

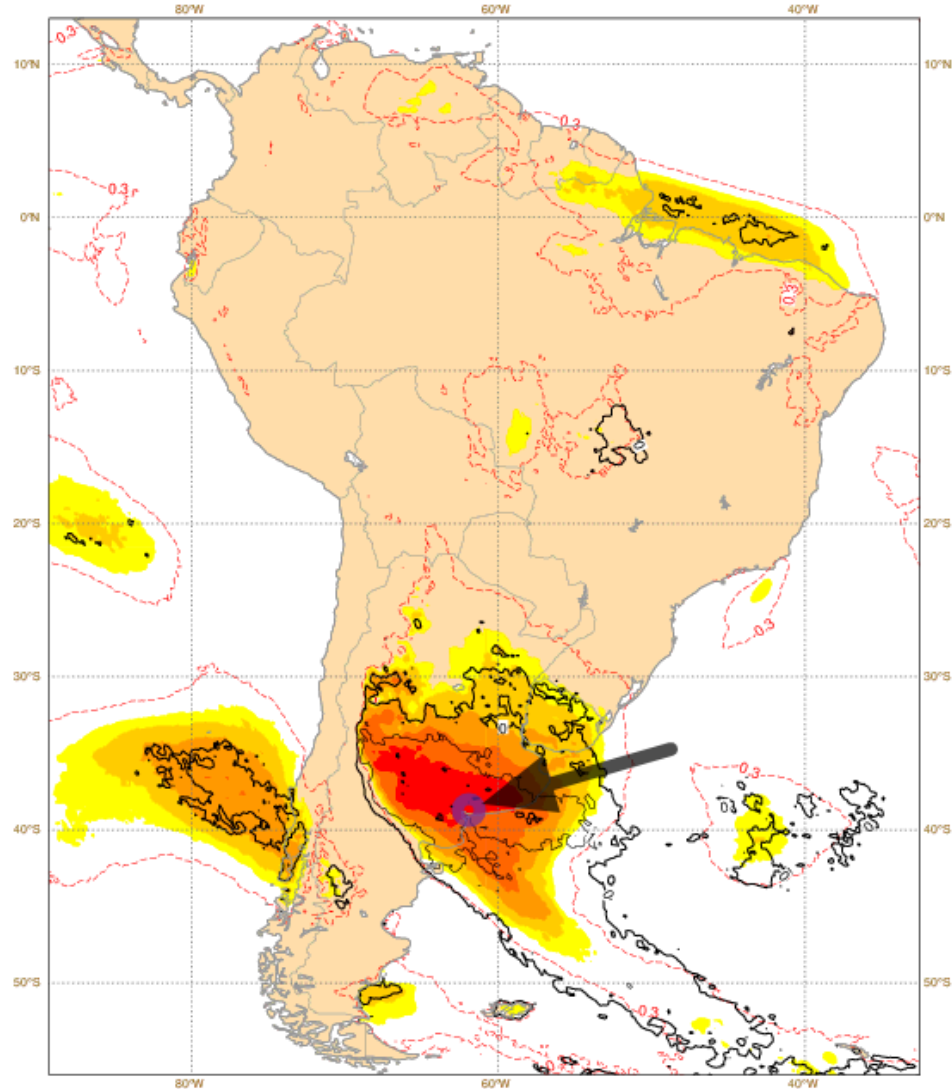
# Argentina

Case studies

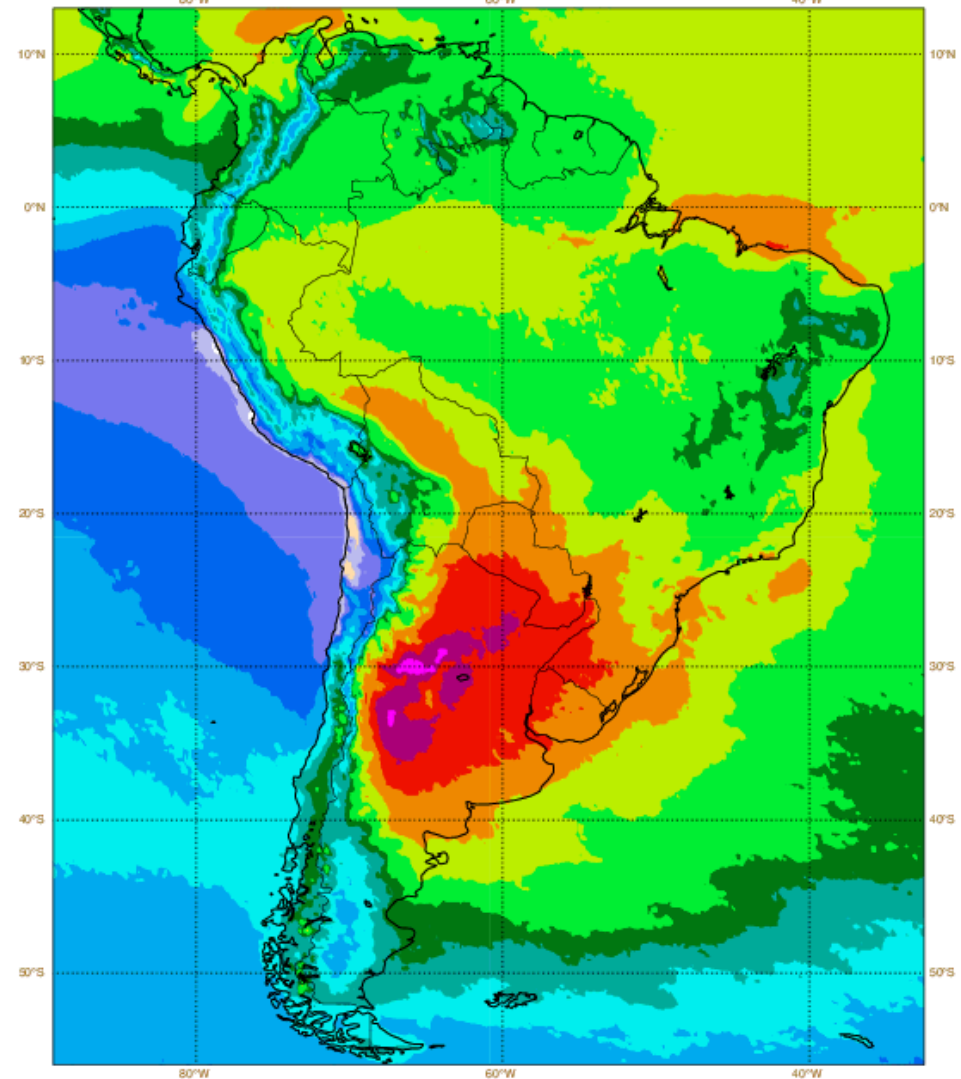
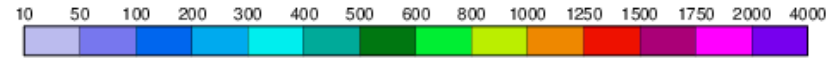
Estíbaliz Gascón

