrada em 24h - 19/02/23 - 683mm

Frentes quentes e estacionárias

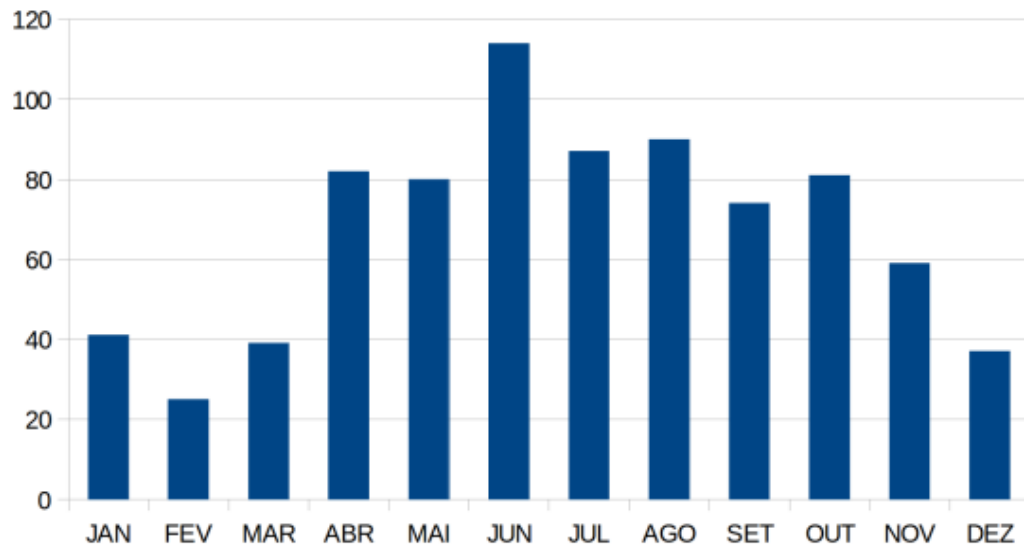
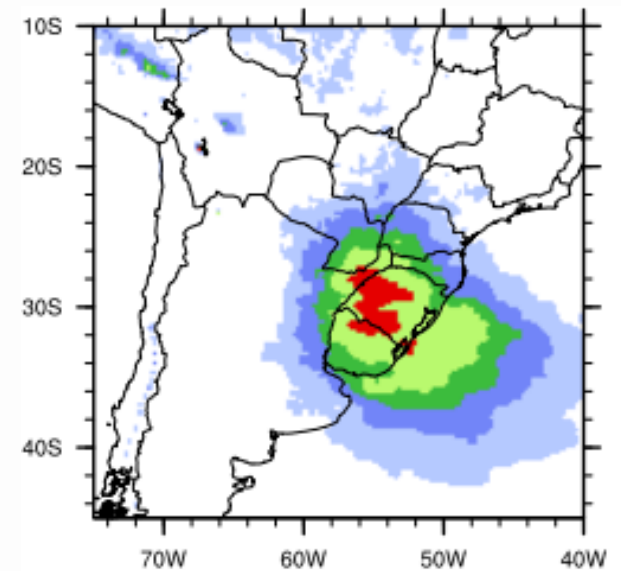


Figura 4.1 - Quantidade de frentes quentes ocorridas em cada mês de 1979 a 2010.



Frentes quentes e estacionárias



Vale do Itajaí, SC, 2008

135 óbitos



Frentes quentes e estacionárias

Vale do Taquari, RS, 2023
54 óbitos, 4 desaparecidos

Rio Grande do Sul, 2024
182 óbitos, 31 desaparecidos



Ciclones



Ciclones (Bomba)



30/06/20



15-16/06/23



Tendência dos Ciclones

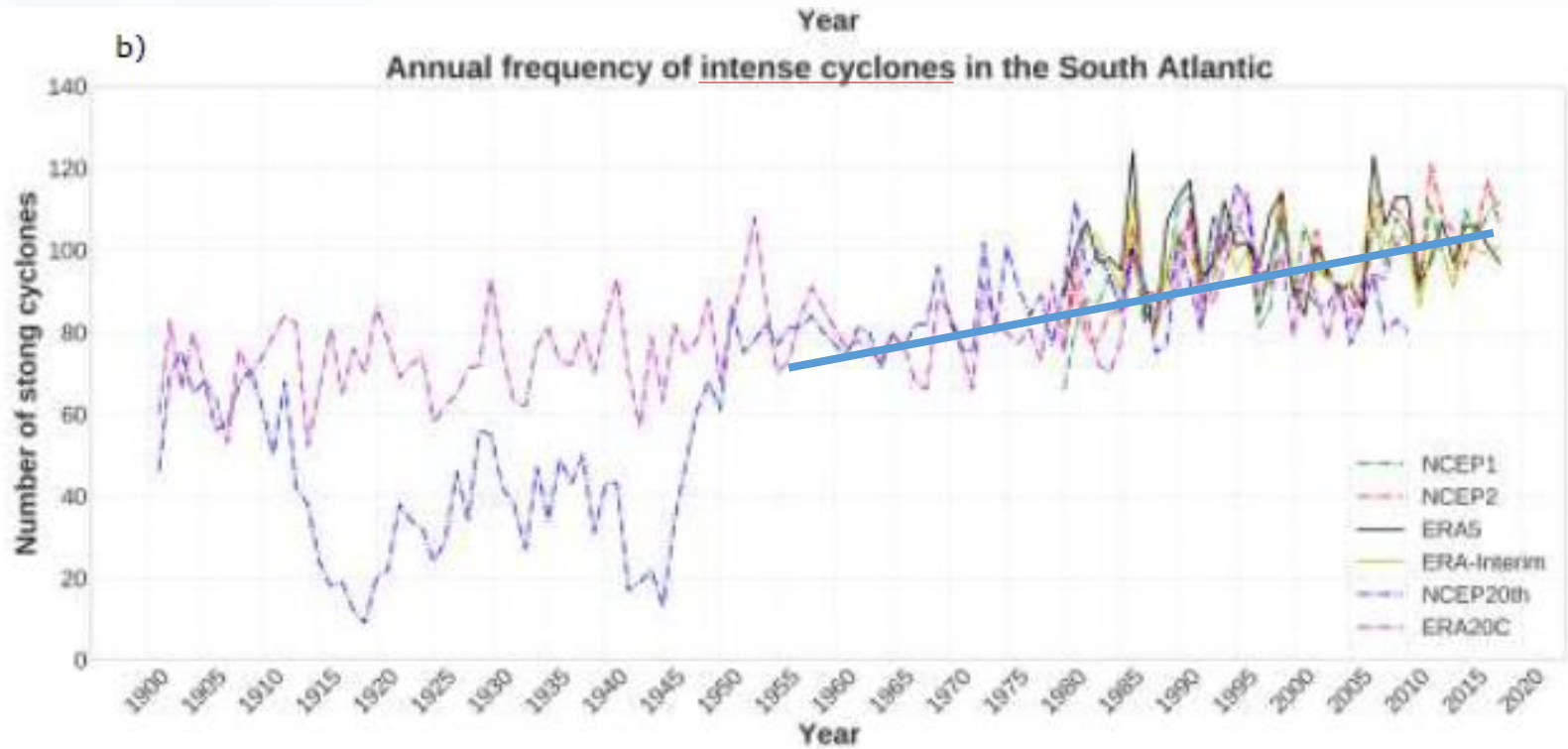
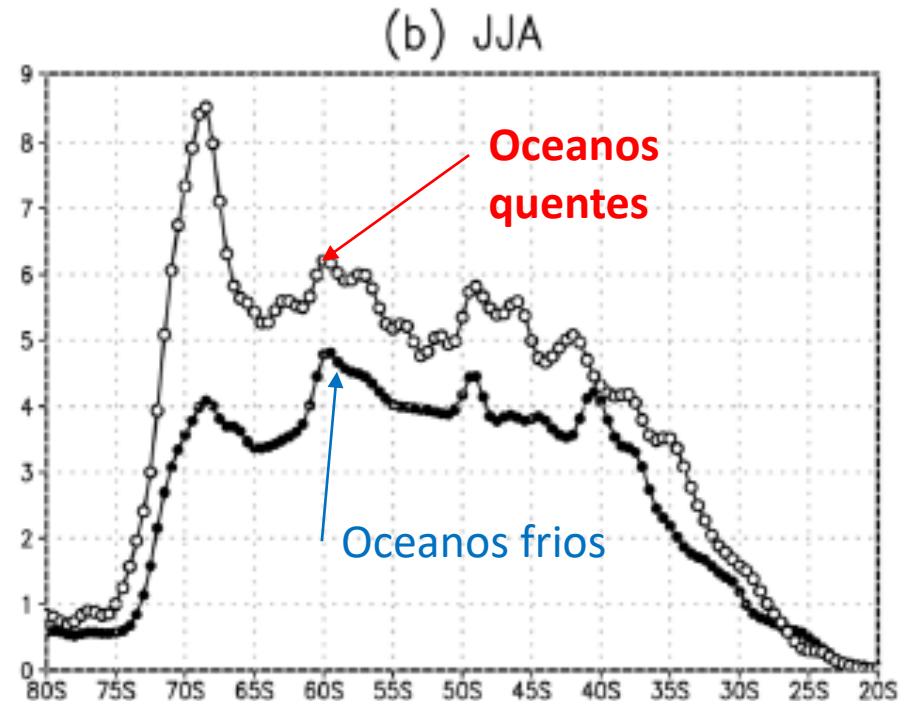
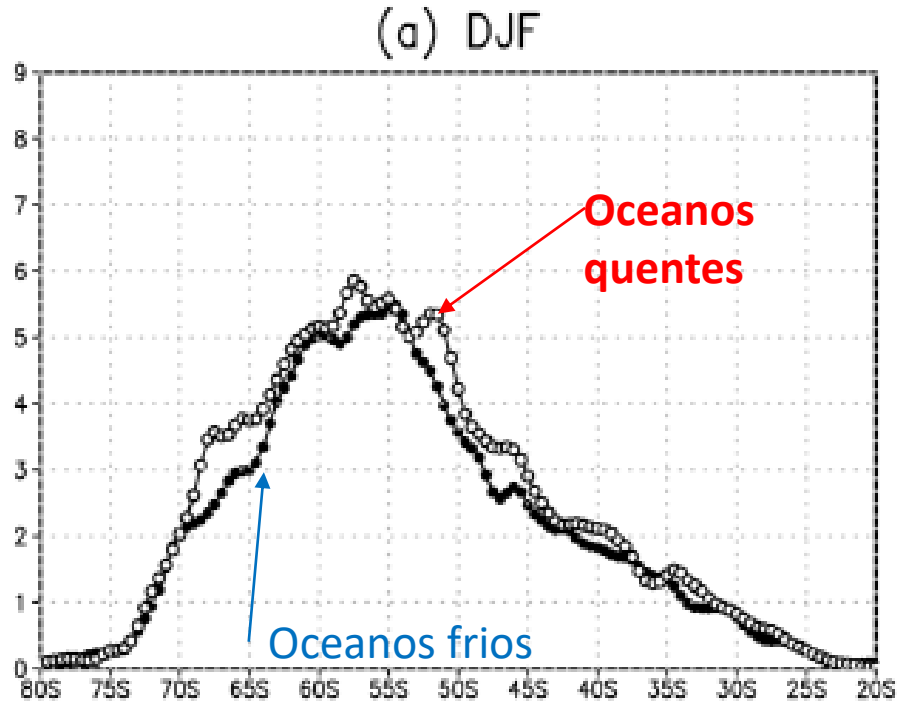


Figure 2 - Annual frequency of intense cyclones in the different reanalyses: (a) Southern Hemisphere and (b) South Atlantic Ocean.

