

**SERVIÇO GEOLÓGICO
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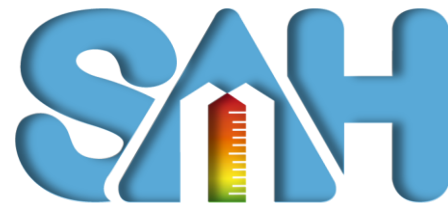
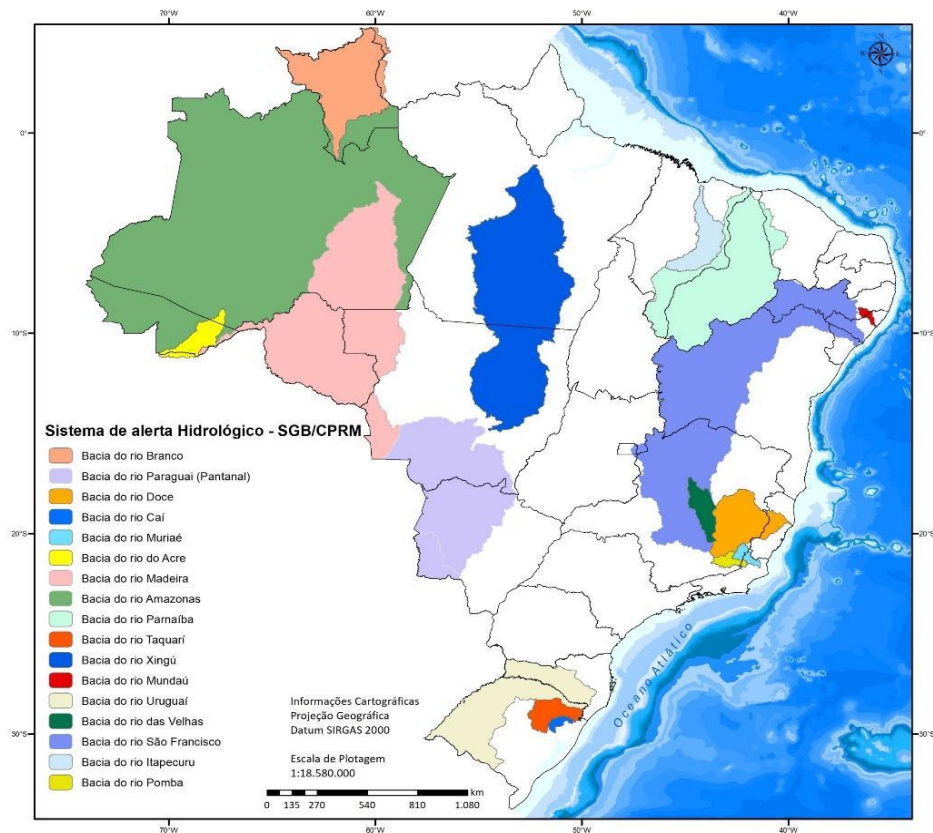
**1ª REUNIÃO DA SALA DE CRISE
DA REGIÃO NORTE
-IMPACTOS NA HIDROLOGIA-**



MINISTÉRIO DE
MINAS E ENERGIA



SISTEMA DE ALERTA HIDROLÓGICO



SISTEMA DE ALERTA HIDROLÓGICO
Serviço Geológico do Brasil (SGB/CPRM)



SERVIÇO GEOLÓGICO
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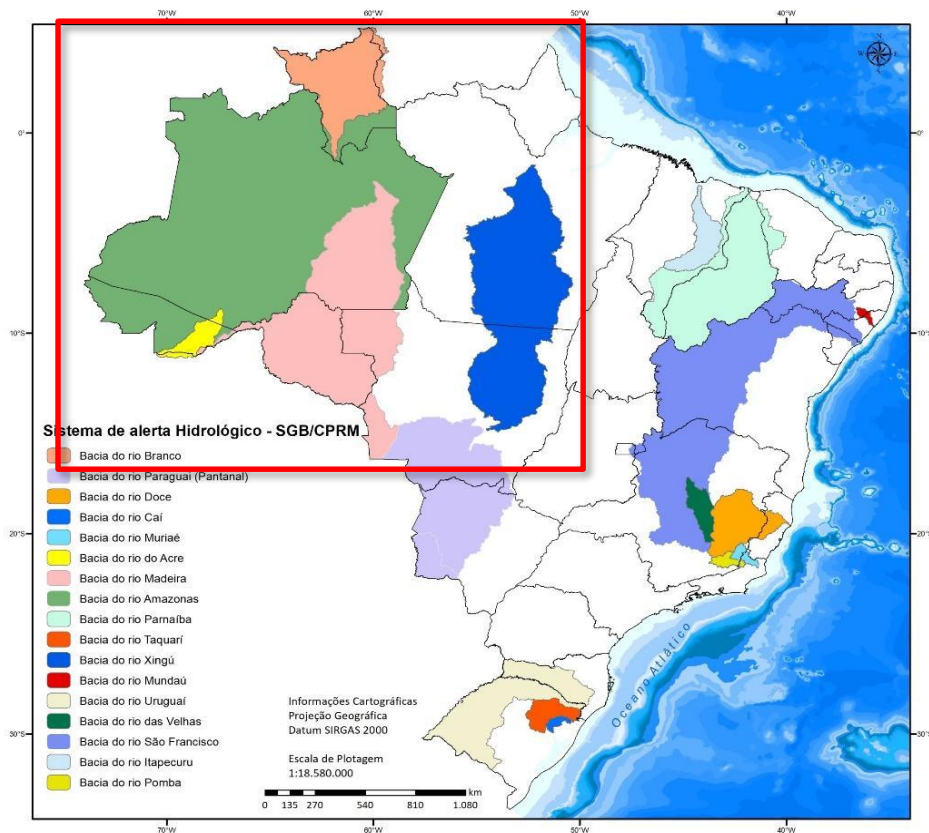


+ DE 7 MILHÕES DE PESSOAS

BENEFICIADAS

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SISTEMA DE ALERTA HIDROLÓGICO



REGIÃO NORTE

- SAH AMAZONAS
- SAH BRANCO
- SAH MADEIRA
- SAH ACRE
- SAH XINGU



Situação do fenômeno *El Niño* no oceano Pacífico equatorial em Junho de 2023

O fenômeno *El Niño* altera os padrões de circulação atmosférica (ventos), transporte de umidade, temperatura e chuvas, em particular em regiões tropicais. No Brasil, os principais efeitos do fenômeno *El Niño* são:

- **Região Norte:** secas de moderadas a intensas no norte e leste da Amazônia. Aumento da probabilidade de incêndios florestais, principalmente em áreas de florestas degradadas.



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MARENGO E ESPINOZA (2016) - Extreme seasonal droughts and floods in Amazonia: causes, trends and impacts

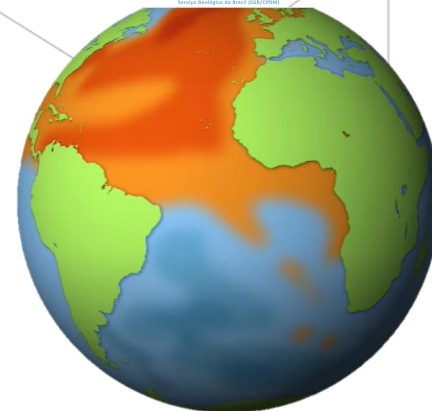
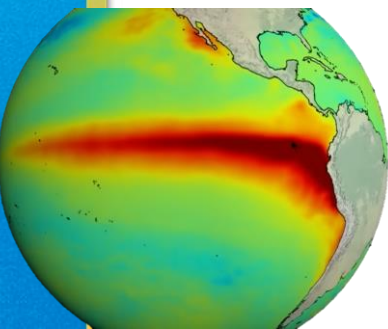


Table 1. History of droughts and floods in Amazonia, indicating if they are related to El Niño, La Niña or to SST conditions in the tropical Atlantic.