# Bahía Blanca extreme convective event (16 Sep 2023)

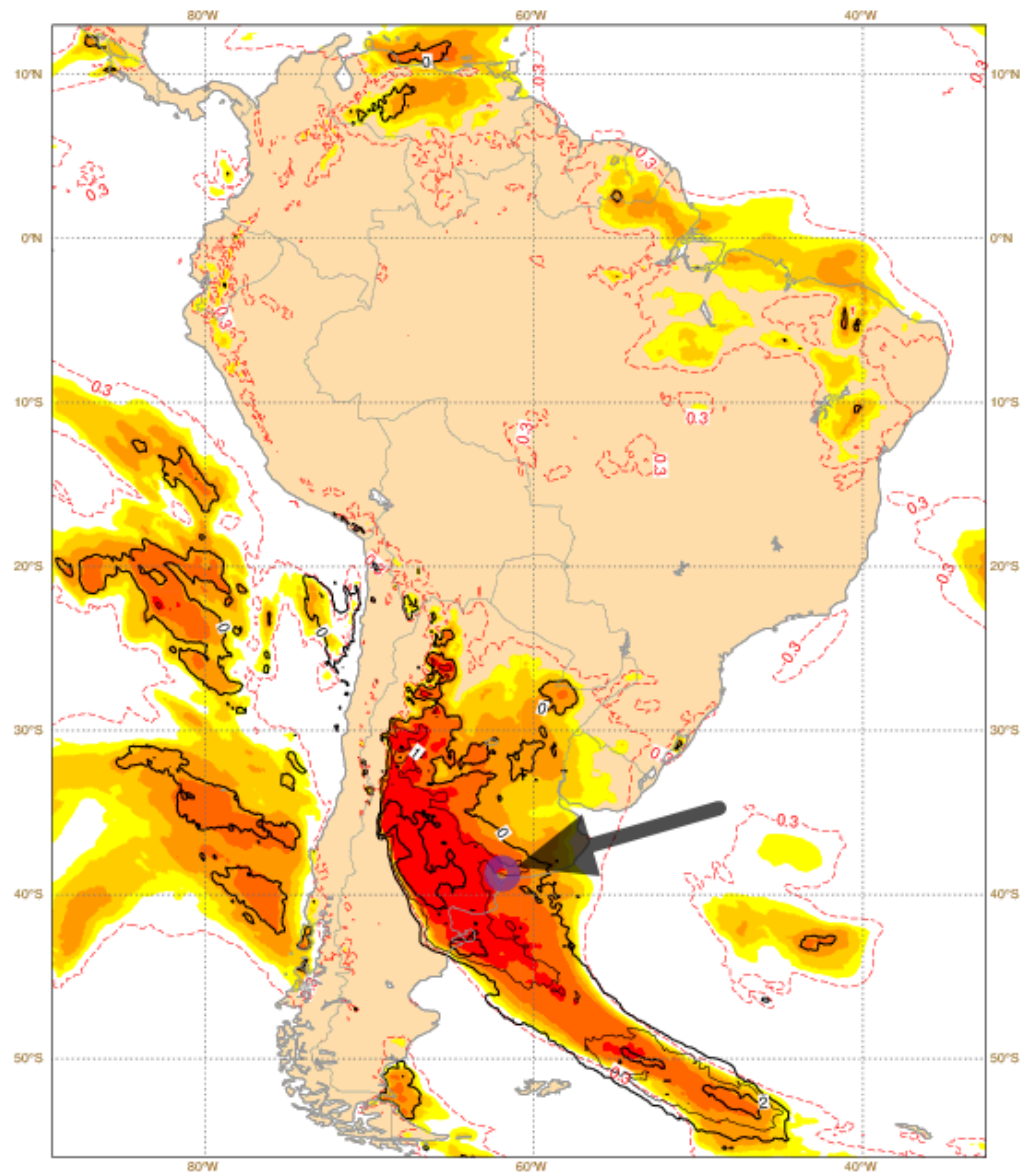
Mon 11 Dec 2023 00UTC @ECMWF t+120-144h VT: Sat 16 Dec 2023 00UTC - Sun 17 Dec 2023 00UTC  
Extreme forecast index and Shift of Tails (black contours 0,1,2,5,8) for CAPESHEAR