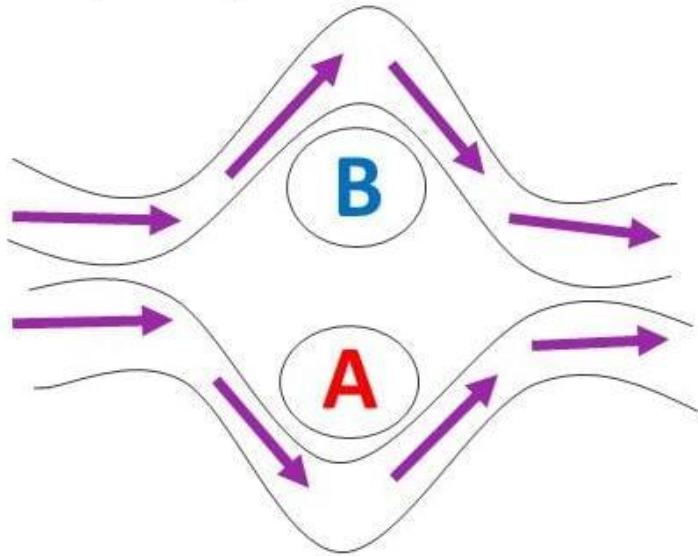
Ciclones (Bomba)



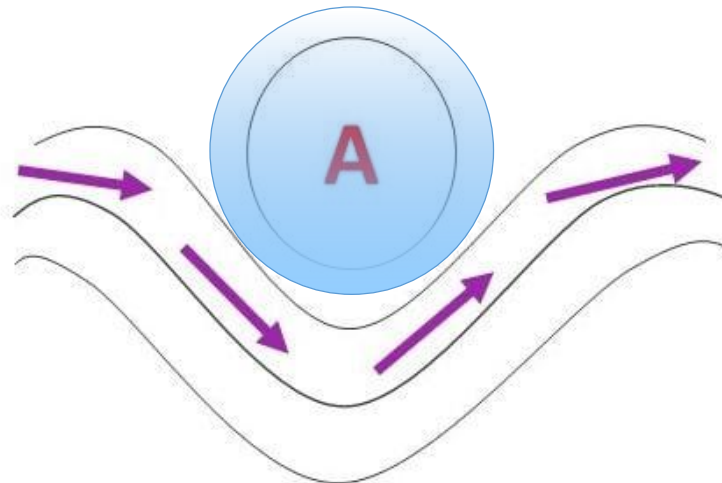
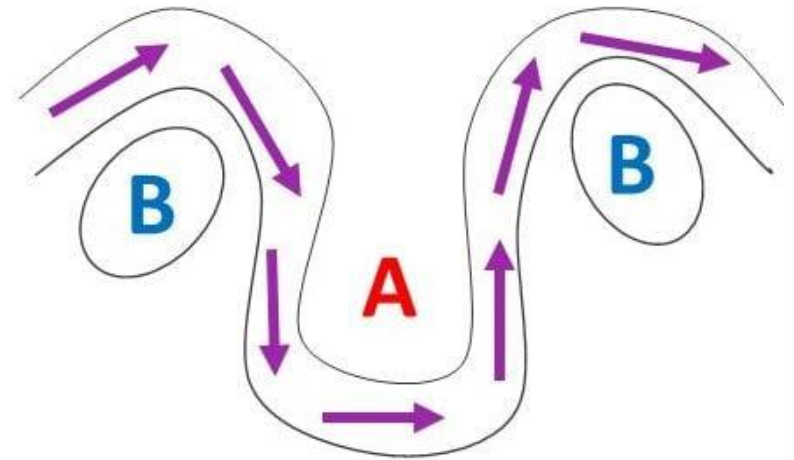
Número de ciclones por faixa de latitude em situações de oceanos quentes e frios

Bloqueios Atmosféricos

Bloqueio tipo Dipolo

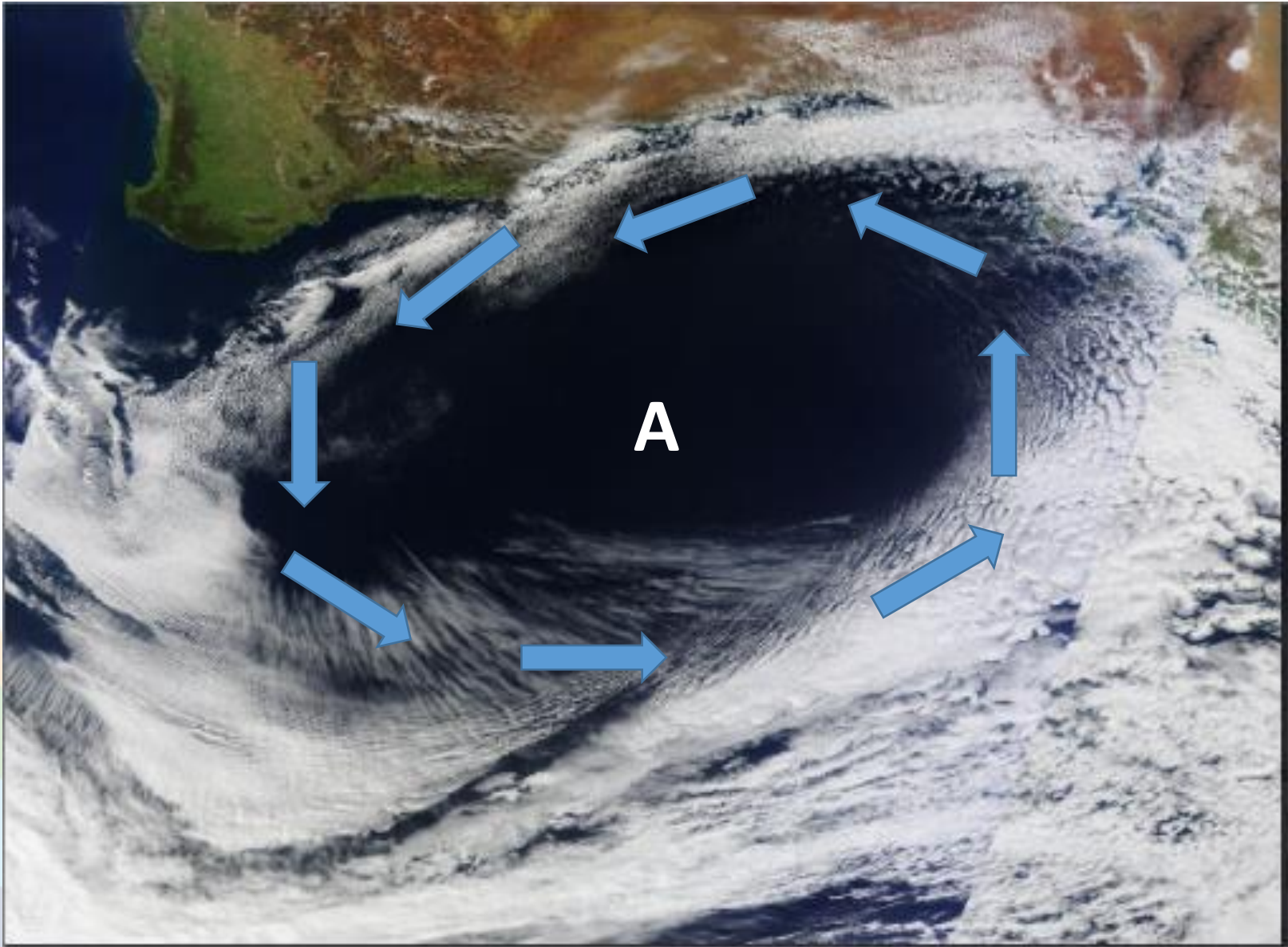


Bloqueio tipo Ômega



Bloqueio por um Anticiclone ou Crista de grande amplitude

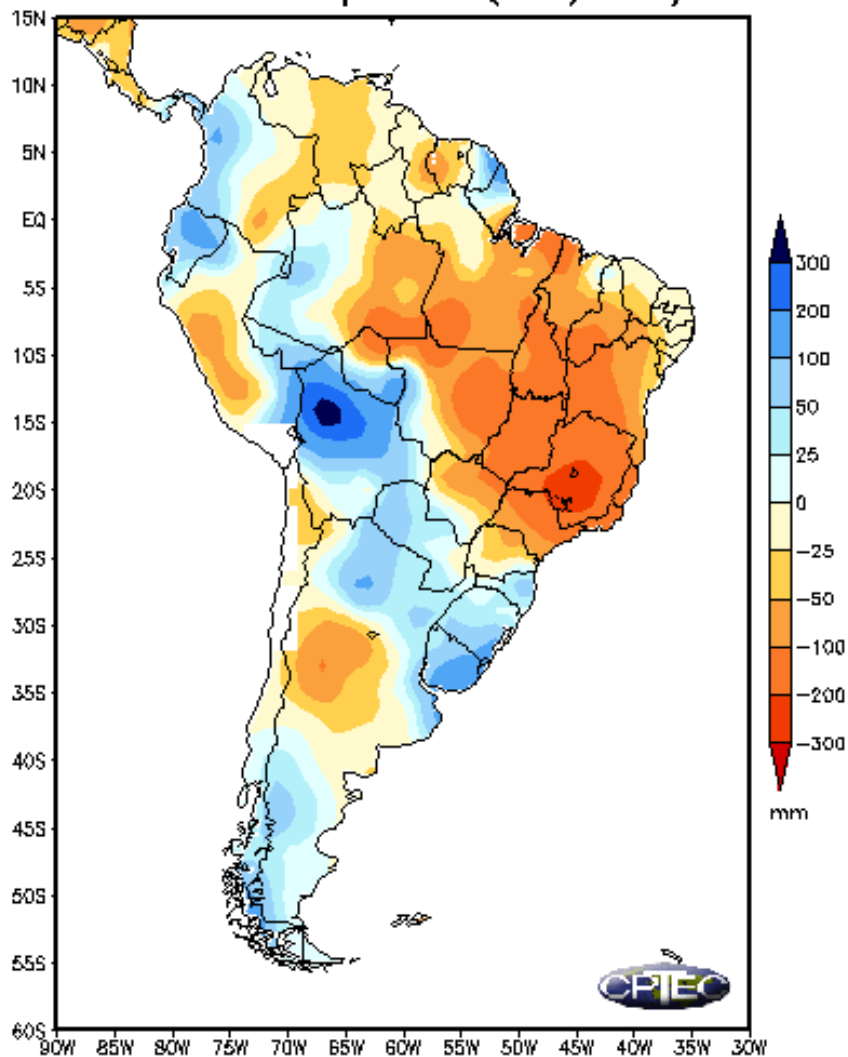
Anticiclones



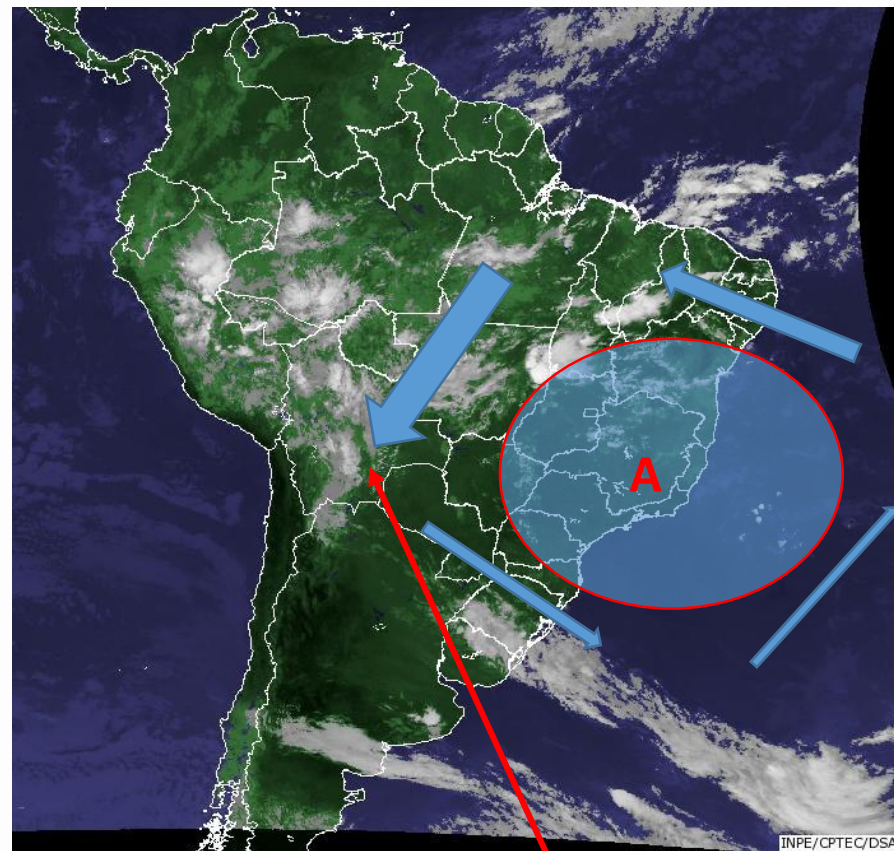
Situação atmosférica em janeiro e fevereiro de 2014

Data da última atualização: 19/02/2014

Anomalia de Precipitação (mm) - JAN/2014

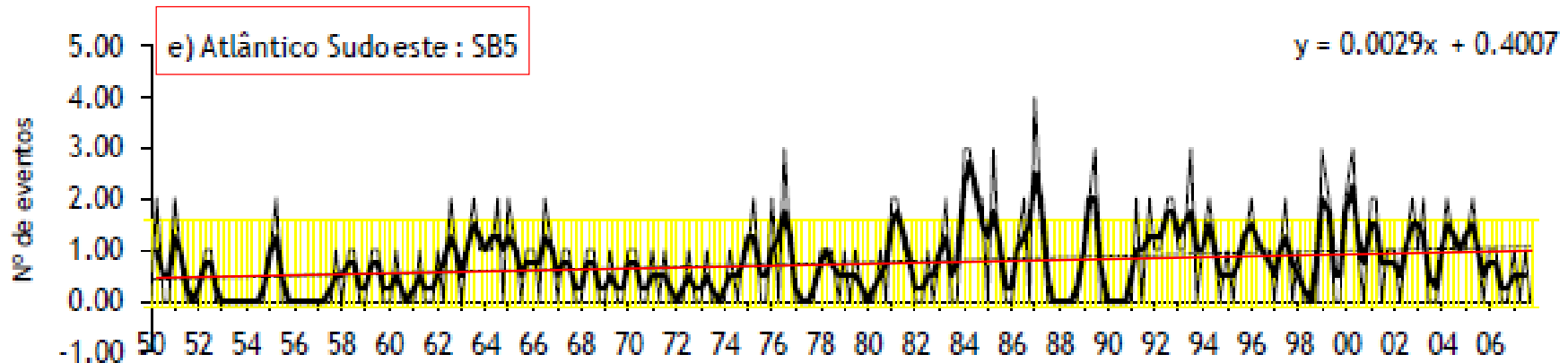


Fonte de Dados: CPTEC-INPE/INMET/FUNCEME-CE/SRH-BA/CEMIG/SIMGE-MG
LMRS-PB/EMPARN-RN/DMRH-RS/IAC-SP/ELDER-GO/SIMEPAR-PR/CLIMERH-SC