Year	Extreme seasonal event	Related to	References
1906	Drought	EN	Sombroek (2001)
1912	Drought	EN	Williams <i>et al.</i> (2005), Marengo <i>et al.</i> (2008a)
1916	Drought	EN	Sombroek (2001), Jenkins (2009)
1925–26*	Drought	EN	Sternberg (1987), Meggers (1994), Williams <i>et al.</i> (2005), Marengo <i>et al.</i> (2008), Sheffield and Wood (2011)
1948	Drought	EN	Sombroek (2001)
1963–64	Drought	Warm TNA	Sombroek (2001), Marengo <i>et al.</i> (2008), Sheffield and Wood (2011)
1979–81	Drought	Warm TNA	Sheffield and Wood (2011)
1982–83	Drought	EN + Warm TNA	Sombroek (2001), Richey <i>et al.</i> (1989), Ronchail <i>et al.</i> (2005), Marengo (1992, 2008)
1995	Drought	El Niño + Warm TNA	Espinoza <i>et al.</i> (2011)
1997–98	Drought	EN + Warm TNA	Sombroek (2001), Marengo <i>et al.</i> (2008), Marengo <i>et al.</i> (2011), Zeng <i>et al.</i> (2008), Espinoza <i>et al.</i> (2011), Tomasella <i>et al.</i> (2011, 2013), Coelho <i>et al.</i> (2013)
2005*	Drought	Warm TNA	Marengo <i>et al.</i> (2008), Marengo <i>et al.</i> (2011), Zeng <i>et al.</i> (2008), Espinoza <i>et al.</i> (2011), Cox <i>et al.</i> (2008), Tomasella <i>et al.</i> (2011), Yoon and Zeng. (2010), Aragão <i>et al.</i> (2007), Coelho <i>et al.</i> (2013)
2010*	Drought	EN + Warm TNA	Lewis <i>et al.</i> (2011), Marengo <i>et al.</i> (2011), Espinoza <i>et al.</i> (2011), Coelho <i>et al.</i> (2013)
1953	Flood	?	Salati and Vose (1984), Ronchail <i>et al.</i> (2005), Marengo <i>et al.</i> (2010a)
1976	Flood	LN	Marengo <i>et al.</i> (2010a), Satyamurty <i>et al.</i> (2013b)
1989	Flood	LN	Ronchail <i>et al.</i> (2006); Marengo <i>et al.</i> (2011, 2013a, 2013b); Espinoza <i>et al.</i> (2013)
1999	Flood	LN	Ronchail <i>et al.</i> (2006), Marengo <i>et al.</i> (2011, 2013a, 2013b), Espinoza <i>et al.</i> (2013), Satyamurty <i>et al.</i> (2013b)
2009*	Flood	Warm TSA	Marengo <i>et al.</i> (2010a), Filizola <i>et al.</i> (2014), Sena <i>et al.</i> (2012), Vale <i>et al.</i> (2011)
2012*	Flood	LN + Warm TSA	Marengo <i>et al.</i> (2013a, 2013b), Espinoza <i>et al.</i> (2013), Satyamurty <i>et al.</i> (2013a)
2014	Flood	Warm IP + Warm SSA	Espinoza <i>et al.</i> (2014)

EN, El Niño; LN, La Niña; TNA, Tropical North Atlantic; TSA, Tropical South Atlantic; SSA, Subtropical South Atlantic; IP, Indo-Pacific Ocean.

*Events characterized at the time as 'once in a century'.

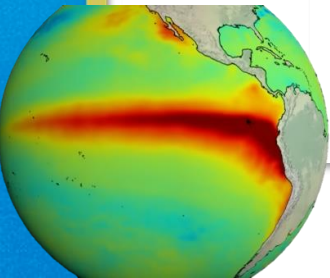
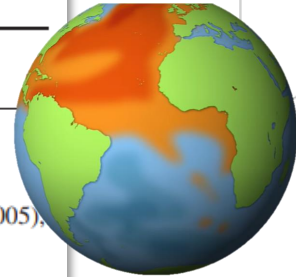


MARENGO E ESPINOZA (2016) - Extreme seasonal droughts and floods in Amazonia:

causes, trends and impacts

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2010*	Drought	EN + Warm TNA	Lewis <i>et al.</i> (2011), Marengo <i>et al.</i> (2011), Espinoza <i>et al.</i> (2011), Coelho <i>et al.</i> (2013)



Cotas mínimas anuais na estação Porto de Manaus (14990000)



Cota mínima (cm)	Ano	Ordem
1619	2022	27
1944	2021	102
1660	2020	35
1806	2019	77
1705	2018	48
1734	2017	59
1720	2016	54
1592	2015	17
1990	2014	110
1883	2013	93
1596	2012	19
1676	2011	41
1363	2010	1
1586	2009	16
1843	2008	86
1774	2007	71
1689	2006	45
1475	2005	8

El Niño

Seca Hidrológica



Cota mínima (cm)	Ano	Ordem
1363	2010	1
1364	1963	2
1420	1906	3
1434	1997	4
1442	1916	5
1454	1926	6
1474	1958	7
1475	2005	8
1497	1936	9
1503	1998	10
1504	1909	11
1506	1995	12
1539	1907	13
1569	1948	14
1574	1950	15
1586	2009	16

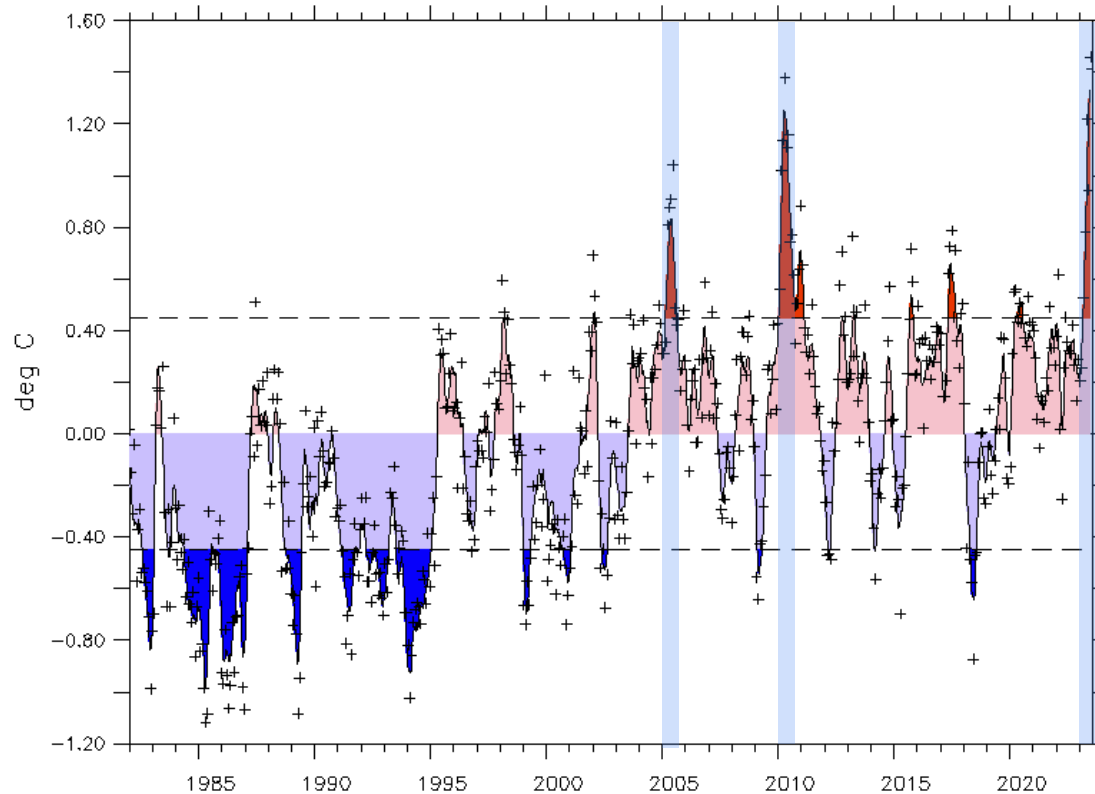


The state of the ocean climate

Towards a measure of our ability to observe the ocean through estimations of key climate indices and their uncertainty

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[Pacific](#) | [Atlantic](#) | [Indian](#)
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The state of the ocean climate

Towards a measure of our ability to observe the ocean through estimations of key climate indices and their uncertainty