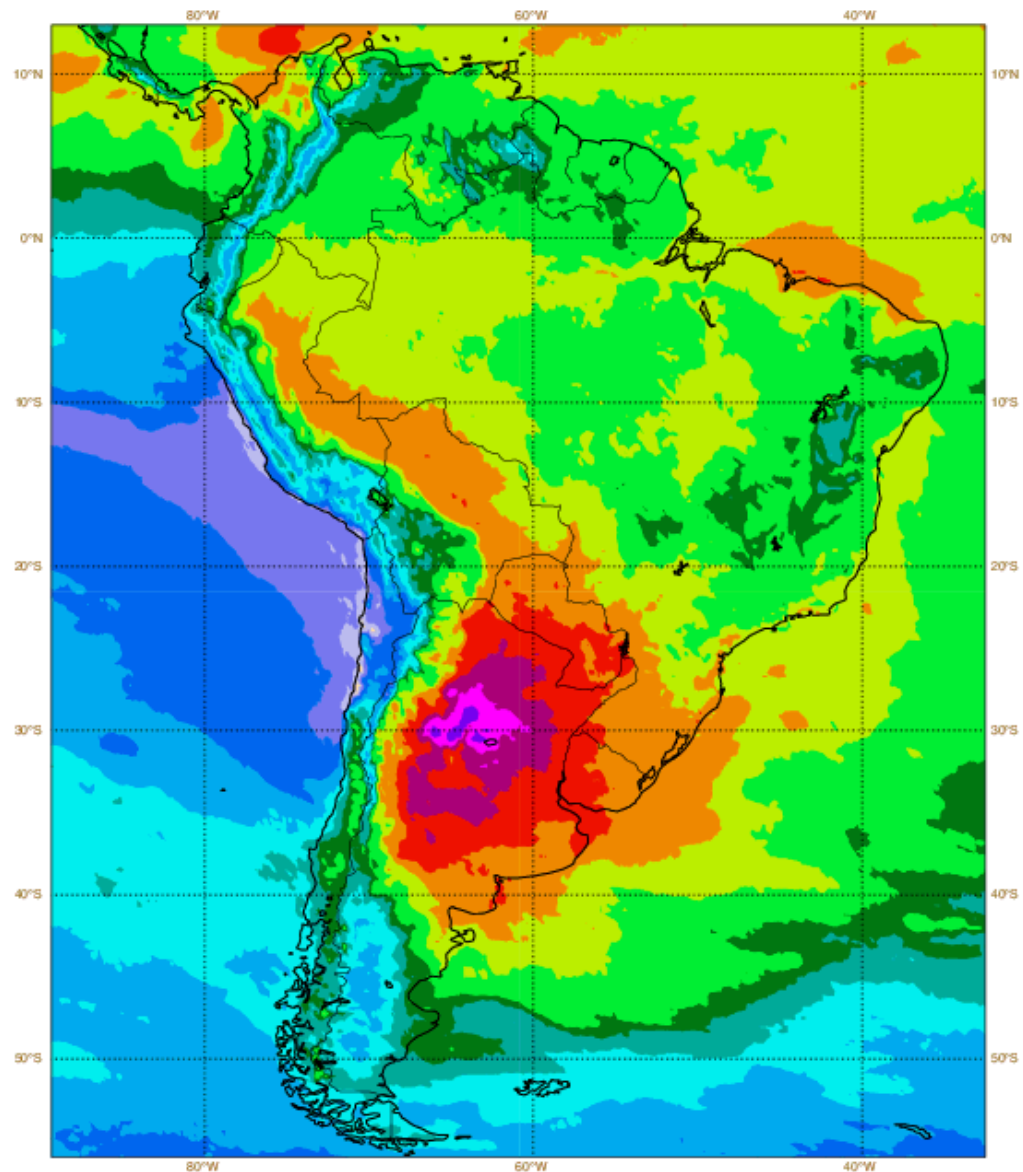
Thu 07 Dec 2023 00UTC @ECMWF VT: Sat 16 Dec 2023 00UTC - Sun 17 Dec 2023 00UTC 120-144h  
CAPESHEAR ( in  $m^2/s^2$ ) Model climate Q99 (one in 100 occasions realises more than value shown)