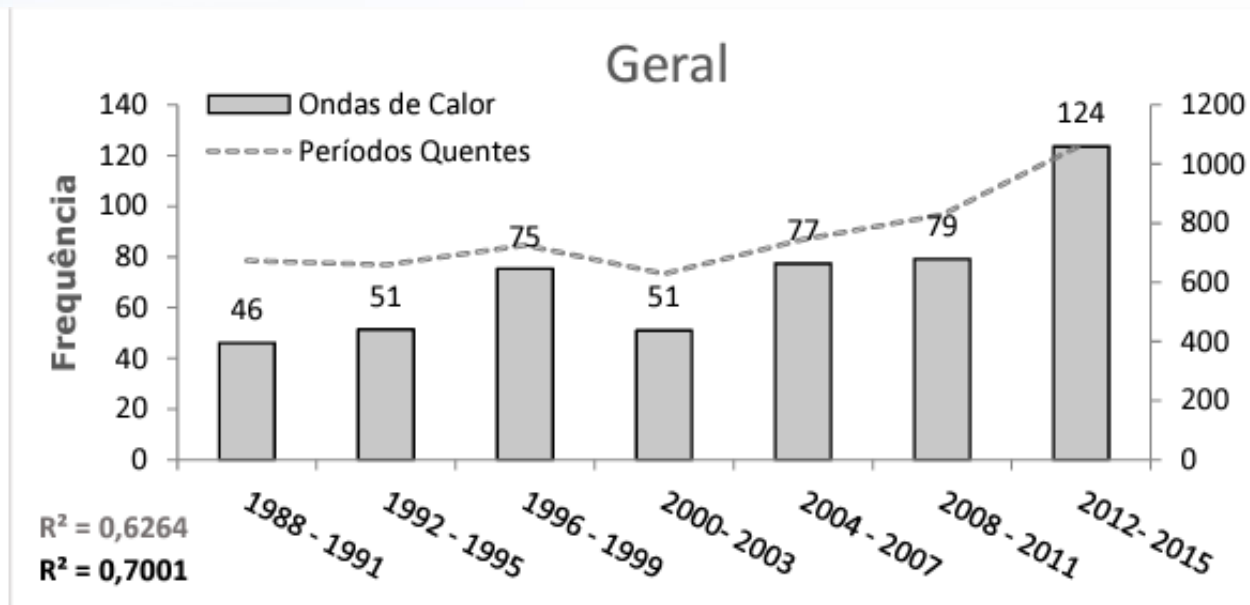


Nos baixos níveis da atmosfera os ventos favoreceram o transporte de umidade para o sul da Amazônia e a Bolívia

Tendência ocorrência de Bloqueios



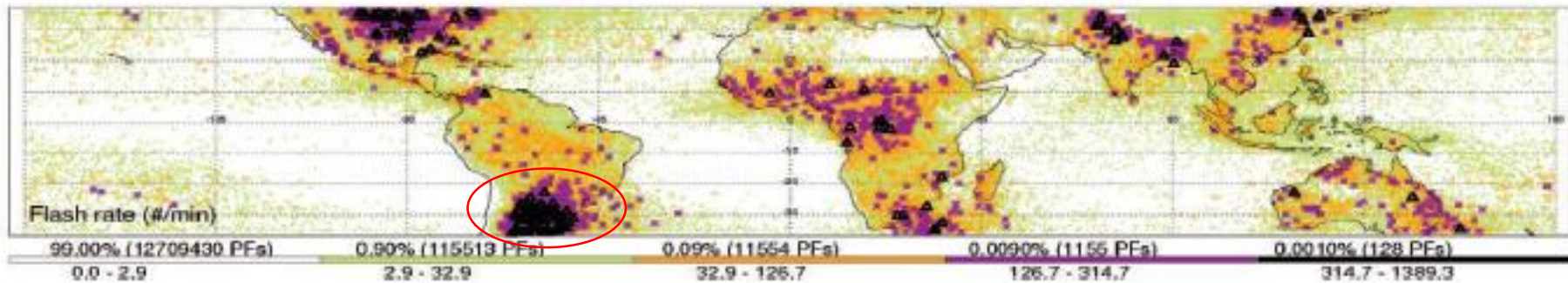
Oliveira 2011 USP



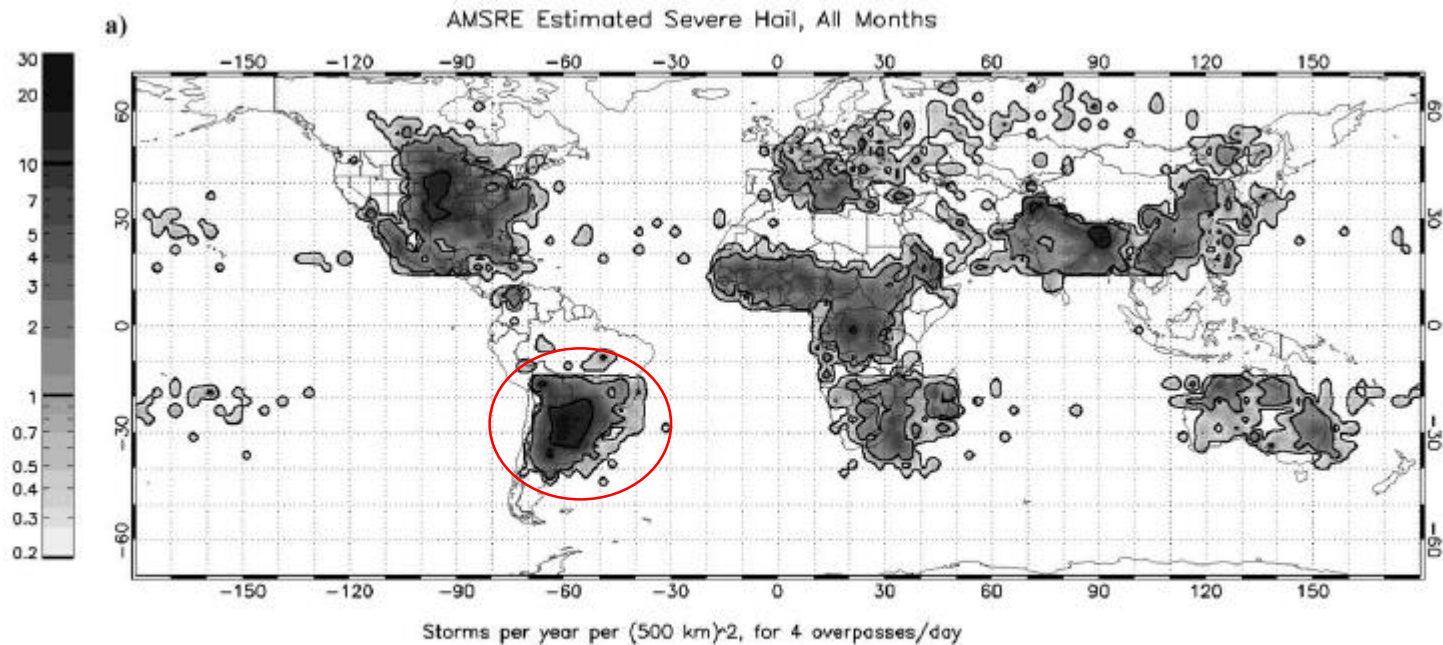
Tempestades Severas



Sistemas Convectivos Severos



Fonte: Zipser et al. (2006).



Fonte: Cecil e Blankenship (2012).

Evolução temporal de situações associadas a queda de granizo

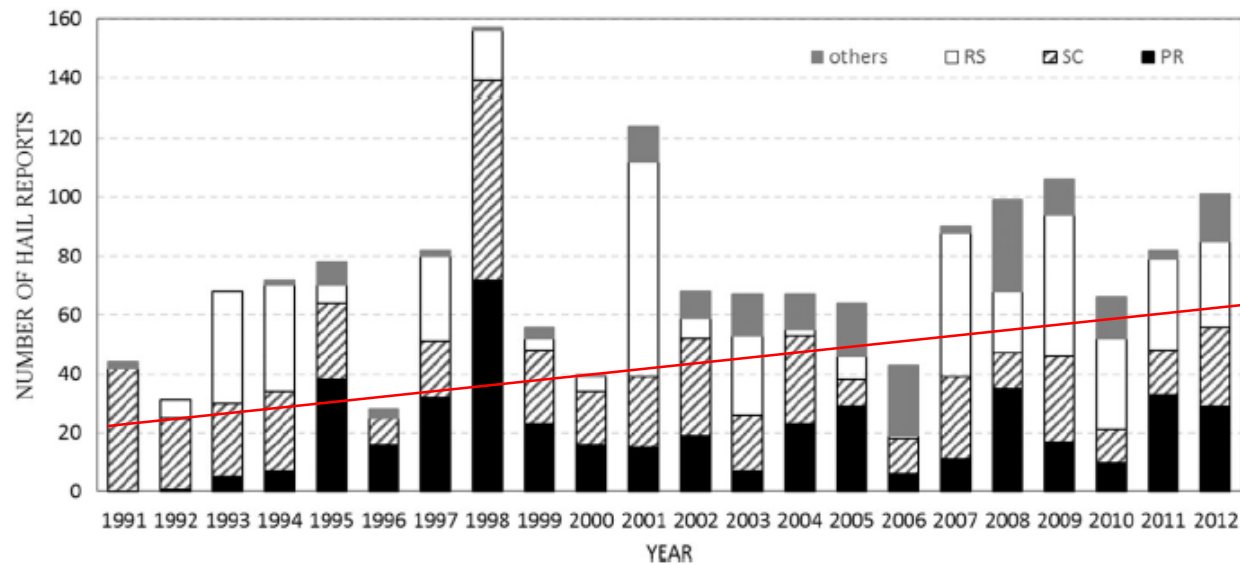


Fig. 3. Time series of the annual number of hail reports for the southern Brazilian States of Paraná (PR), Santa Catarina (SC), Rio Grande do Sul (RS), and other States, for the period 1991–2012.

Condições Observadas e Previsões

<https://www.youtube.com/watch?v=Su3t2dprDil>

<https://www.gov.br/cemaden/pt-br/assuntos/monitoramento/boletim-de-impactos/convite-para-reuniao-mensal-de-avaliacao-e-previsao-de-impactos-de-desastres>



REUNIÃO DE
IMPACTOS
DO CEMADEN

AVALIAÇÃO E PREVISÃO DE IMPACTOS DE EXTREMOS DE ORIGEM HIDRO-GEO-CLIMÁTICO EM ATIVIDADES ESTRATÉGICAS PARA O BRASIL

SEJA BEM VINDO

INICIAREMOS EM INSTANTES!

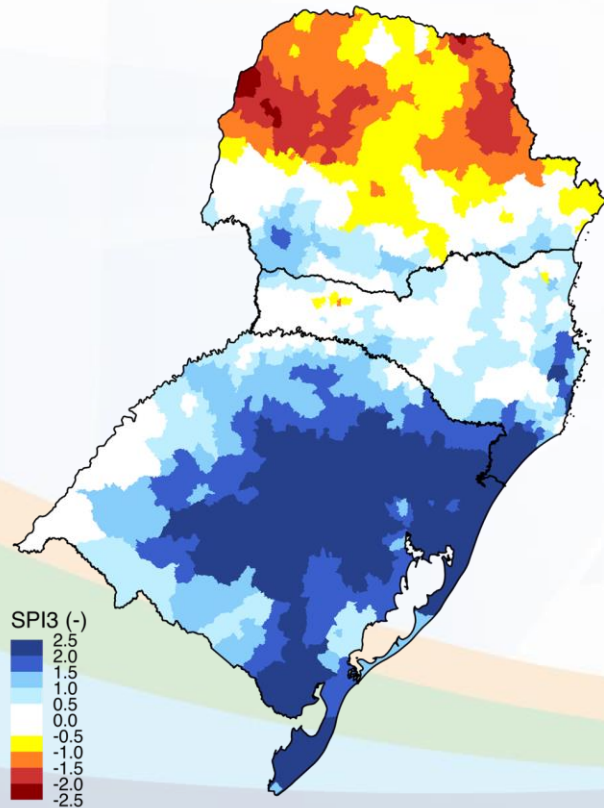
Cemaden
Centro Nacional de Monitoramento e Alertas de Desastres Naturais
UNIDADE DE PESQUISA DO NOT

MINISTÉRIO DA
CIÊNCIA, TECNOLOGIA
E INOVAÇÃO

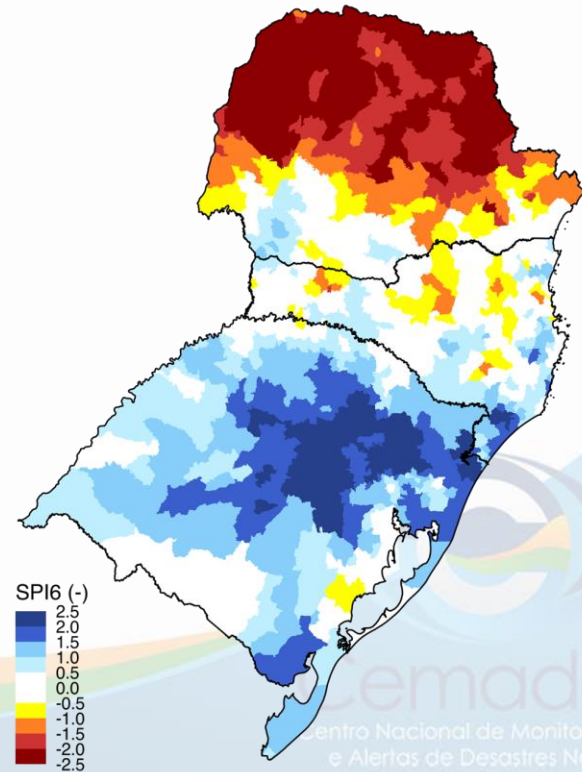
GOVERNO FEDERAL
BRASIL
UNIÃO E RECONSTRUÇÃO