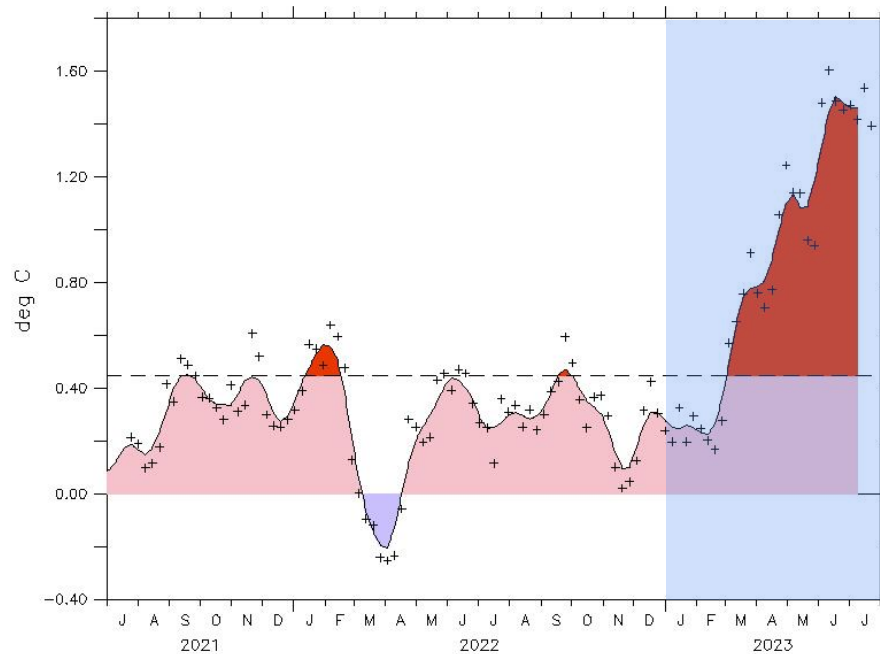
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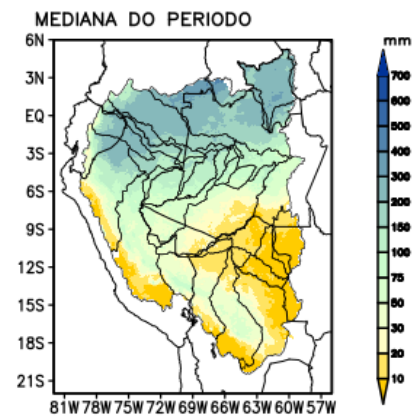
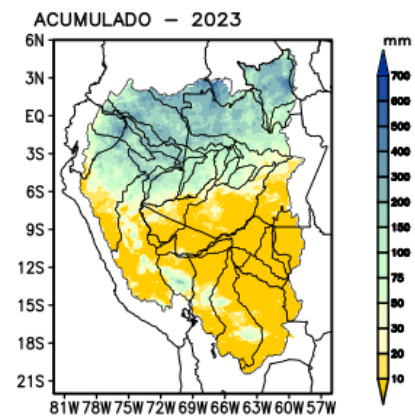
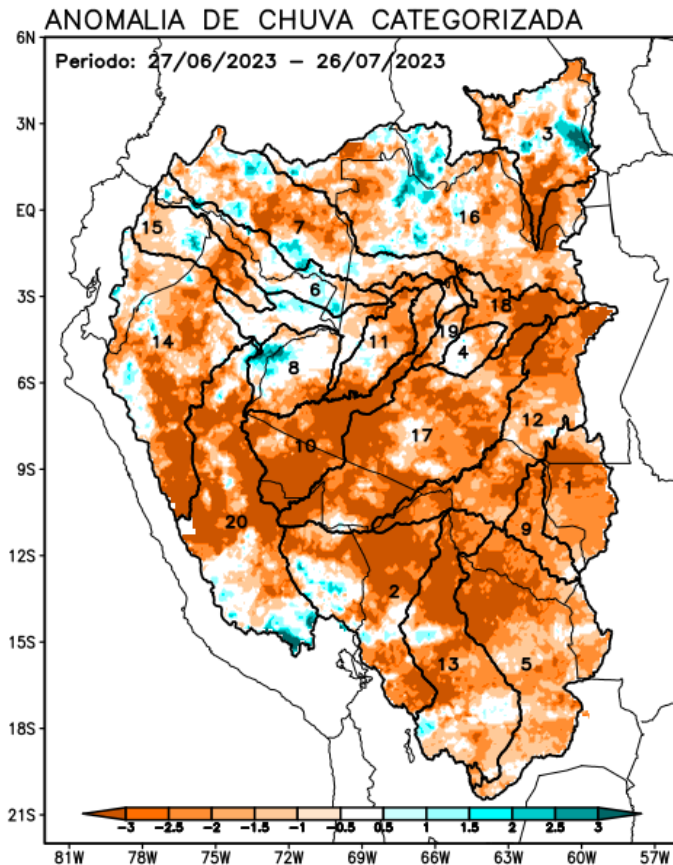


SAH AMAZONAS



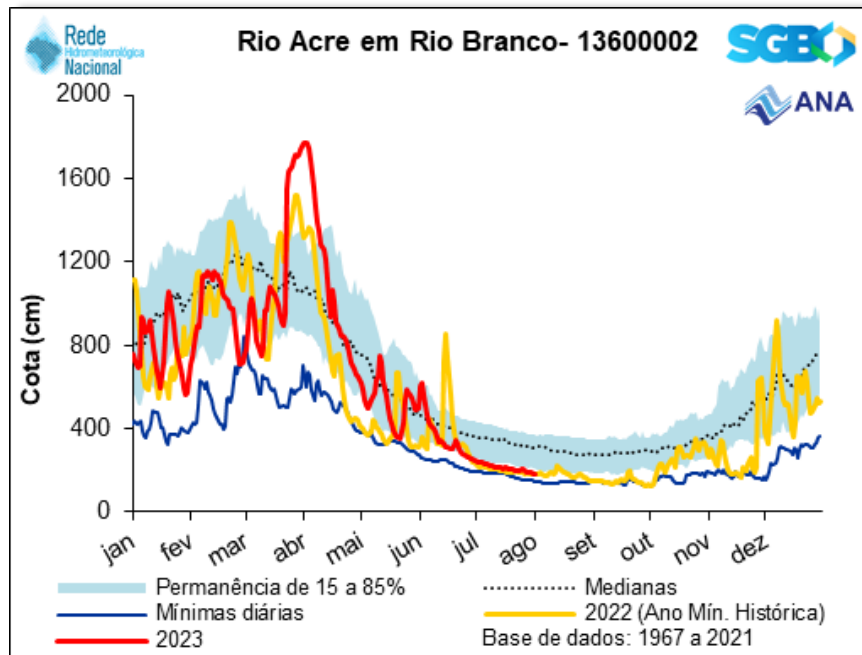
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**RENATO
SENNÁ
(INPA)**

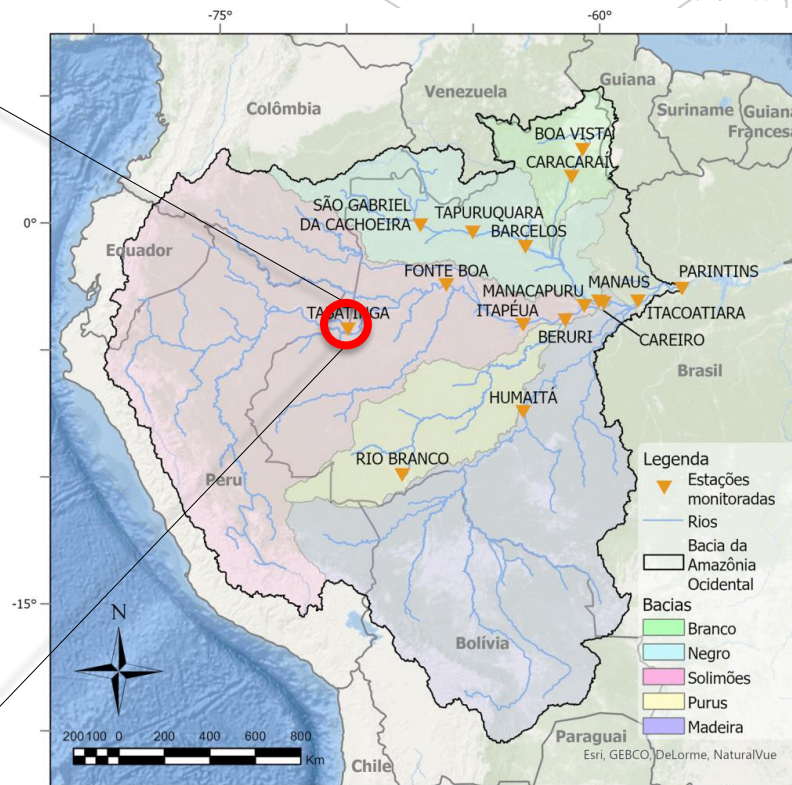
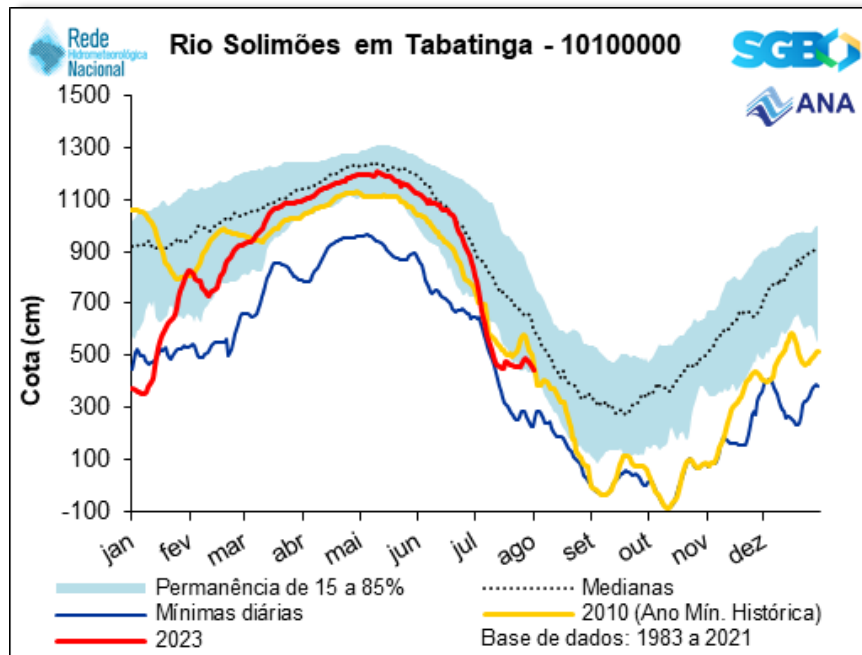


1	BH Aripuanã
2	BH Beni
3	BH Branco
4	BH Coari
5	BH Guaporé
6	BH Içá
7	BH Japurá
8	BH Javari
9	BH Ji-Paraná
10	BH Juruá
11	BH Jutai
12	BH Madeira
13	BH Mamoré
14	BH Marañon
15	BH Napo
16	BH Negro
17	BH Purus
18	BH Solimões
19	BH Tefé
20	BH Ucayali