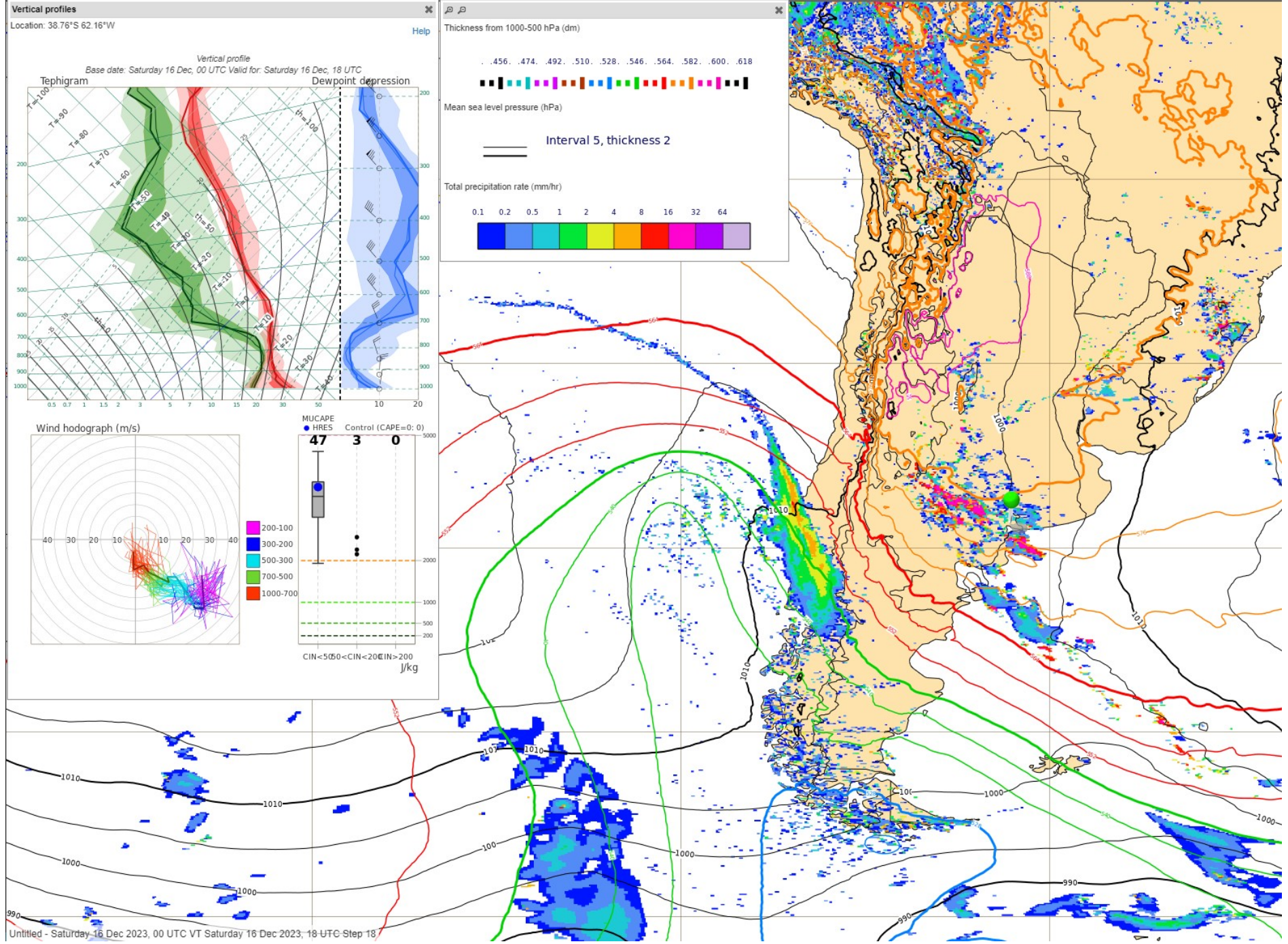
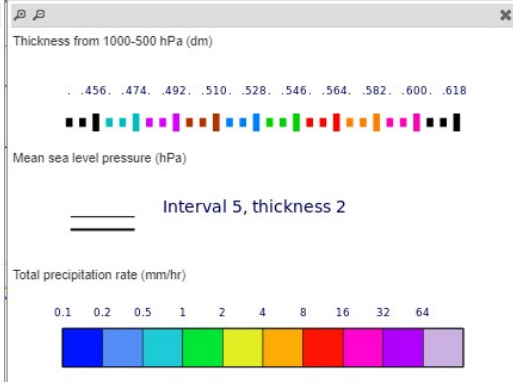
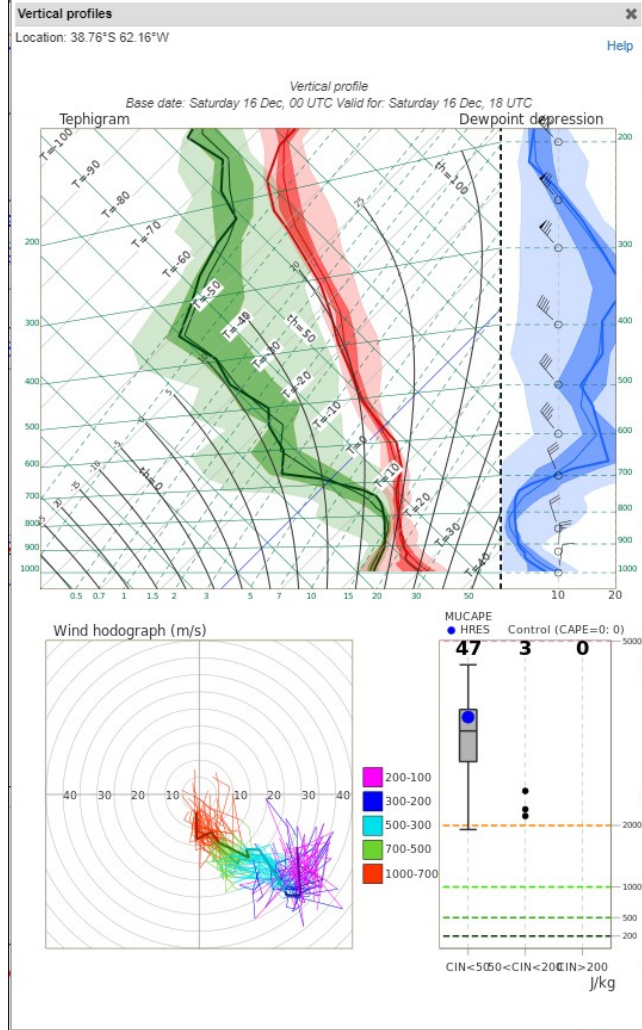
Sat 16 Dec 2023 00UTC @ECMWF t+0-24h VT: Sat 16 Dec 2023 00UTC - Sun 17 Dec 2023 00UTC  
 Extreme forecast index and Shift of Tails (black contours 0,1,2,5,8) for CAPESHEAR



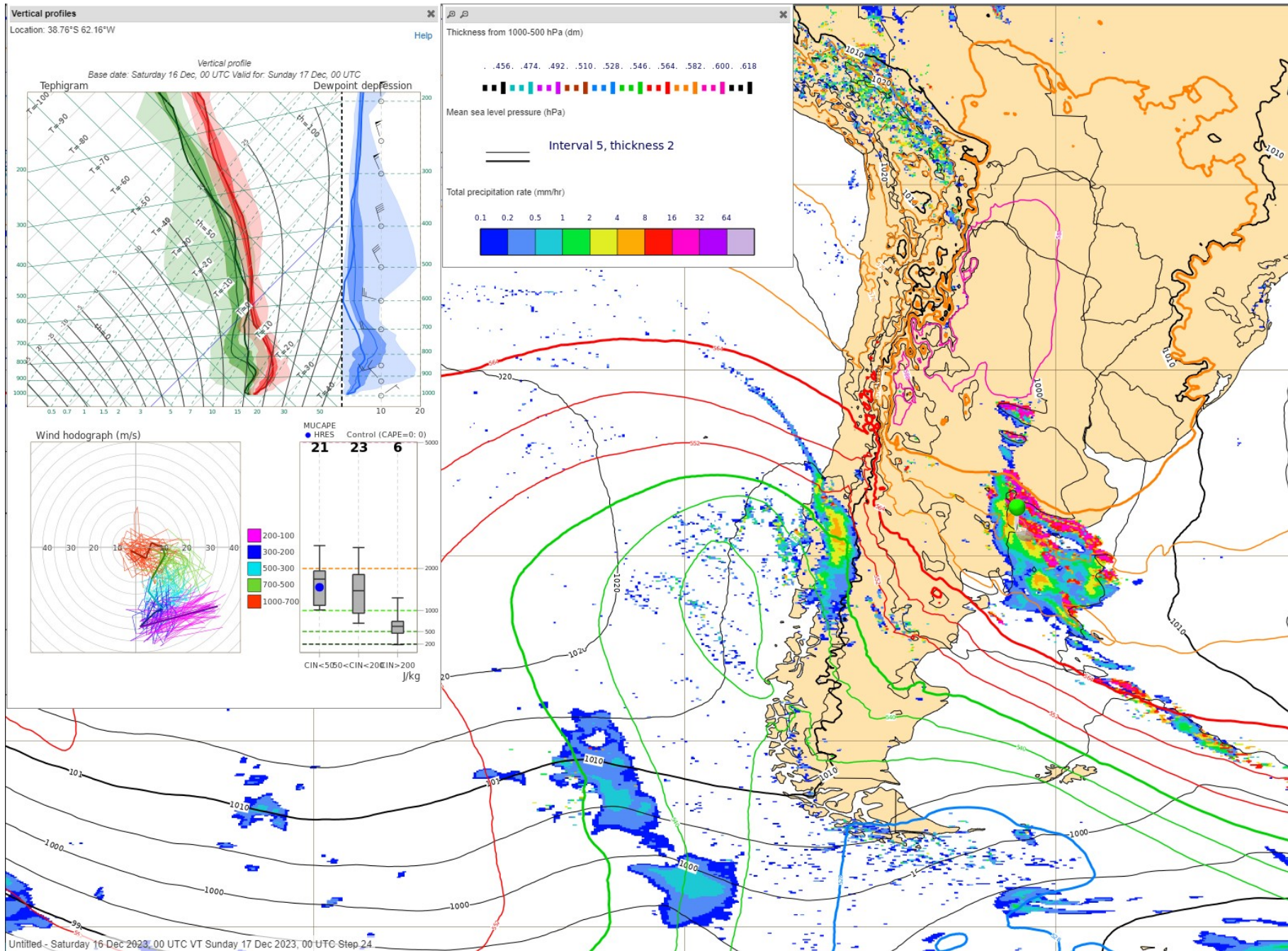
Thu 14 Dec 2023 00UTC @ECMWF VT: Sat 16 Dec 2023 00UTC - Sun 17 Dec 2023 00UTC 0-24h  
 CAPESHEAR ( in  $m^2/s^2$ ) Model climate Q99 (one in 100 occasions realises more than value shown)