SPI: AGOSTO 2024

SPI 03



SPI 06

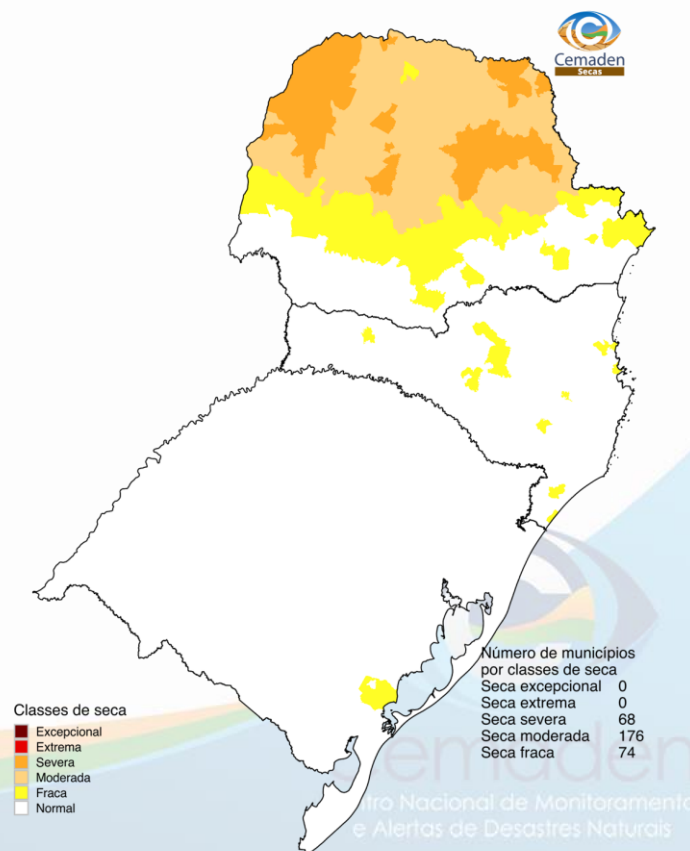
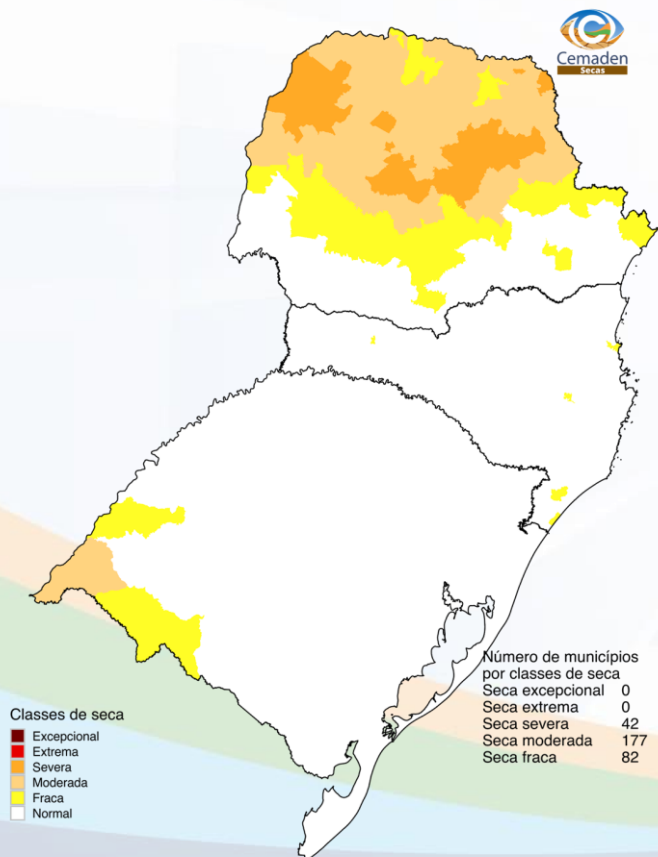


ÍNDICE INTEGRADO DE SECA - IIS

(SPI3 E 6 + VHI + AUS): AGOSTO /2024

IIS 3 MESES

IIS 6 MESES



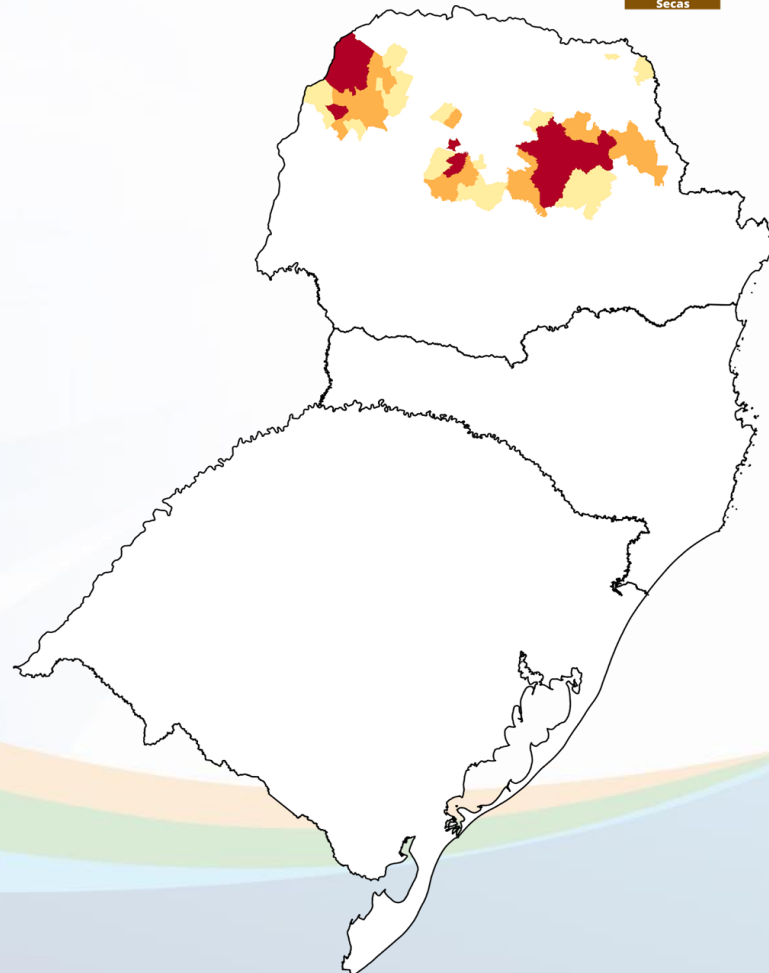
ESTIMATIVA DE ÁREAS DE PASTAGENS E AGRÍCOLAS AFETADAS PELO SECA

OBSERVADO: AGO /24



Fração da
área afetada

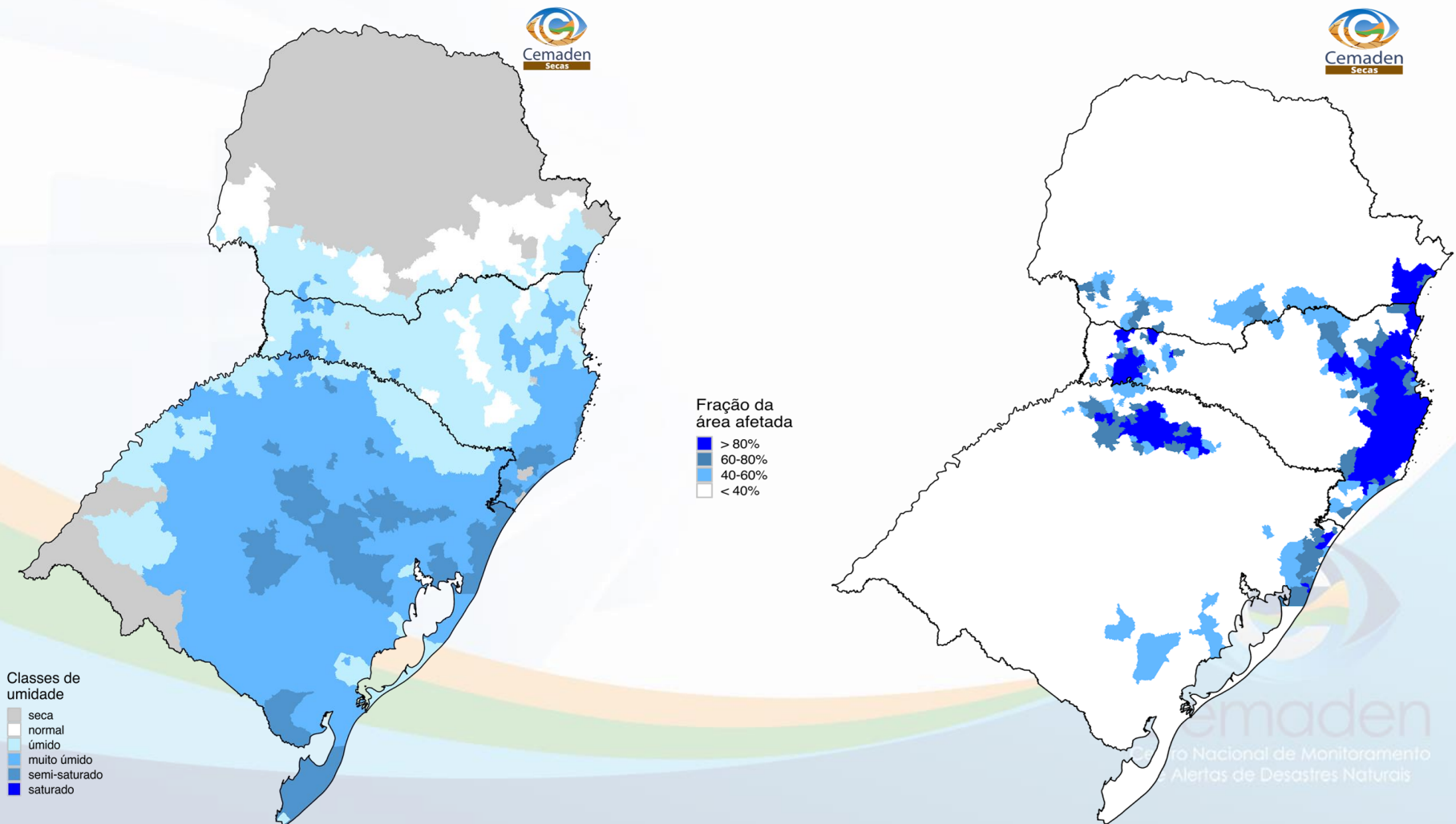
- > 80%
- 60-80%
- 40-60%
- < 40%



Cemaden
Centro Nacional de Monitoramento
e Alertas de Desastres Naturais

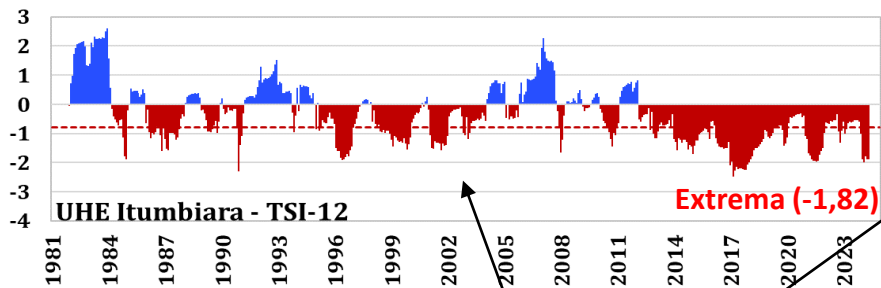
IARA (SPI, SM, VHI)