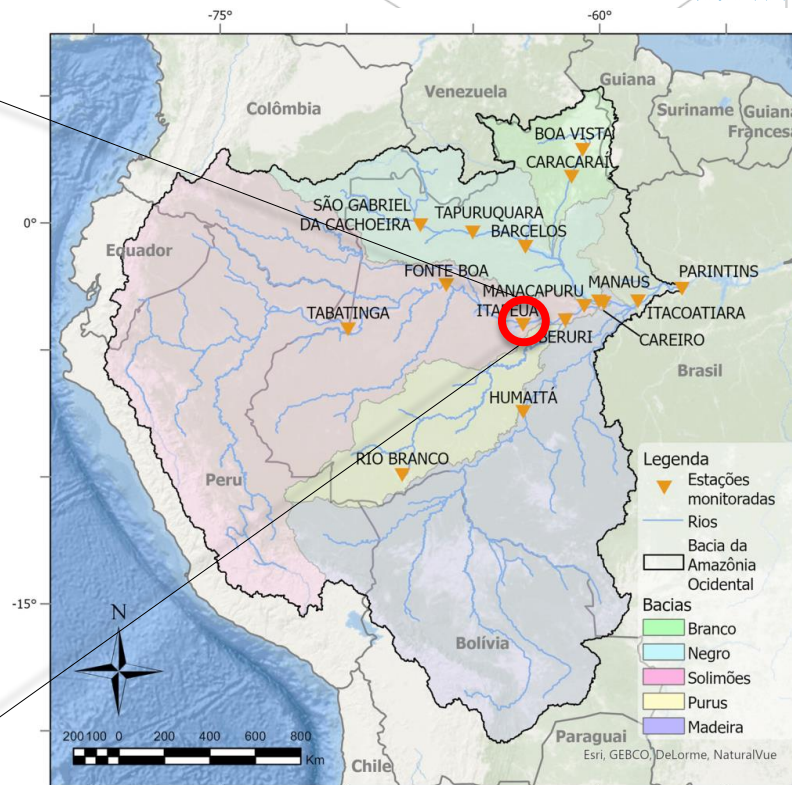
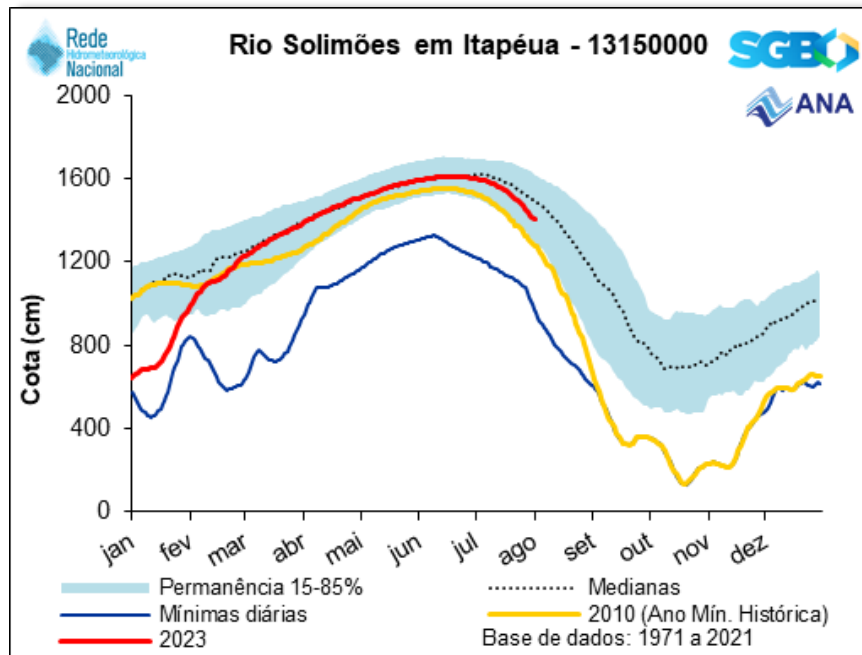
SAH ACRE/AMAZONAS