# Cold spell South Argentina (June/July 2020)

Localidad	Duración ola de frío	Rango T mín (°C)	Rango T máx(°C)
Río Grande	7 días	-16.5 y -9.6	-8.8 y -2.5
Gdor. Gregores	6 días	-15.0 y -7.2	-6.0 y 1.0
Río Gallegos	6 días	-13.4 y -5.0	-4.8 y 3.0
El Calafate	5 días	-12.5 y -7.4	-3.6 y 1.6
San Julián	5 días	-9.3 y -5.1	1.0 y 3.5
Comodoro Rivadavia	4 días	-3.5 y -0.6	4.8 y 6.6
Santa Cruz	4 días	-9.0 y -5.8	-0.2 y 0.5
Perito Moreno	3 días	-20.0 y -15.5	-1.5 y 3.5

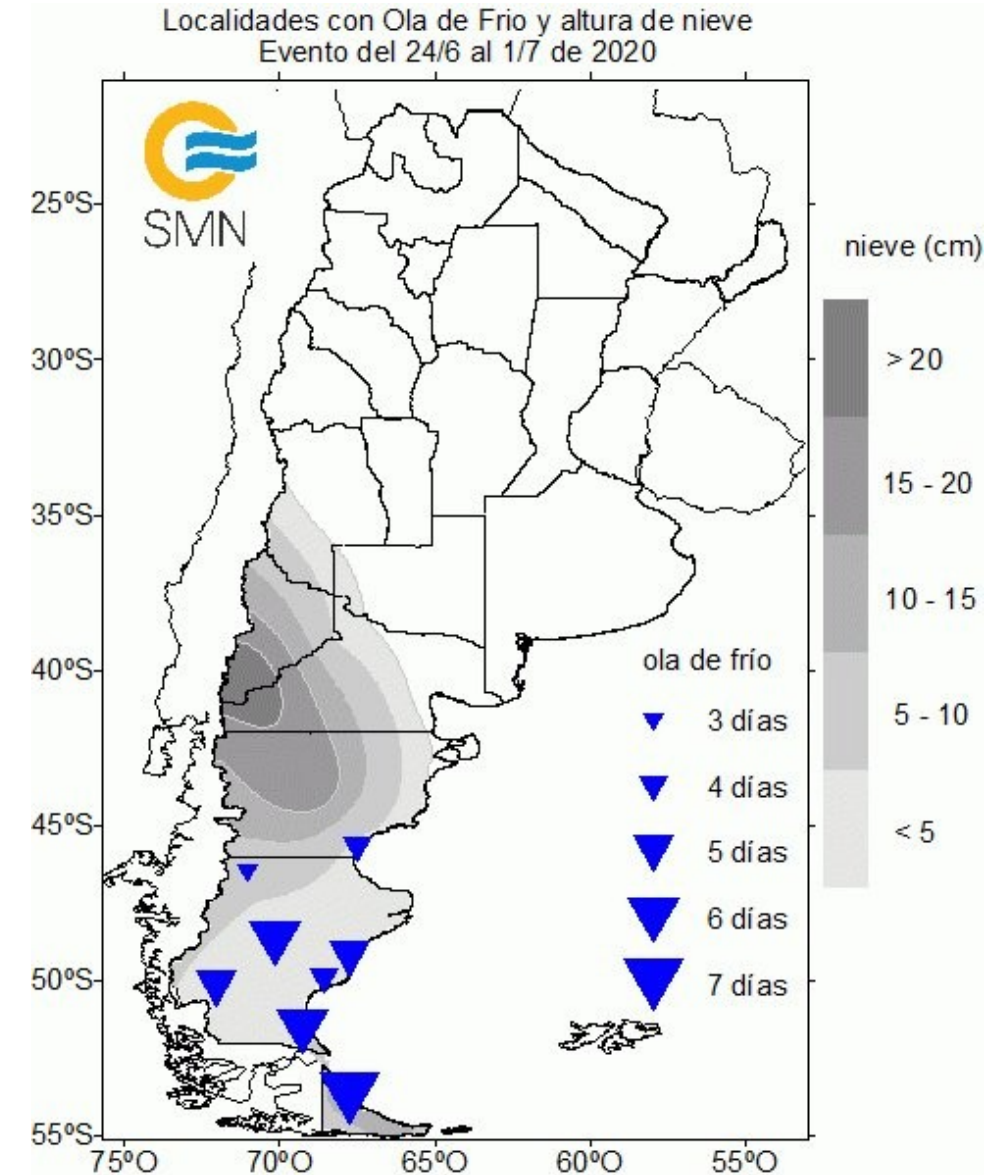
Duración y rango de temperaturas registradas en las localidades afectadas