OBSERVADO: AGOSTO

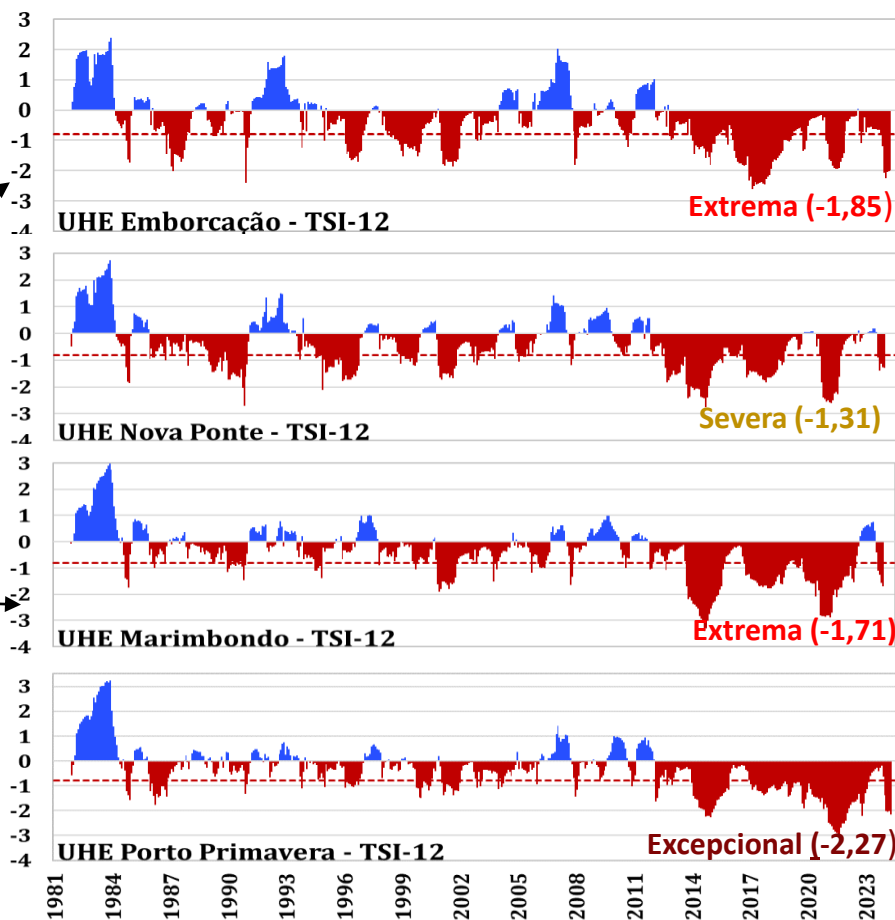
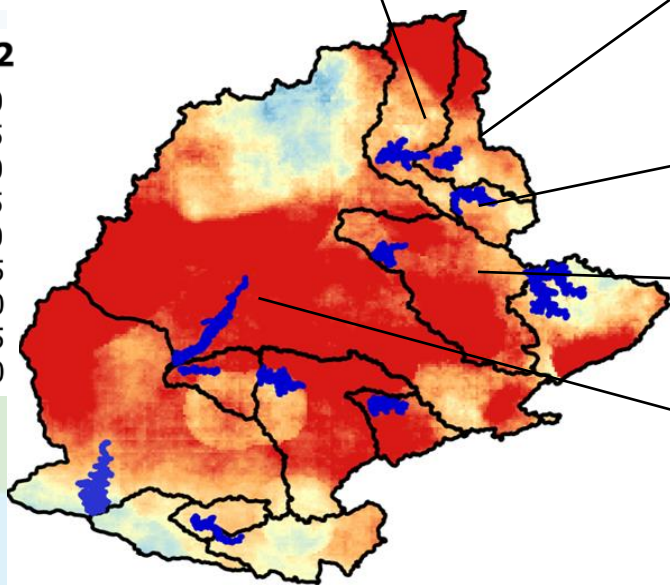


Seca Hidrológica na bacia do rio Paraná

Índice Padronizado Chuva-Vazão – TSI

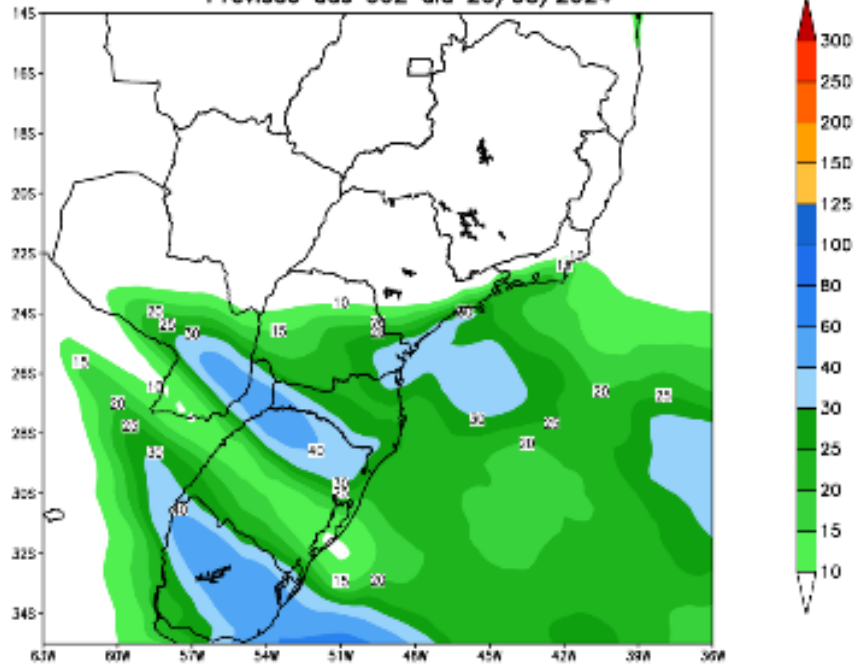


SPI 12

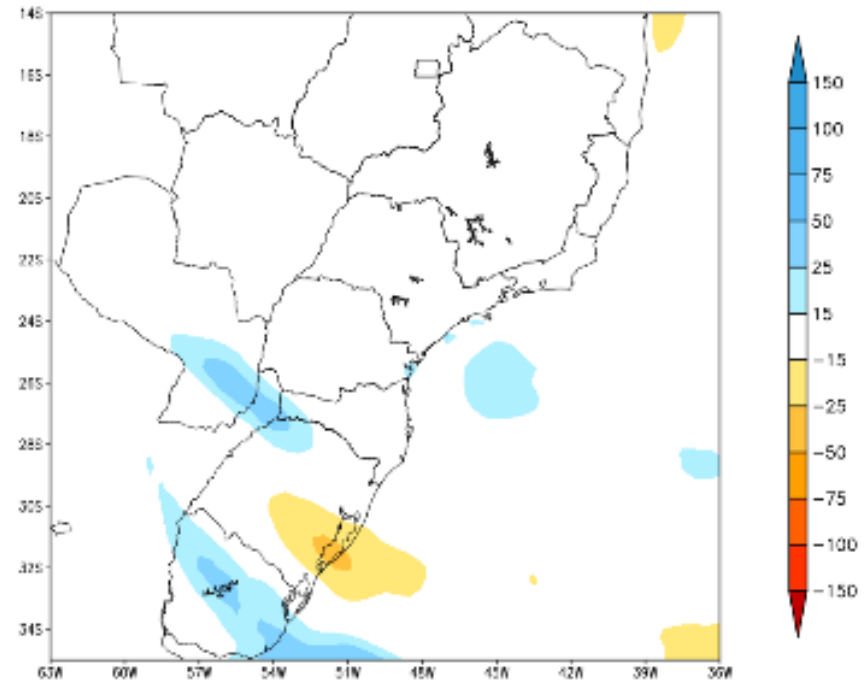


Previsão de chuva 20 a 27 de agosto

GEFS / BRASIL_SUL
Precipitacao acumulada 1aSem (mm)
Previsao das 00Z dia 20/08/2024

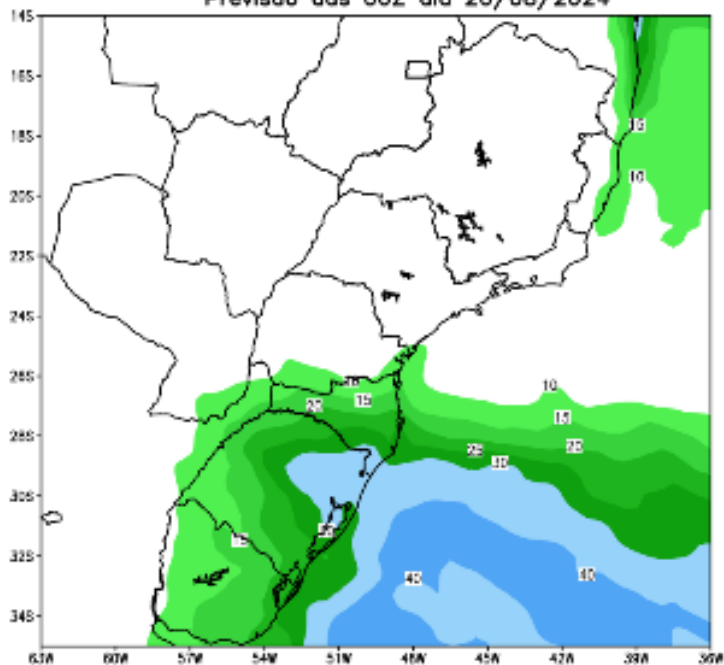


Anomalia de Precipitacao BR_SUL (mm)
Periodo: 2024082000 a 2024082700

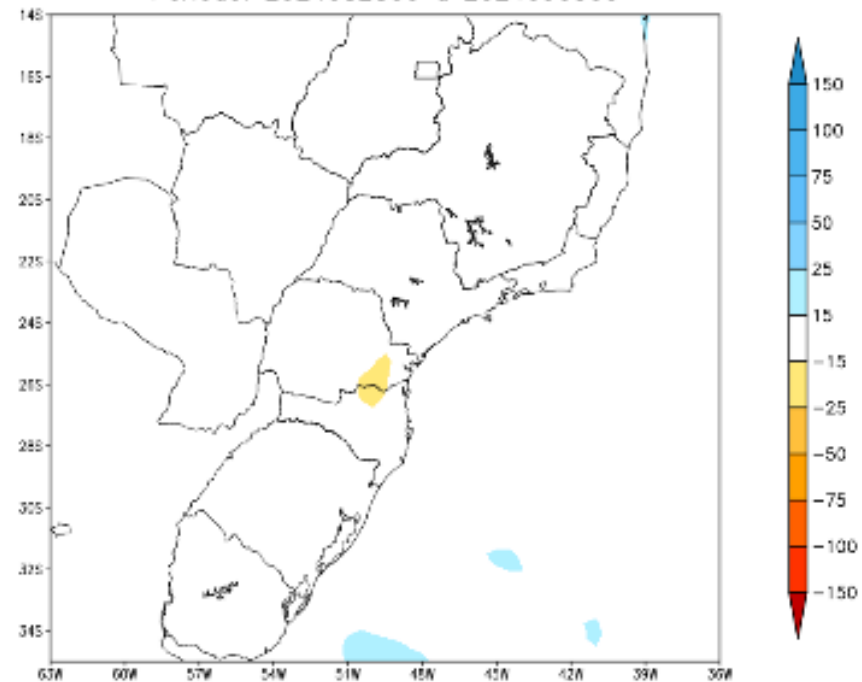


Previsão de chuva 28 Ago a 03 Set

GEFS / BRASIL_SUL
Precipitação acumulada 2aSem (mm)
Previsão das 00Z dia 20/08/2024