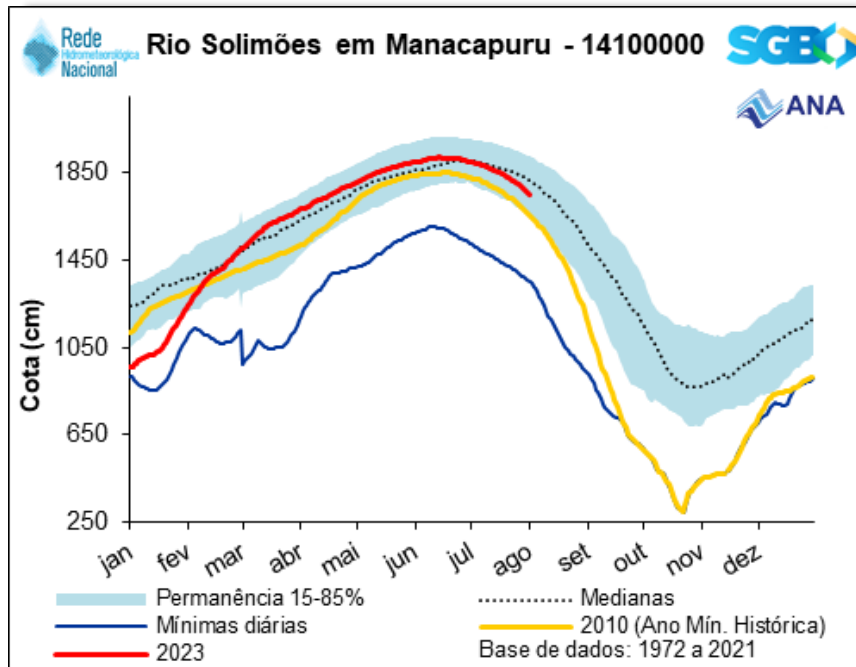
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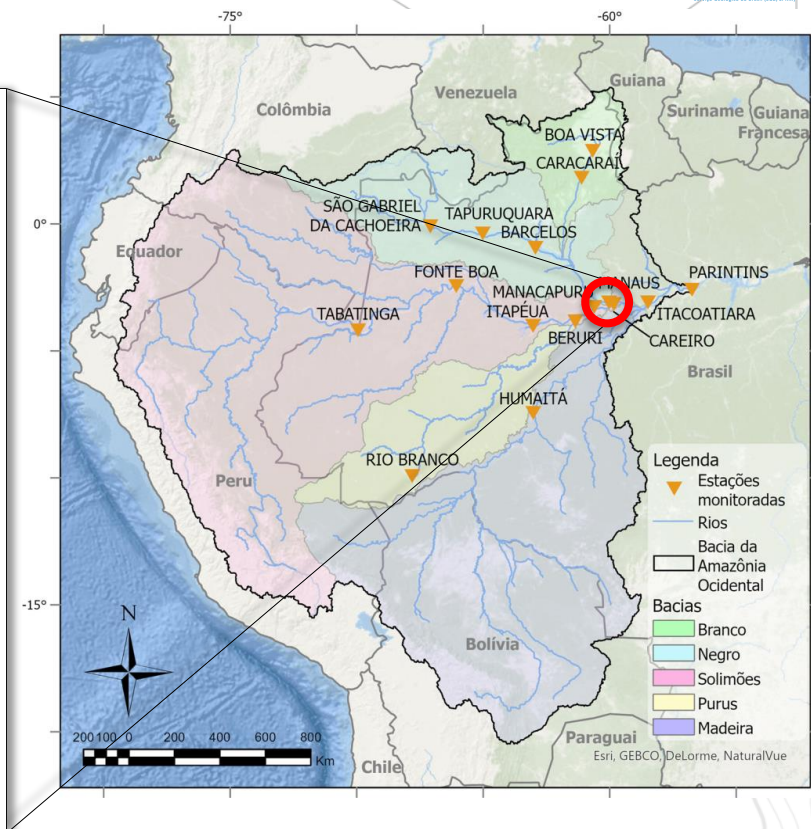
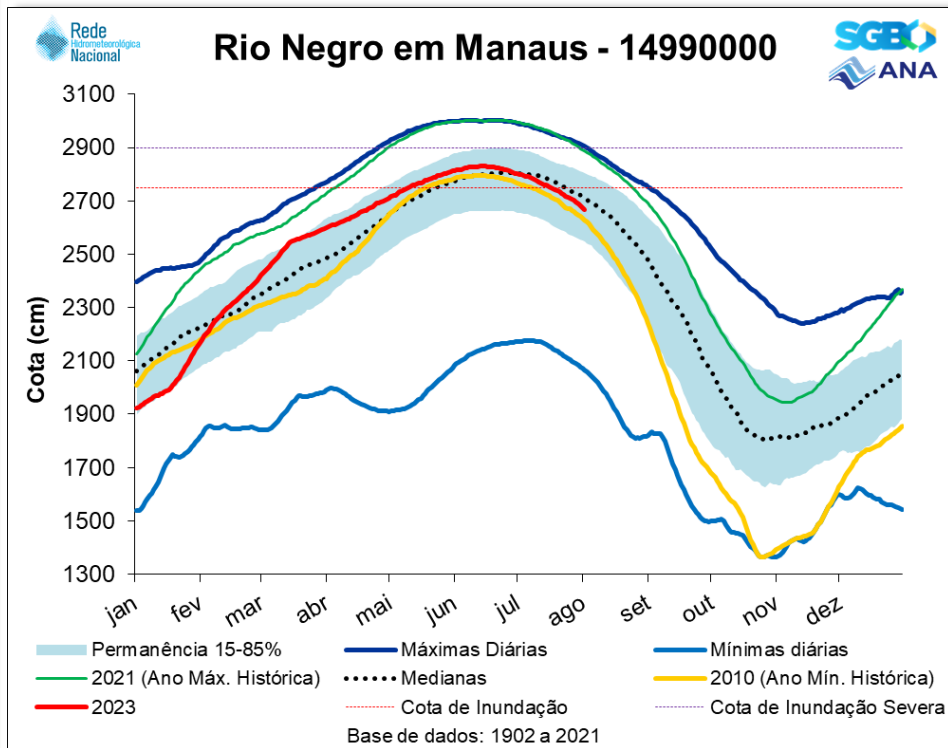
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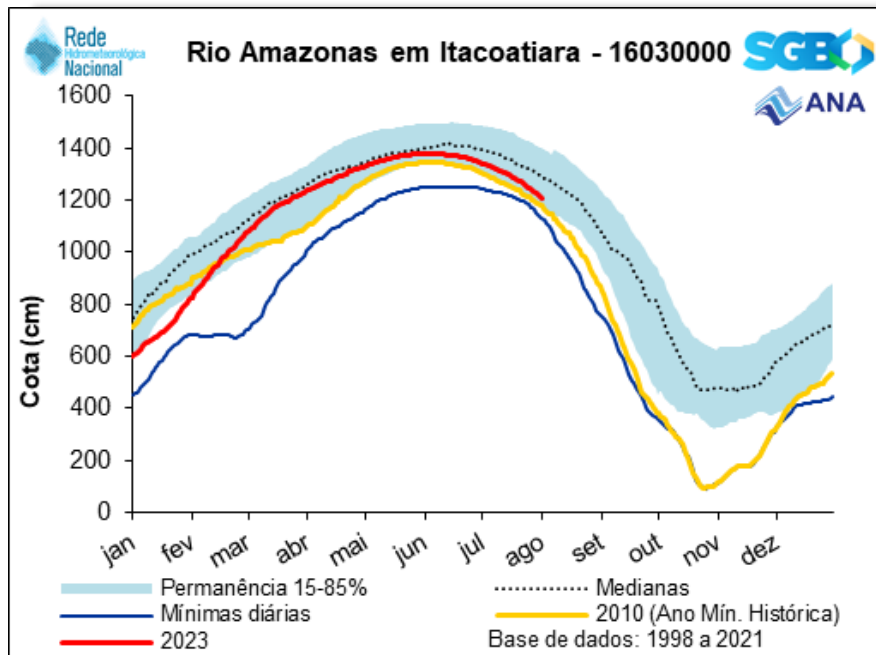
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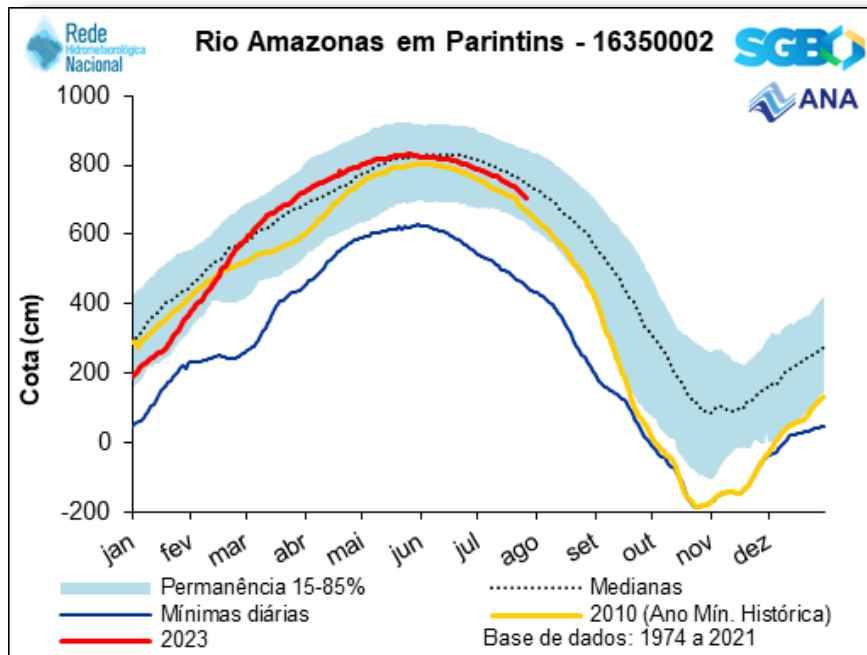
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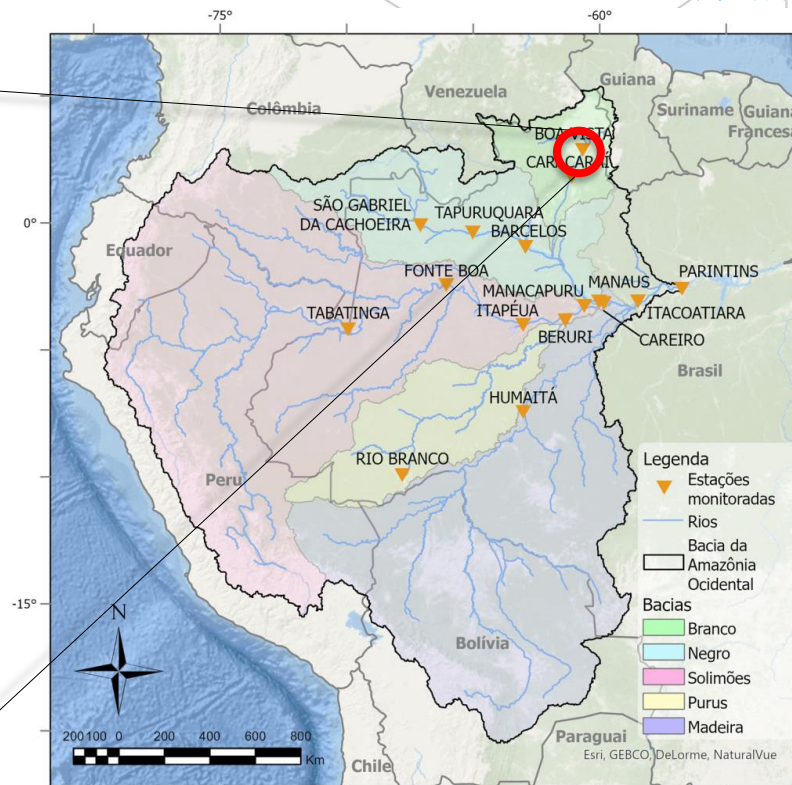