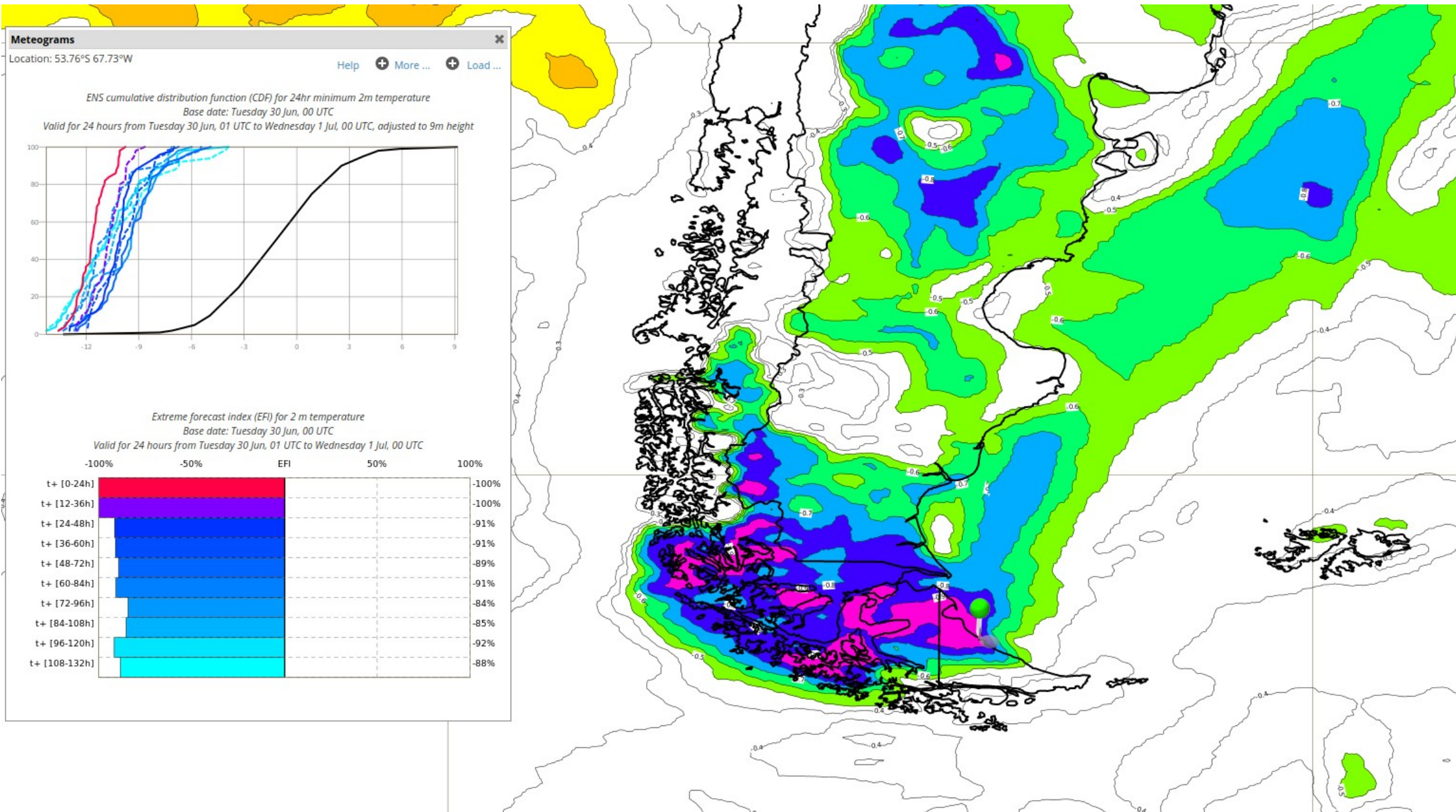
**87934: Río Grande B. A. (Argentina)**

Latitud: 53-48S Longitud: 067-45W Altitud: 13 m.

Resumen diario a las 06:00 UTC. (01:29 tiempo solar)  
Periodo: 30 días desde 2020/07/02