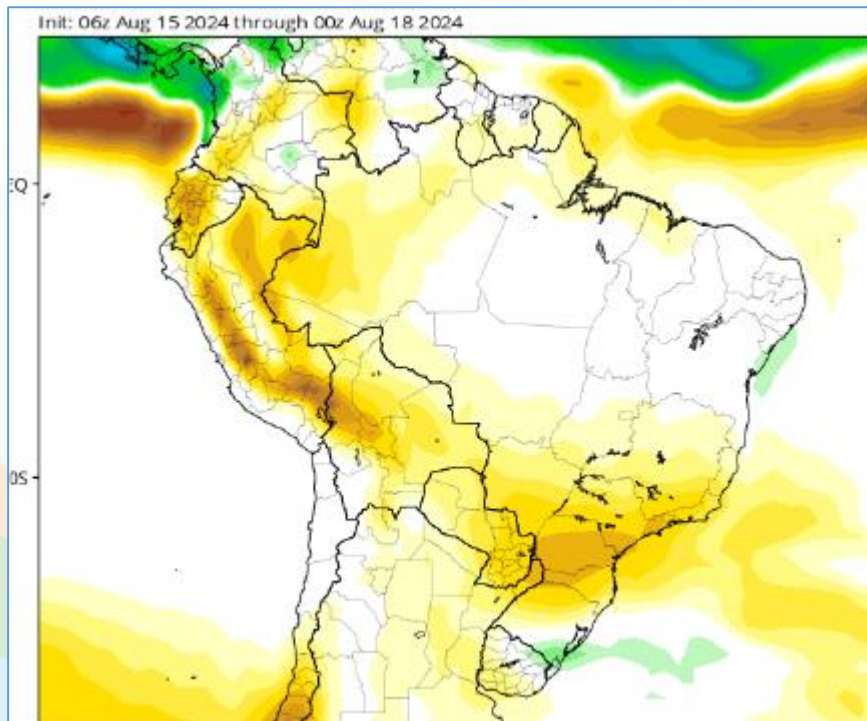


Anomalia de Precipitação BR_SUL (mm)
Período: 2024082800 a 2024090300

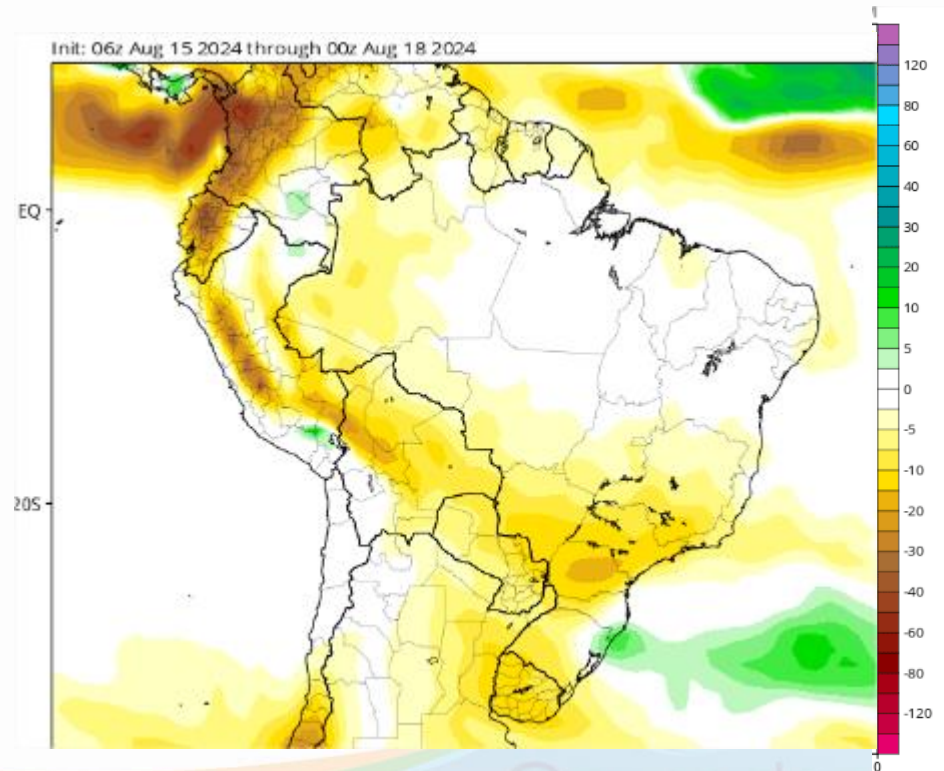


Tendência 3a e 4a semanas

01-08 Set



08-15 Set

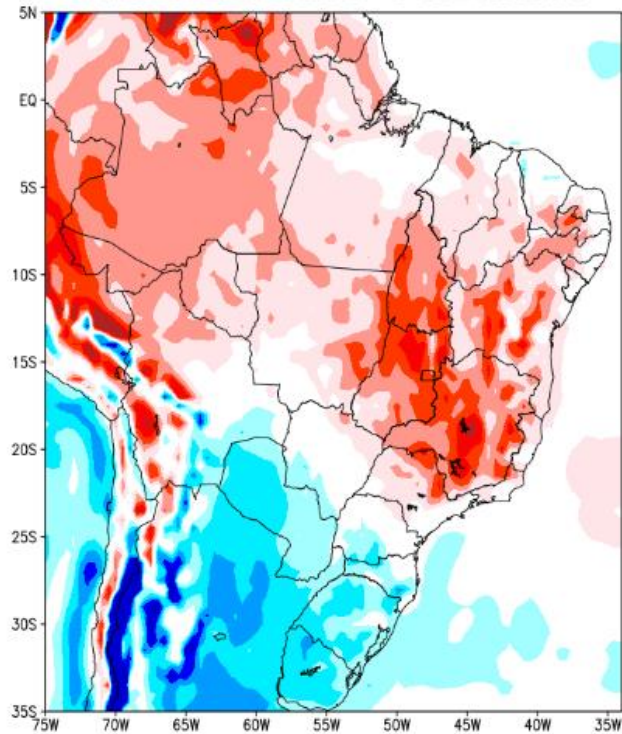


Cemaden
Centro Nacional de Monitoreo
e Alertas de Desastres Naturales

Previsão de Temperatura

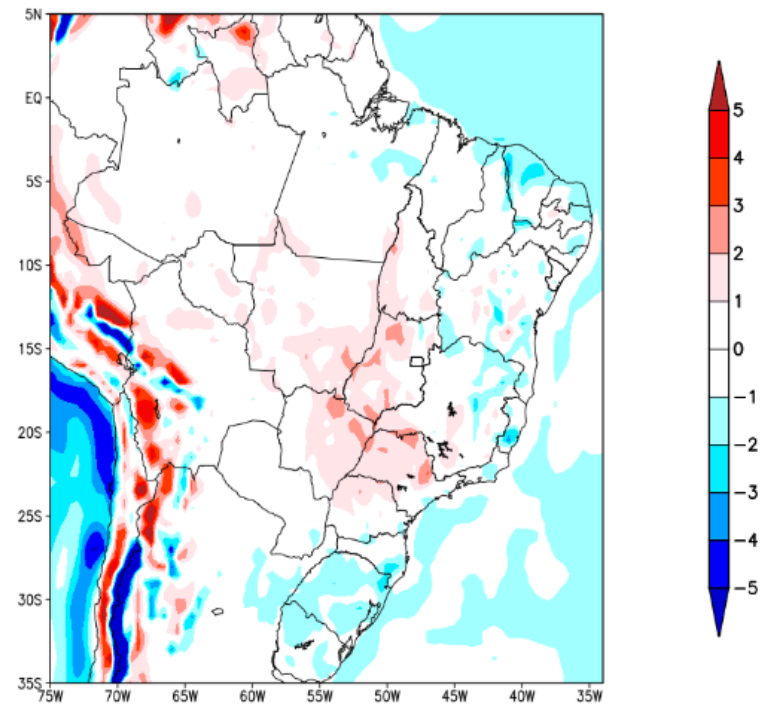
20-27 Ago

Anomalia de Temperatura BR (C)
Período: 2024082000 a 2024082700



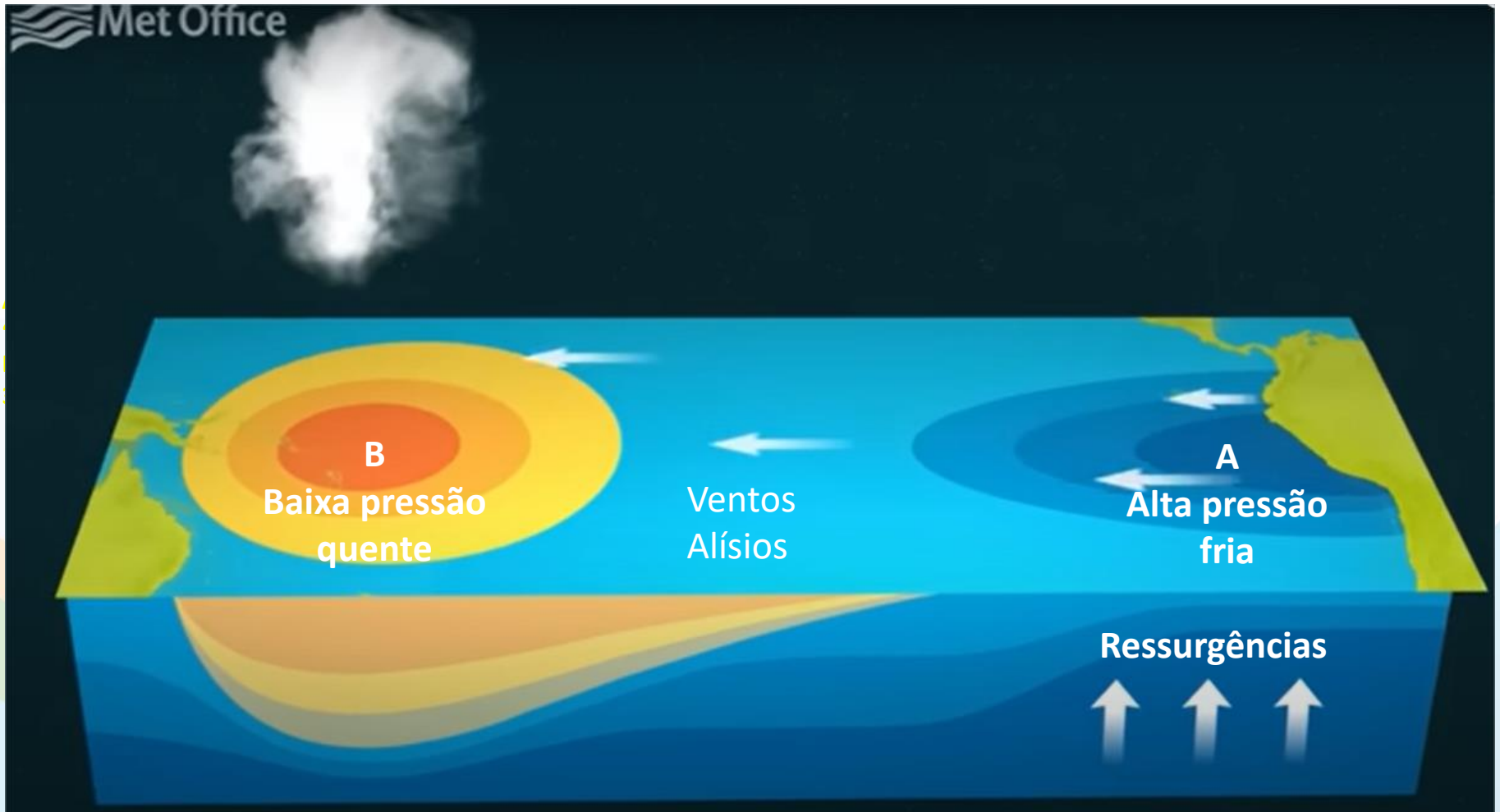
28 Ago- 03 Set

Anomalia de Temperatura BR (C)
Período: 2024082800 a 2024090300

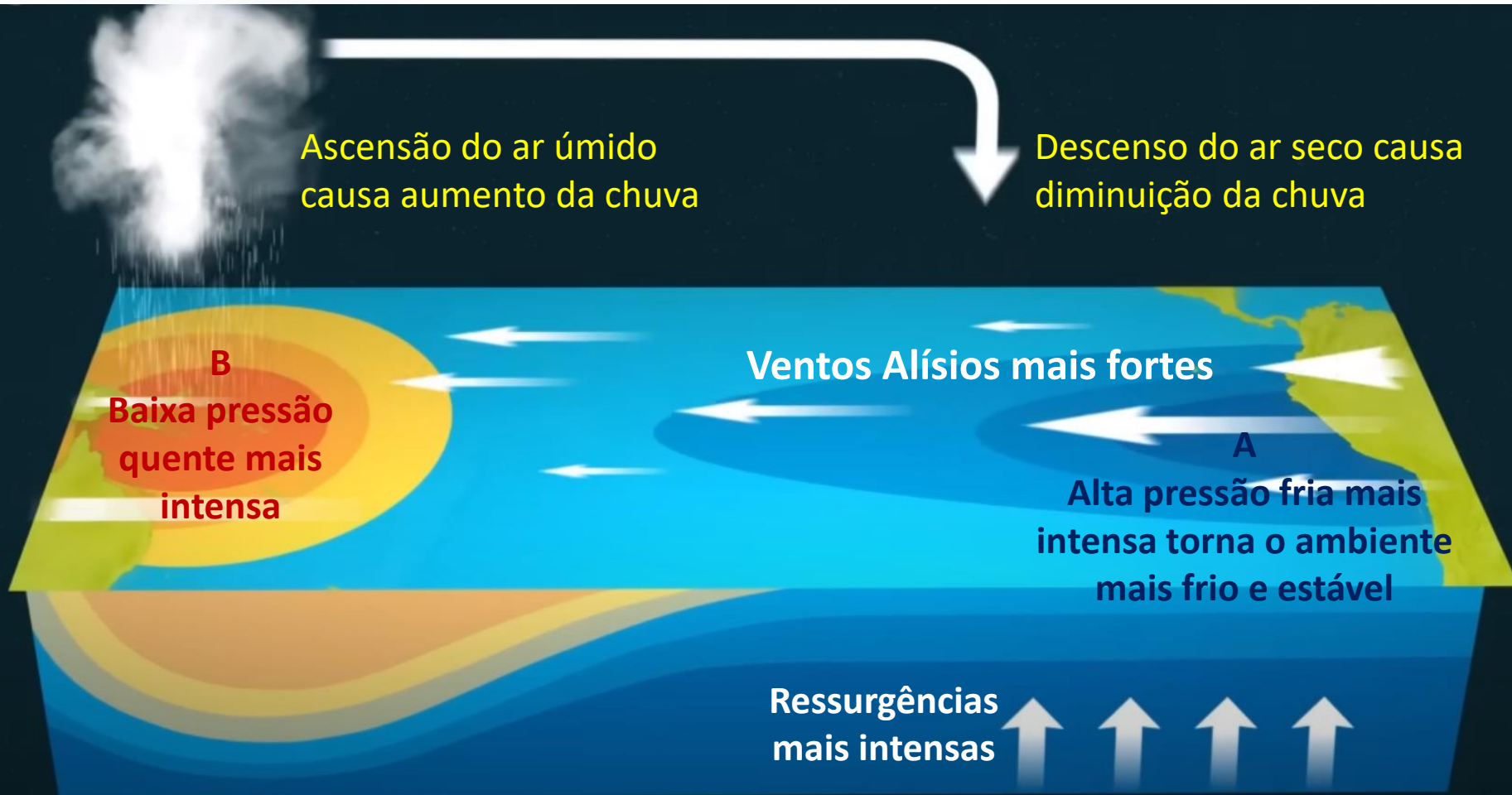


Centro Nacional de Monitoramento
e Alertas de Desastres Naturais