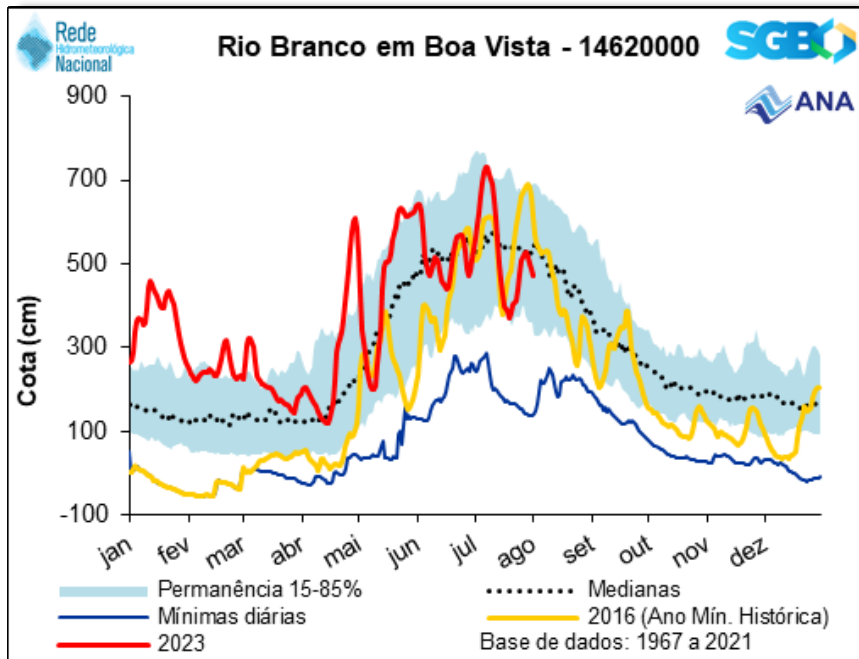
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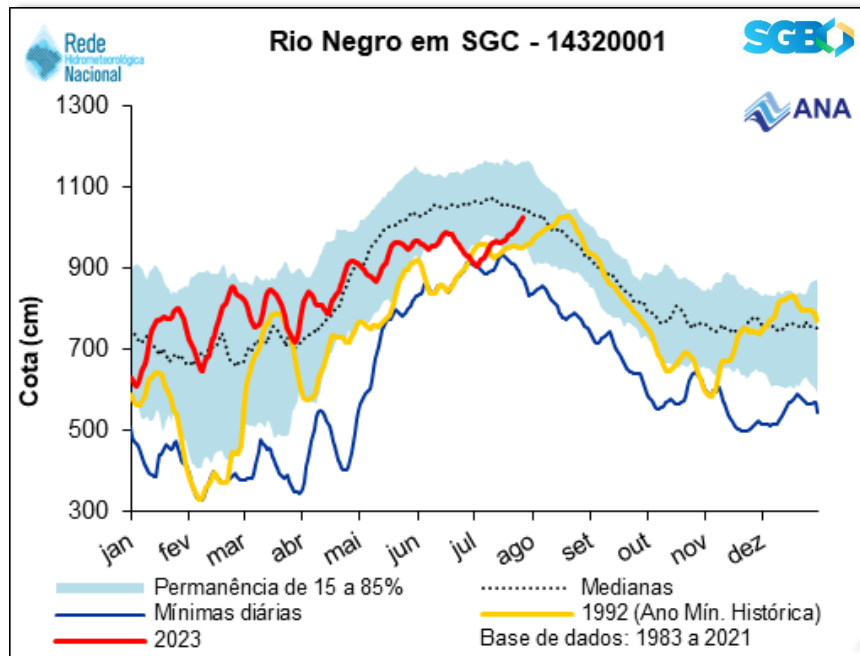
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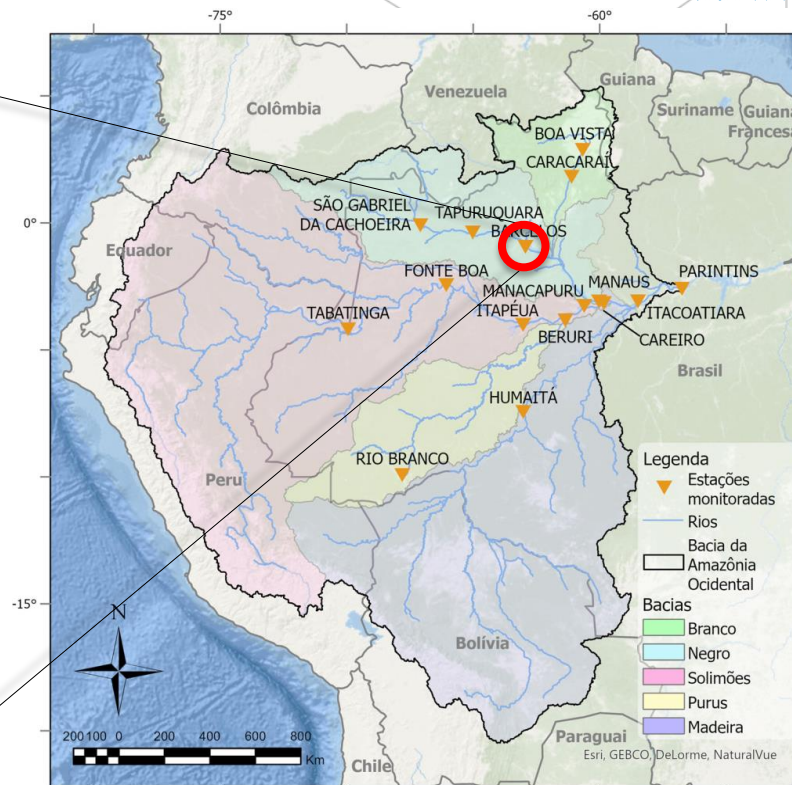
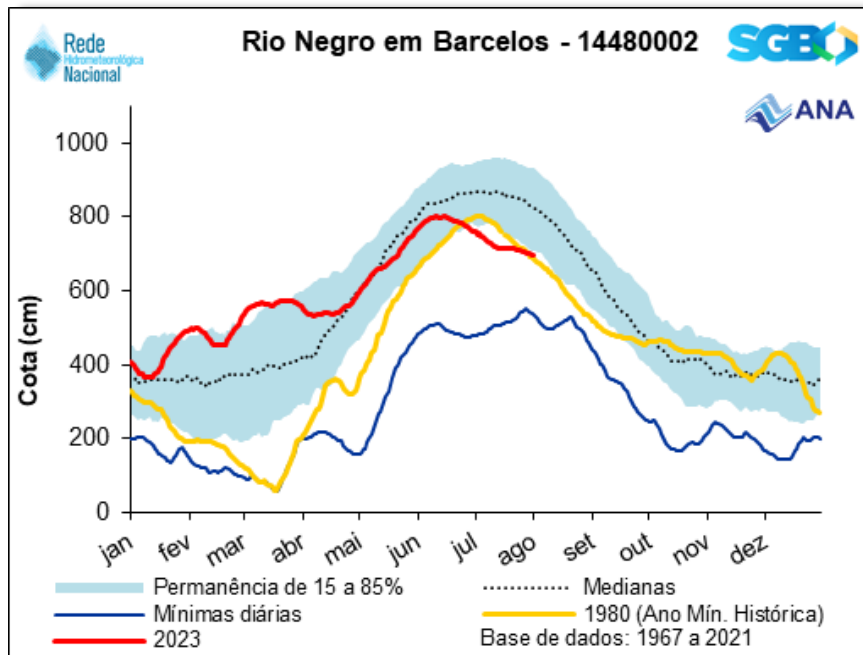
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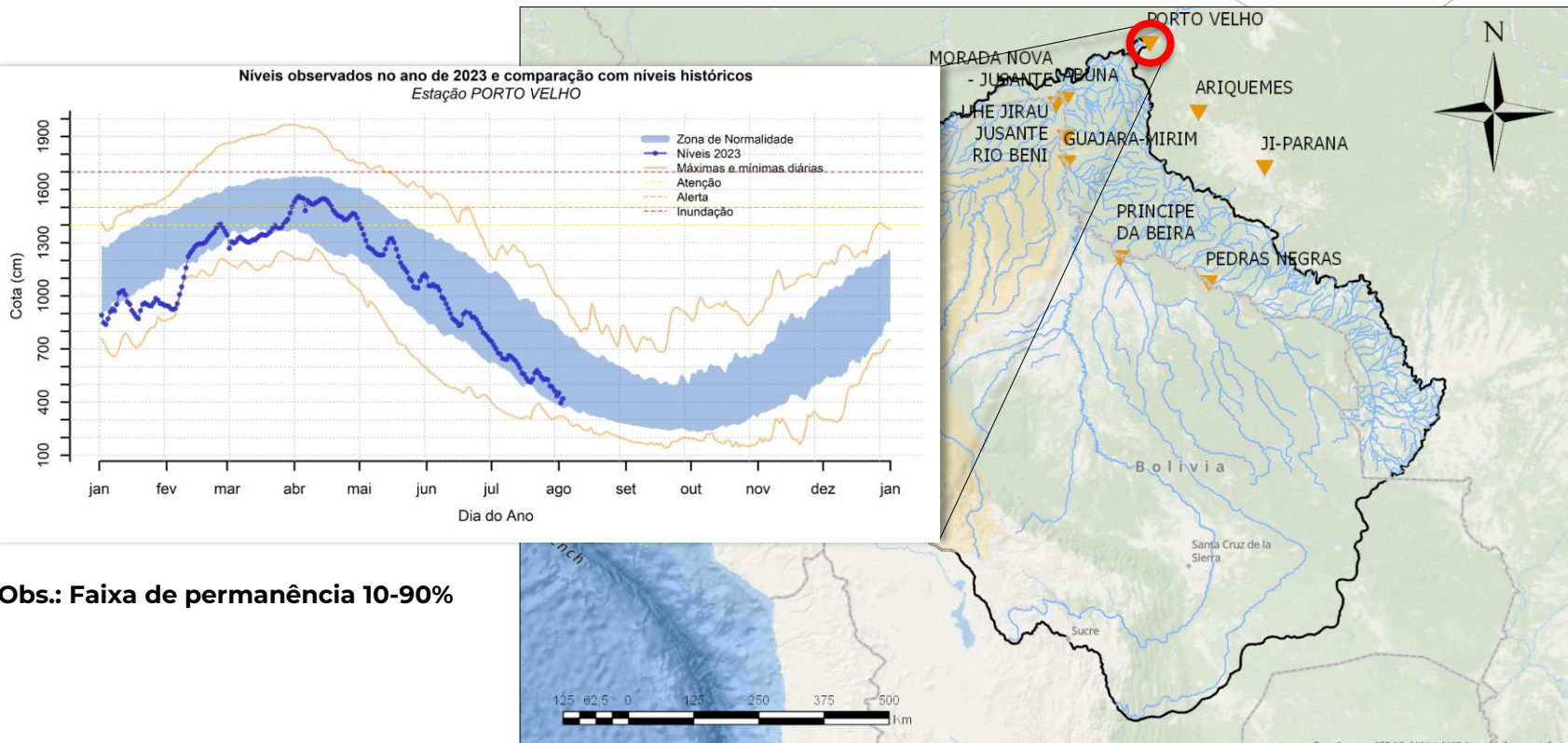
SAH AMAZONAS