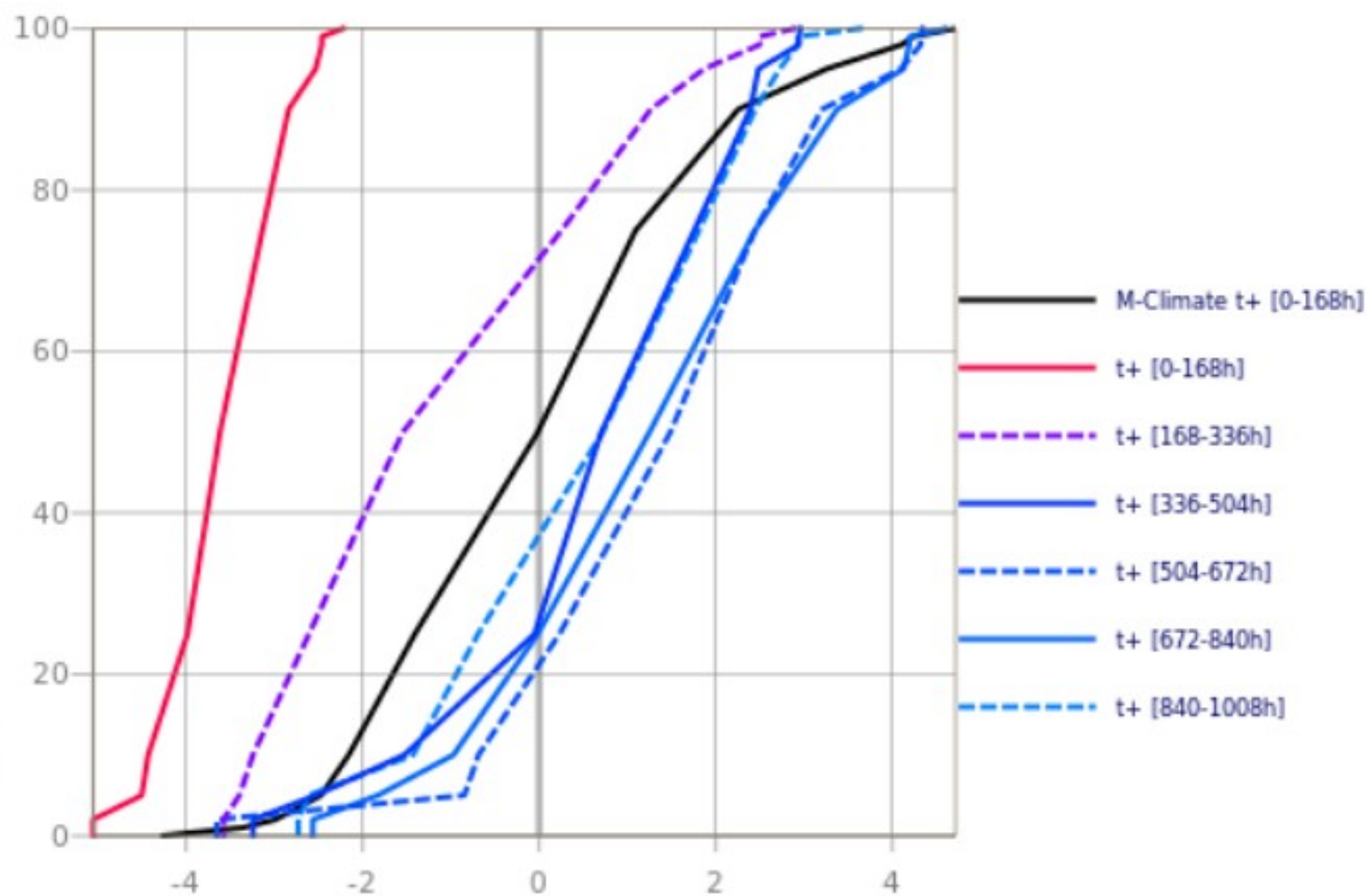
Fecha	Temperatura (C)			Td Med (C)	Hr. Med (%)	Viento (km/h)		Pres. n. mar (Hp)	Prec. (mm)	Nub Tot Oct	Nub baj Oct	Vis Km	Esp. Nie. (cm)
	Max	Min	Med			Dir.	Vel.						
02/07	-5.7	-16.5	-11.7	-13.7	84.5	SW	8.8	1019.7	0.0	1.9	5.7	26.1	8
01/07	-8.8	-15.5	-12.2	-14.8	82.0	SW	12.7	1026.6	0.0	0.0	---	30.0	9
30/06	-8.1	-16.0	-11.6	-14.6	78.3	SW	11.0	1027.4	0.0	0.0	---	30.0	10
29/06	-5.0	-12.0	-8.6	-10.6	85.7	SW	14.2	1026.0	0.0	0.3	0.0	30.0	10
28/06	-2.5	-15.0	-7.1	-8.5	88.0	WSW	13.5	1023.6	0.0	0.2	1.0	30.0	10
27/06	-3.0	-14.0	-9.5	-11.4	86.8	SW	12.4	1023.0	0.0	0.0	---	30.0	10
26/06	-3.2	-10.4	-6.4	-8.1	88.4	SW	12.3	1024.1	0.0	1.4	1.2	30.0	12