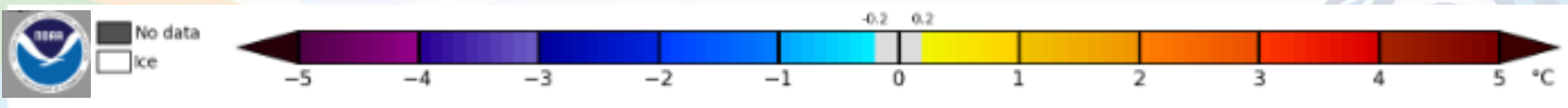
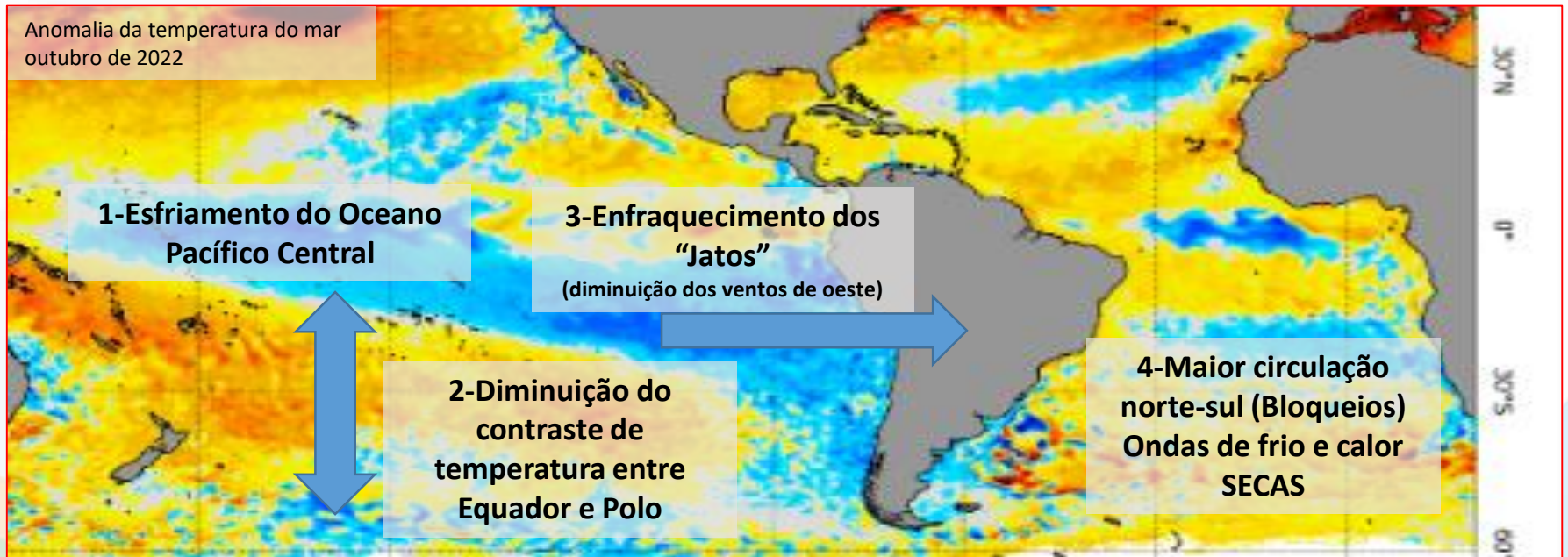
Situação de “normalidade”



Situação de “La Niña”



Dinâmica dos episódios do “La Niña”



Impactos do “La Niña”



- altas temperaturas
- menos chuvas
- mais chuvas
- incógnita

Dinâmica dos episódios do “La Niña”

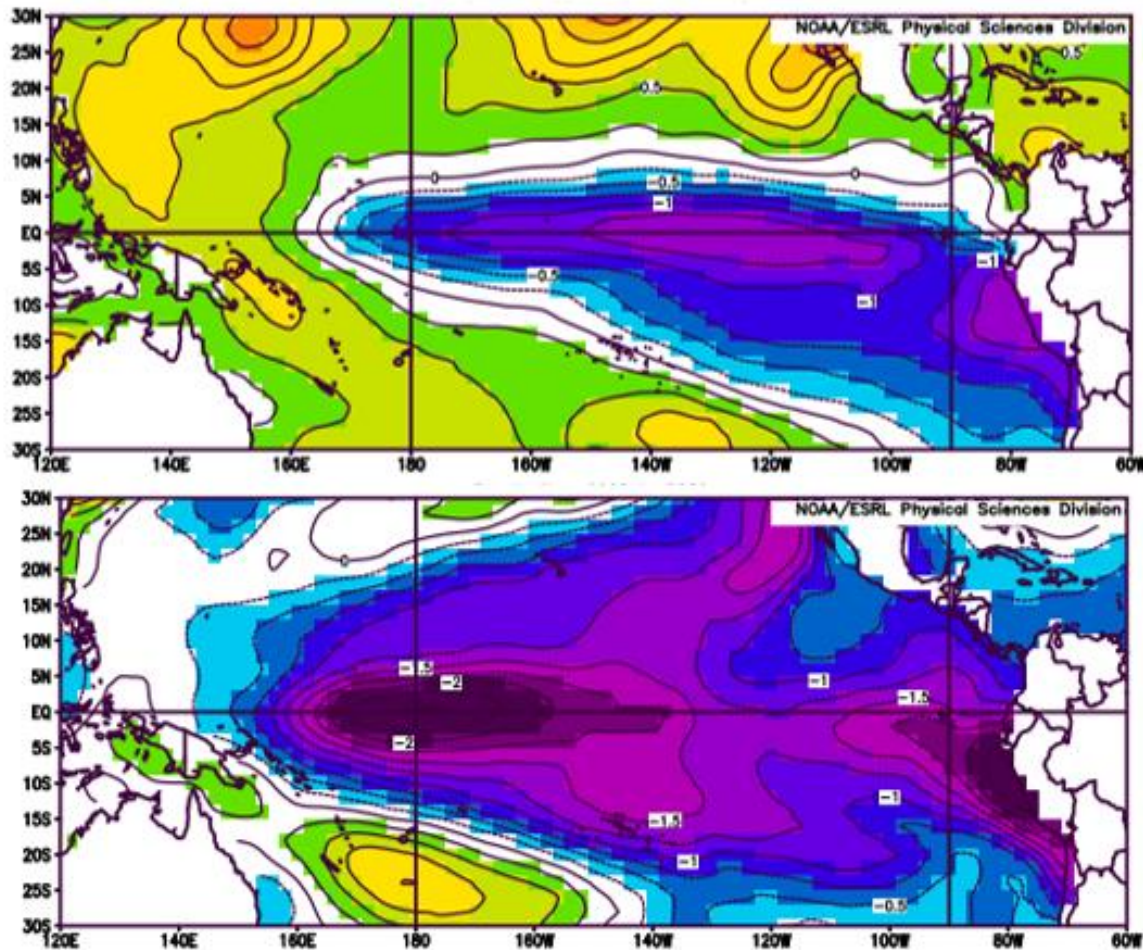
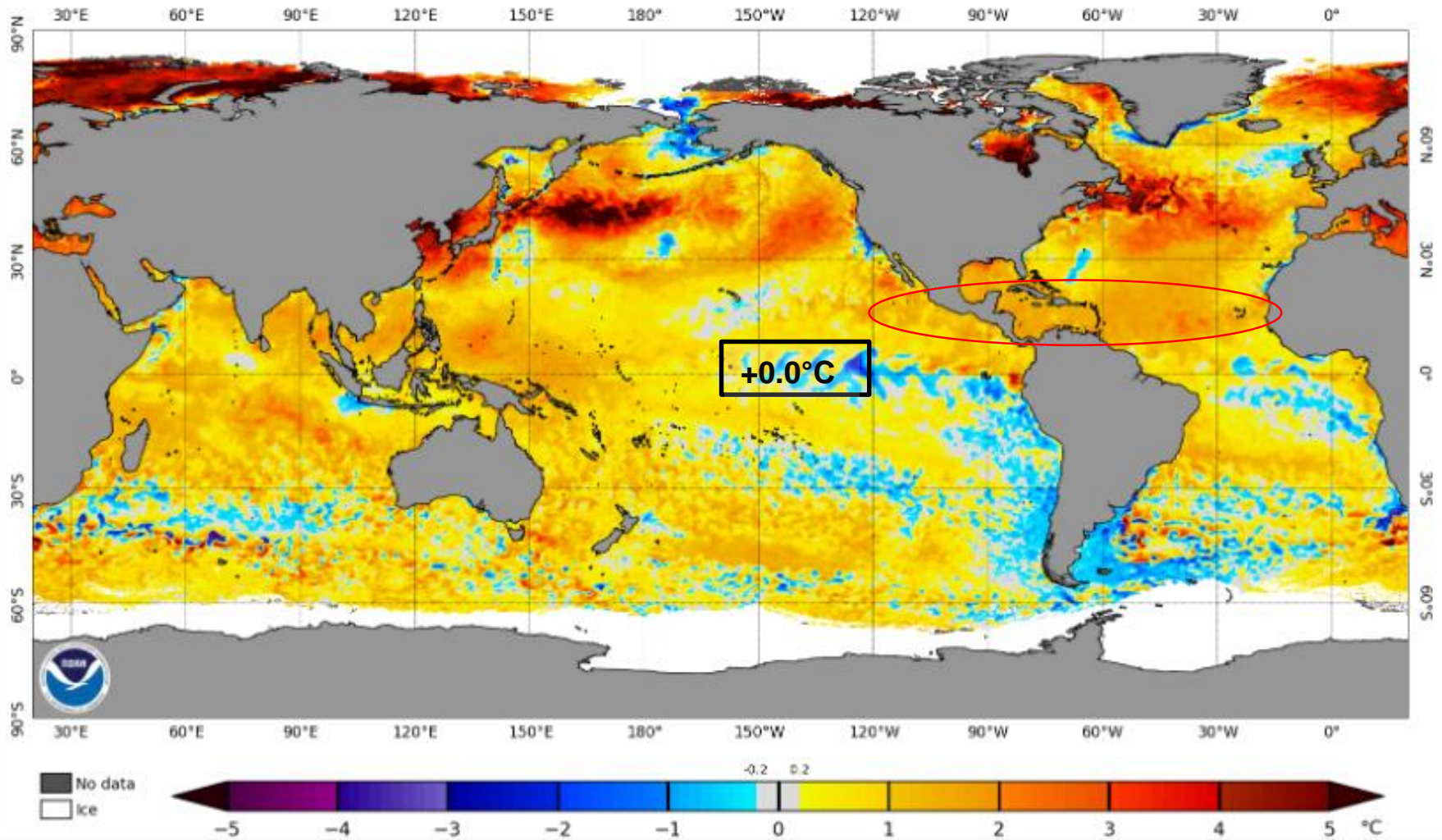


Figura 1 – Exemplos de eventos La Niña nas configurações Pacífico Oriental (acima) e Pacífico Central (abaixo). Ambas as configurações são do trimestre setembro-outubro-novembro. O painel superior diz respeito ao evento de 2020-2021 e o painel inferior representa o evento de 1975-1976.