SAH AMAZONAS

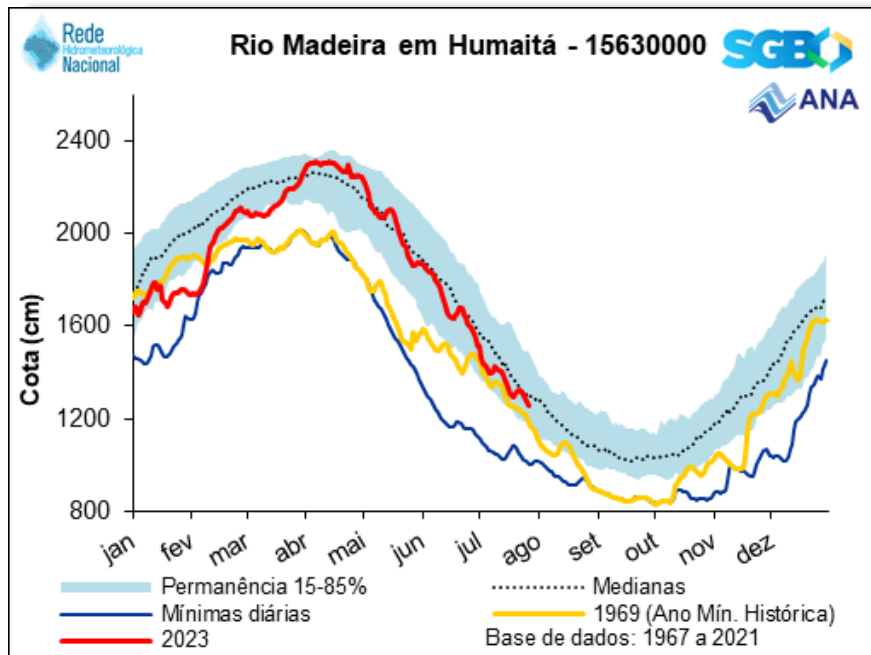


SAH MADEIRA

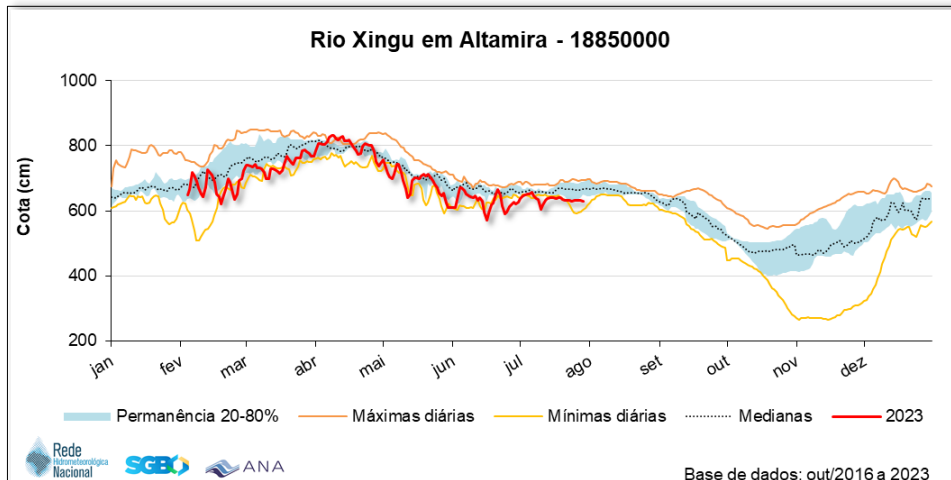


Obs.: Faixa de permanência 10-90%

SAH AMAZONAS

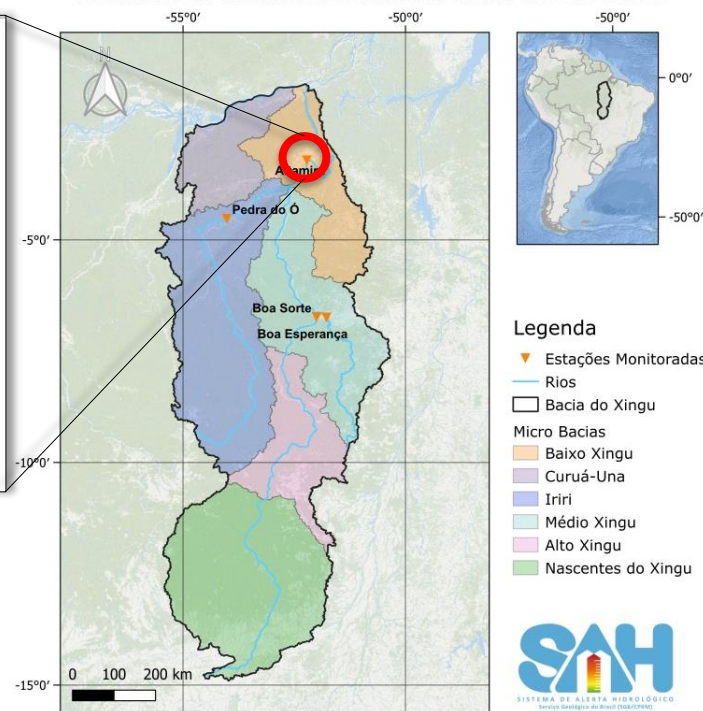


SAH XINGU



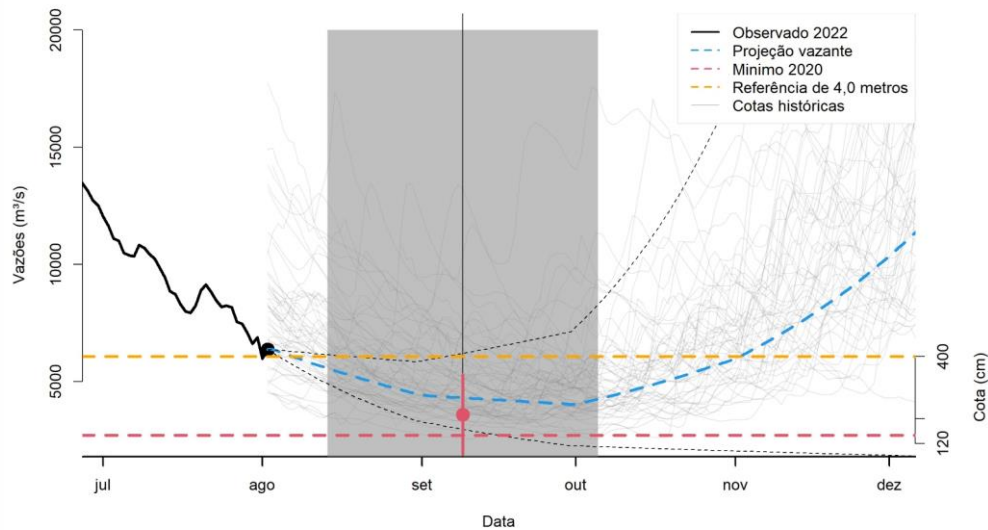
Obs.: Faixa de permanência 20-80%

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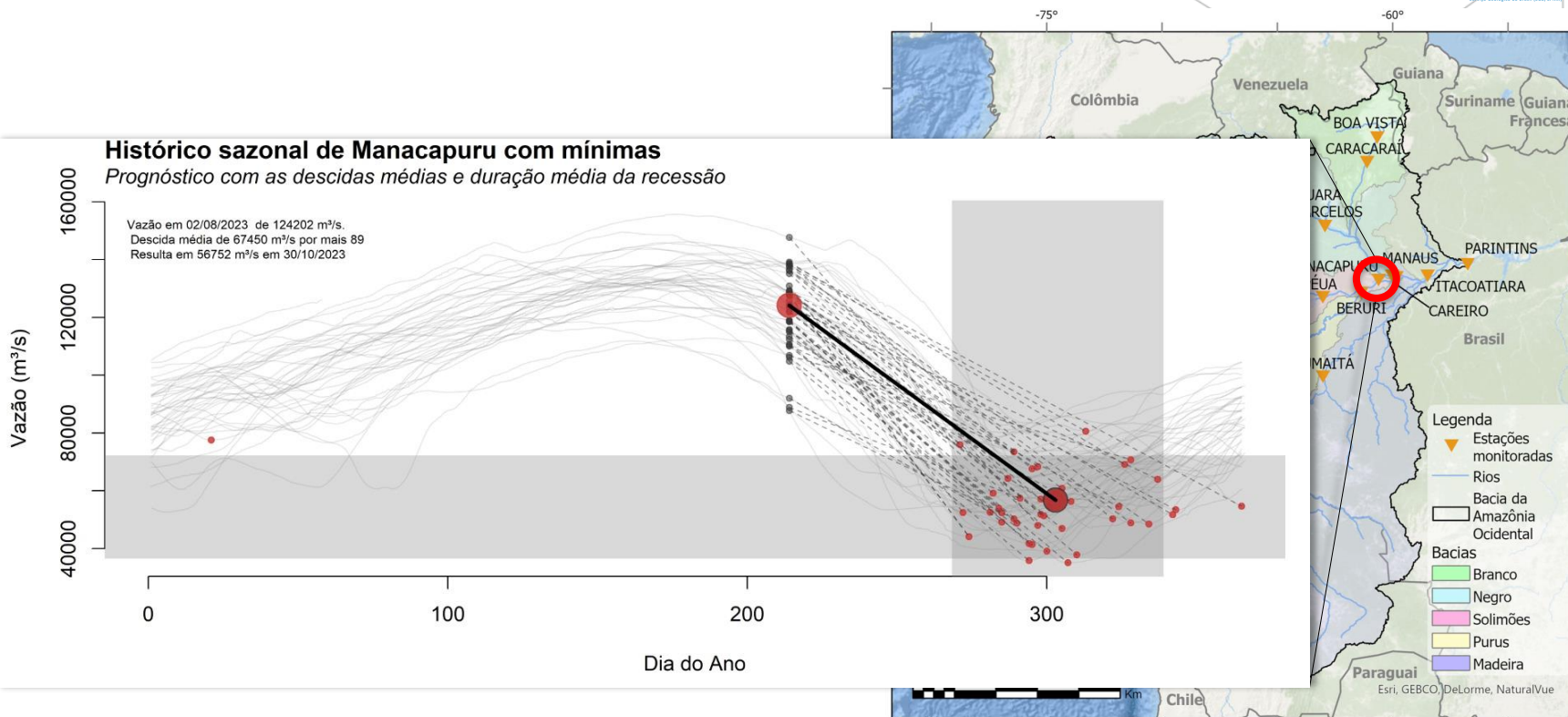