Status Atual: **La Niña Watch**

NOAA Coral Reef Watch Daily 5km SST Anomalies (v3.1) 17 Aug 2024

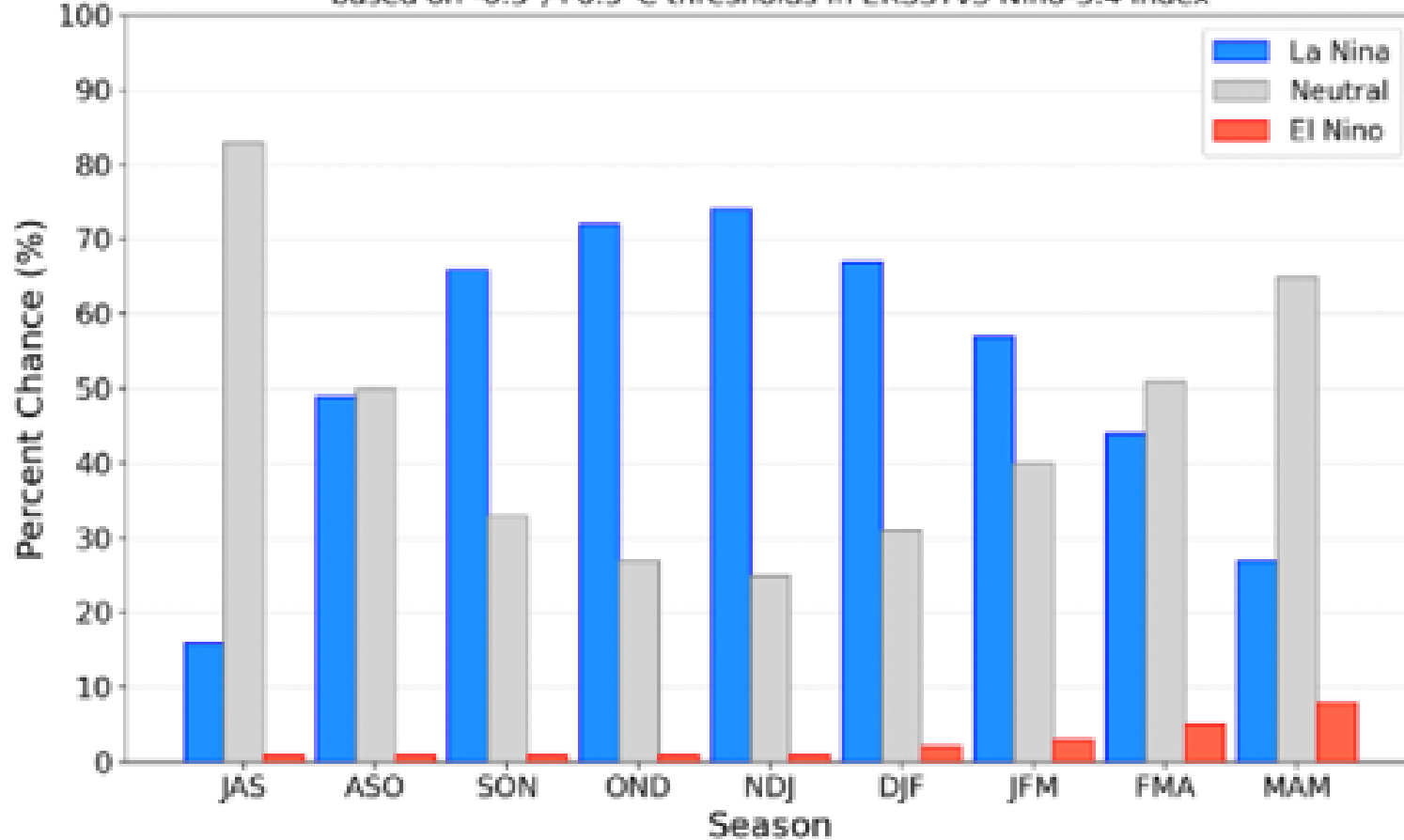


e Alertas de Desastres Naturais

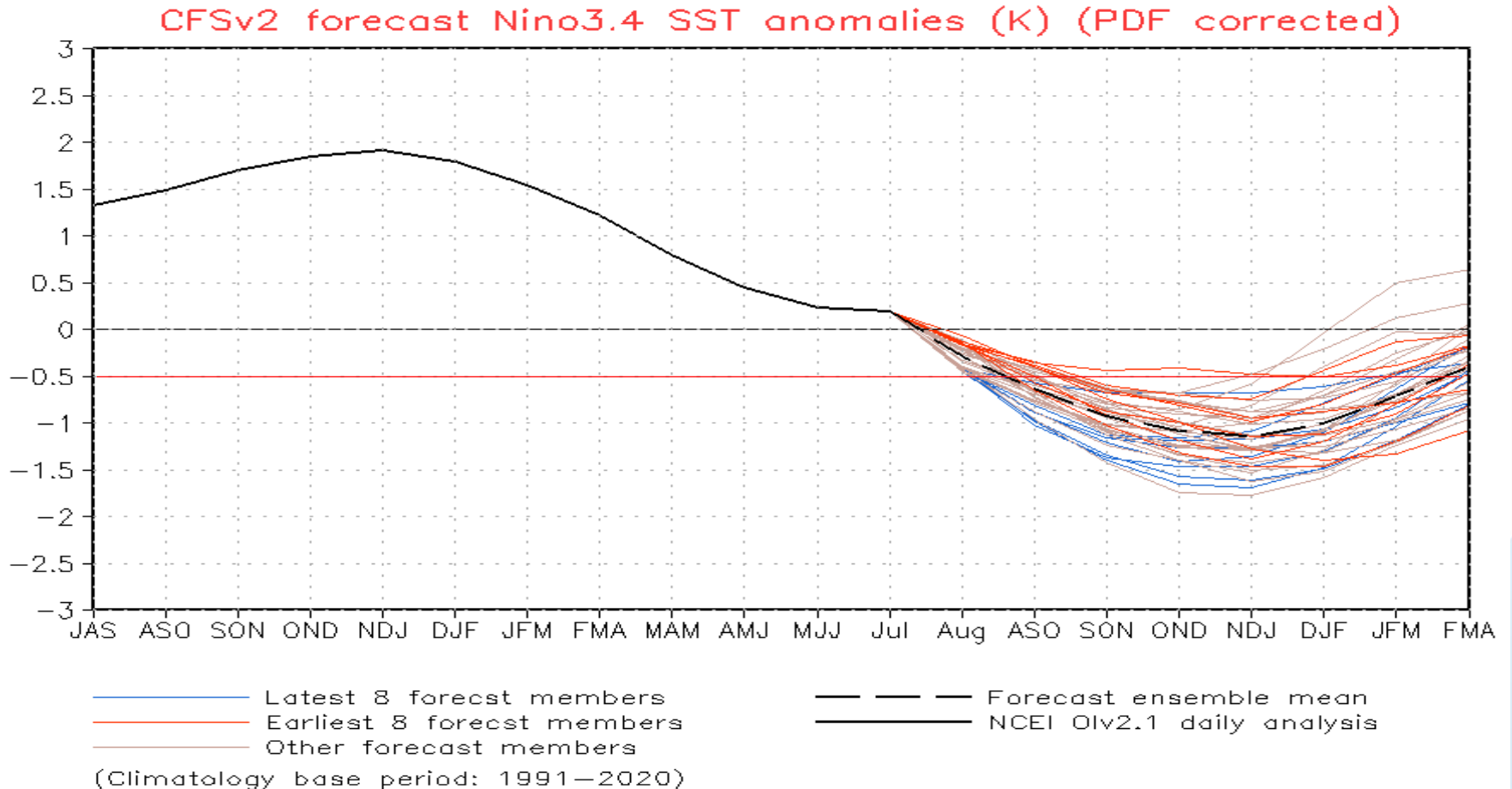
Previsão do “ENSO”

Official NOAA CPC ENSO Probabilities (issued August 2024)

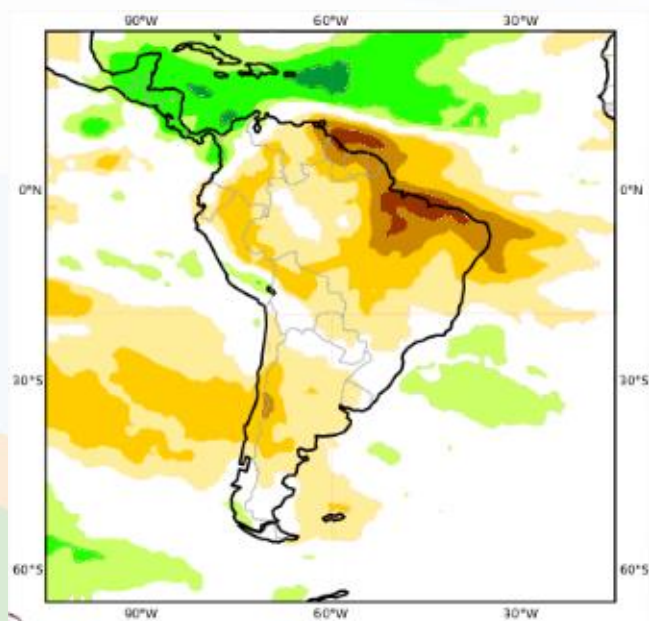
based on $-0.5^{\circ}/+0.5^{\circ}\text{C}$ thresholds in ERSSTv5 Niño-3.4 index



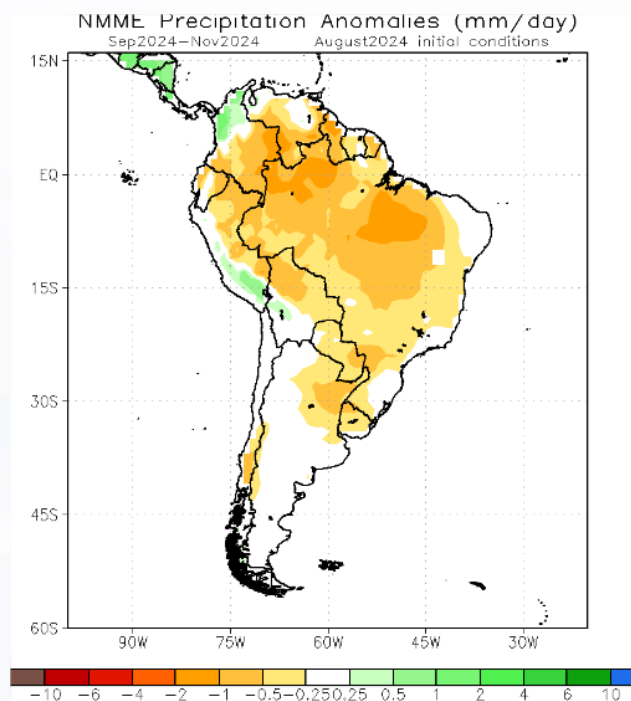
Previsão do “ENSO”



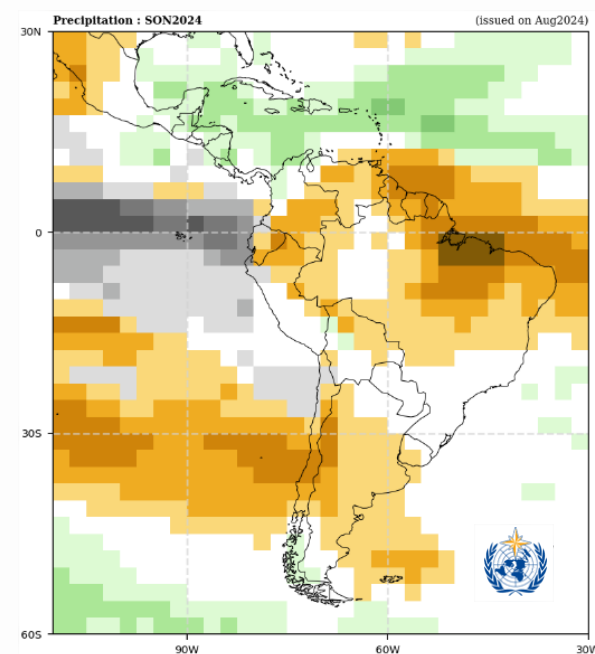
Previsão Sazonal de Chuva Multi-Modelo para SON



Modelos Europeus

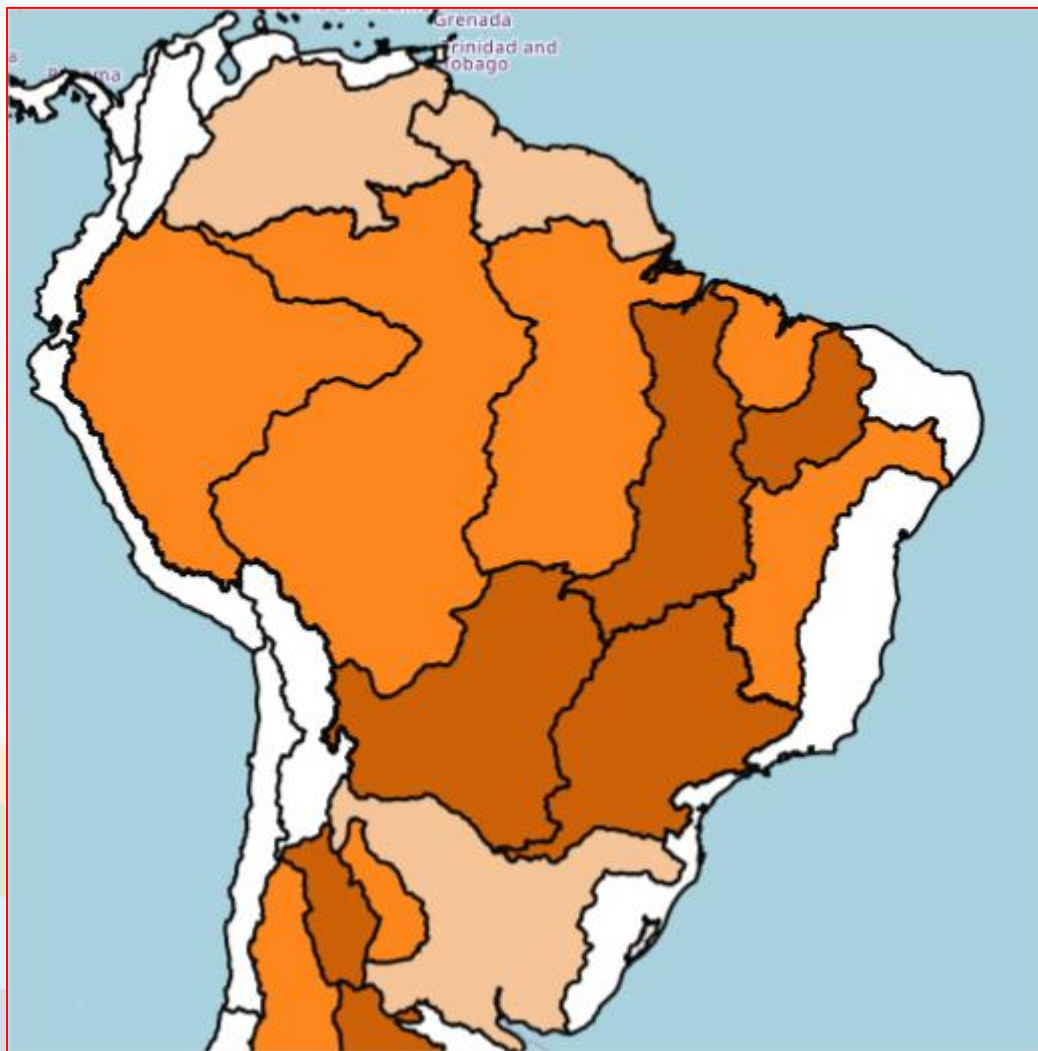


Modelos Americanos



Modelos da Organização Meteorológica Mundial

Previsão Sazonal de Vazão das principais bacias



- > 90% probability of high flows
- 75-90% probability of high flows
- 50-75% probability of high flows
- 50-75% probability of low flows
- 75-90% probability of low flows
- > 90% probability of low flows

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