PREVISÕES

Prognóstico de vazões e níveis - seca de 2023 no rio Madeira, em Porto Velho

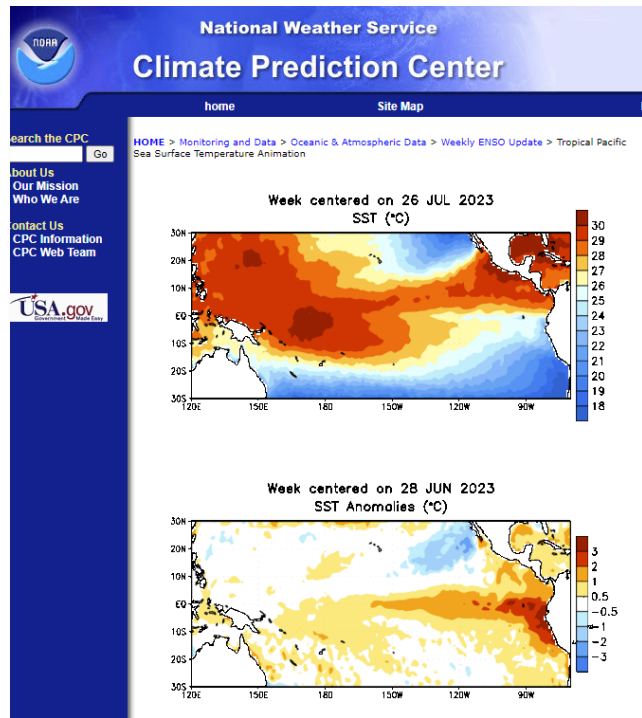


PREVISÕES



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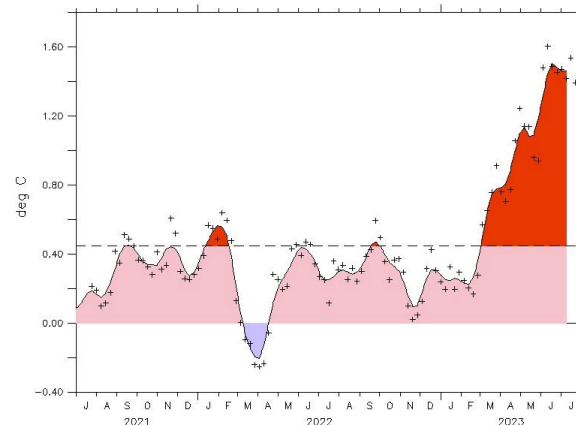
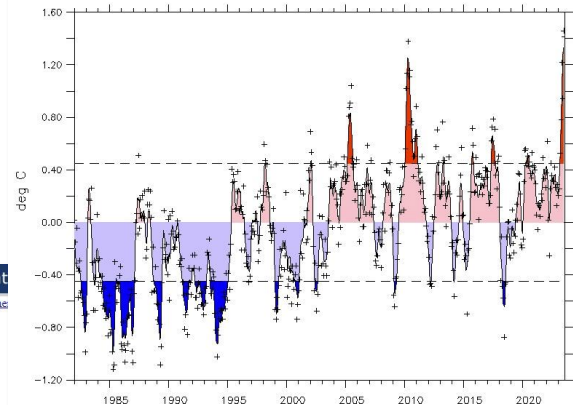


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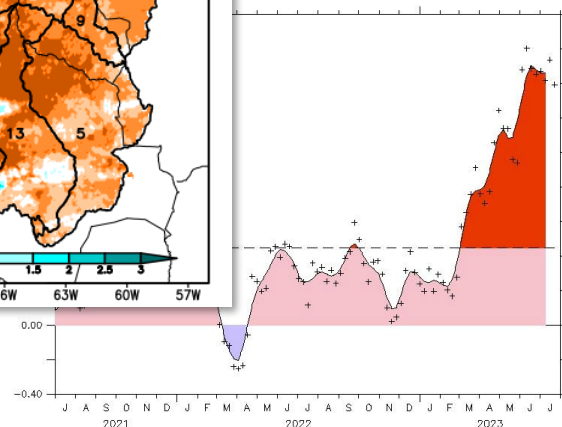
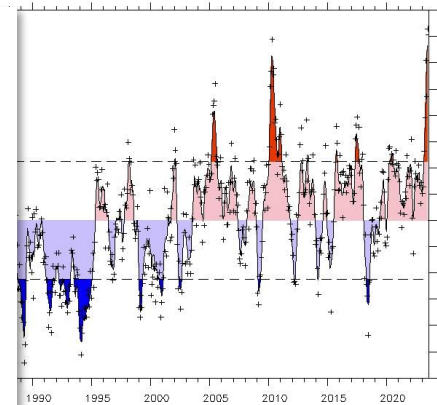
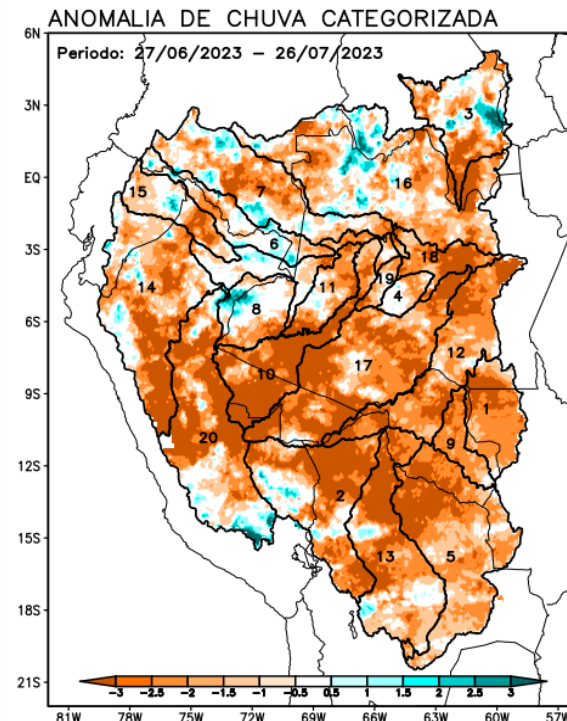
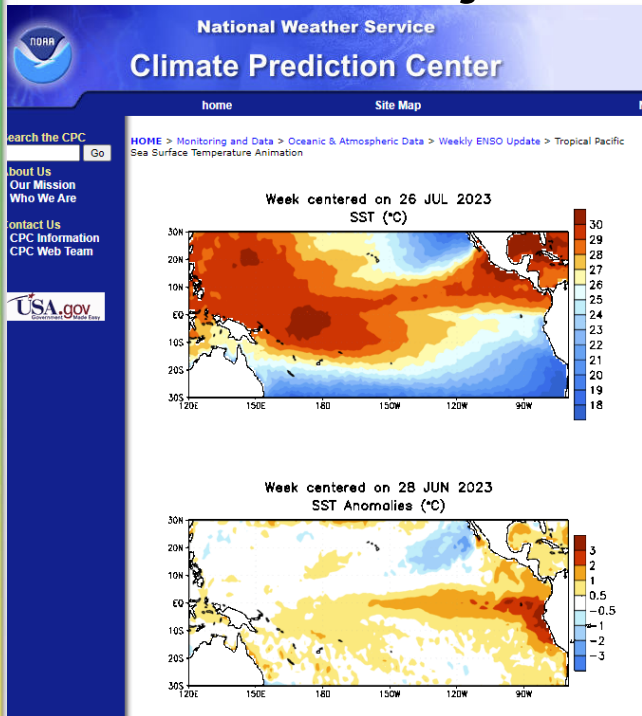
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<https://clima.cptec.inpe.br/gpc/pdf/situacao-El-Nino-Junho-2023.pdf>

CONSIDERAÇÕES FINAIS

ATN



<https://stateoftheocean.osmc.noaa.gov/sur/atn/tna.php>

CONSIDERAÇÕES FINAIS

HIDROVIAS

- Transporte de grandes cargas
- Transporte de alimentos, remédios e combustíveis para interior
- Mobilidade de pessoas entre comunidades e centros de saúde

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- Pesca
- Agricultura

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- Consumo
- Higiene

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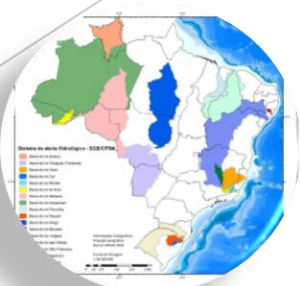
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