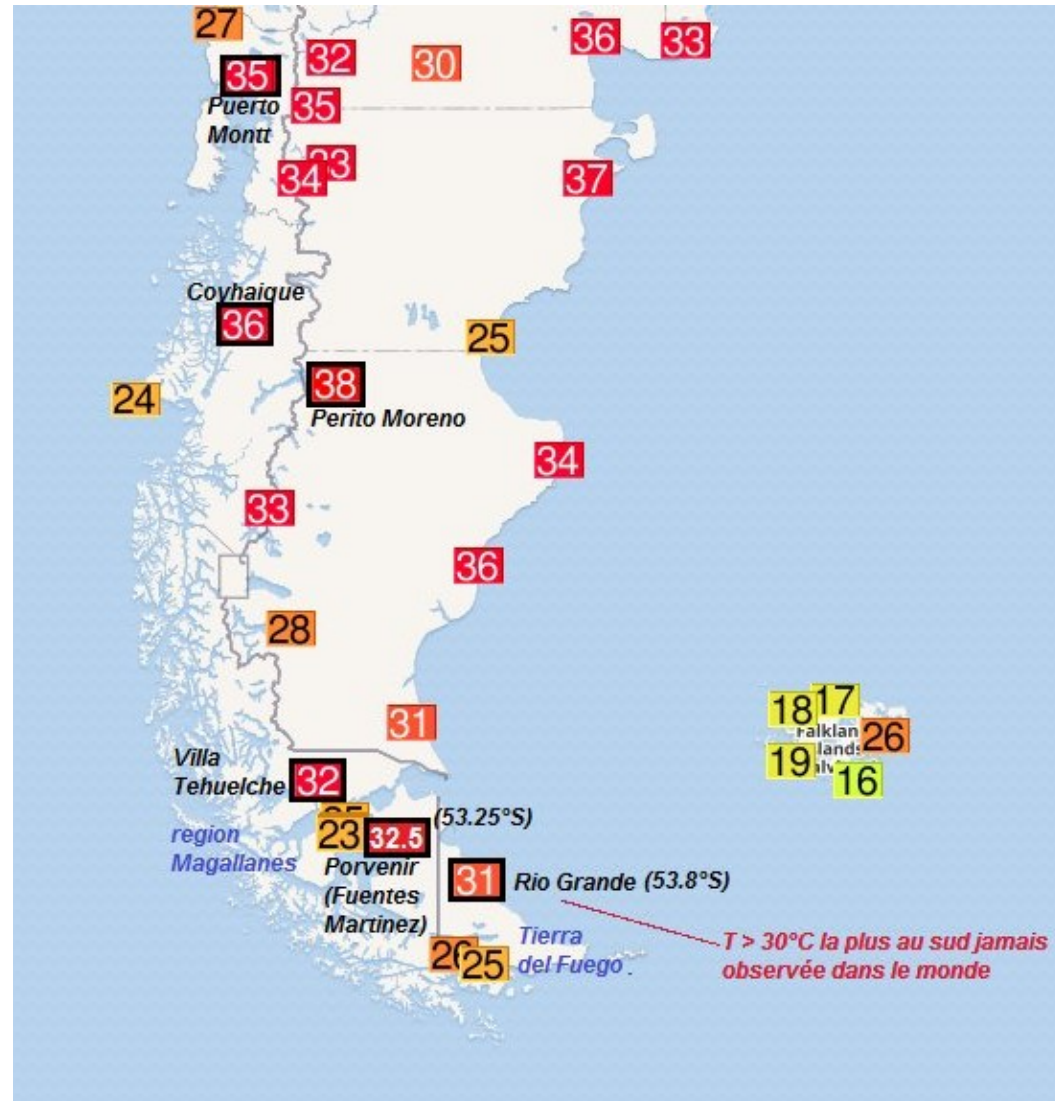


*Extended CDF for 2mt weekly mean anomalies*  
*Valid for the period from Thursday 25 Jun, 00 UTC to Thursday 2 Jul, 00 UTC*





# Heatwave South Argentina-Chile (February 2019)



# ECMWF EPS-Monthly Forecasting System

## 2-meter Temperature anomaly

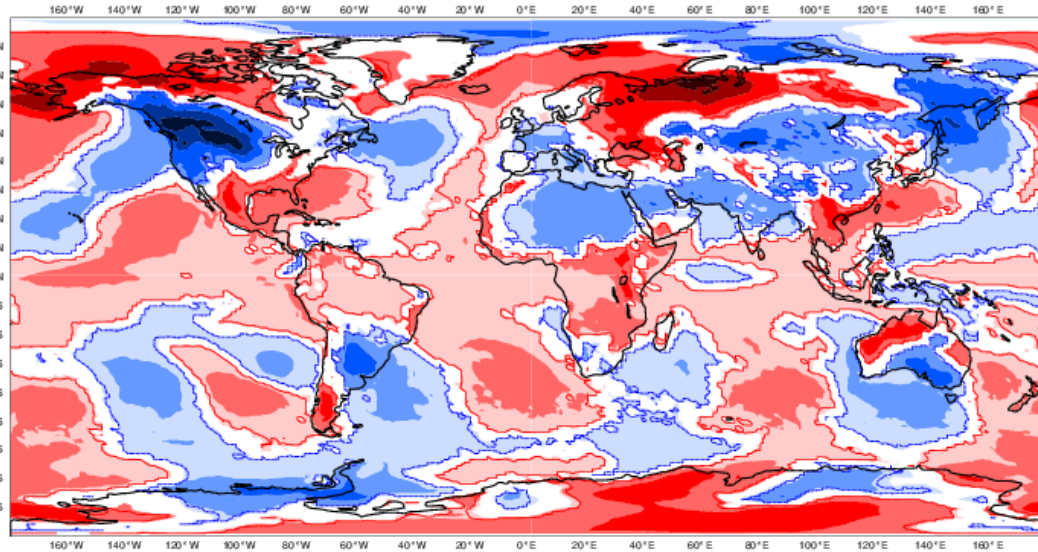
Forecast start reference is 07-02-2019  
ensemble size = 51 ,climate size = 660

Day 5-11

11-02-2019/TO/17-02-2019

Shaded areas significant at 10% level  
Contours at 1% level

<-10deg -10..-6 -6..-3 -3..-1 -1.. 0 0.. 1 1.. 3 3.. 6 6.. 10 > 10deg



**Week 1**

# ECMWF EPS-Monthly Forecasting System

## 2-meter Temperature anomaly

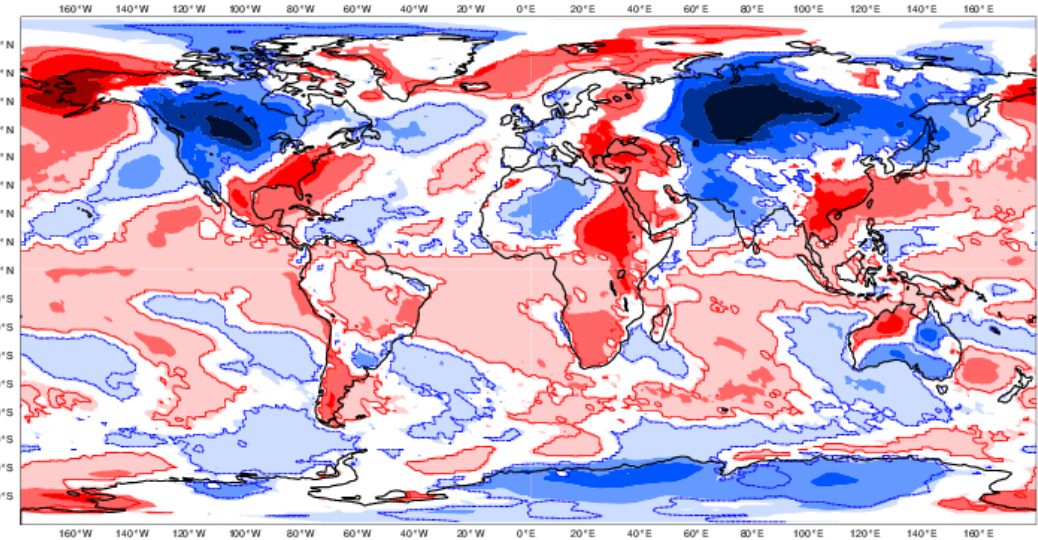
Forecast start reference is 28-01-2019  
ensemble size = 51 ,climate size = 660

Day 8-14

04-02-2019/TO/10-02-2019

Shaded areas significant at 10% level  
Contours at 1% level

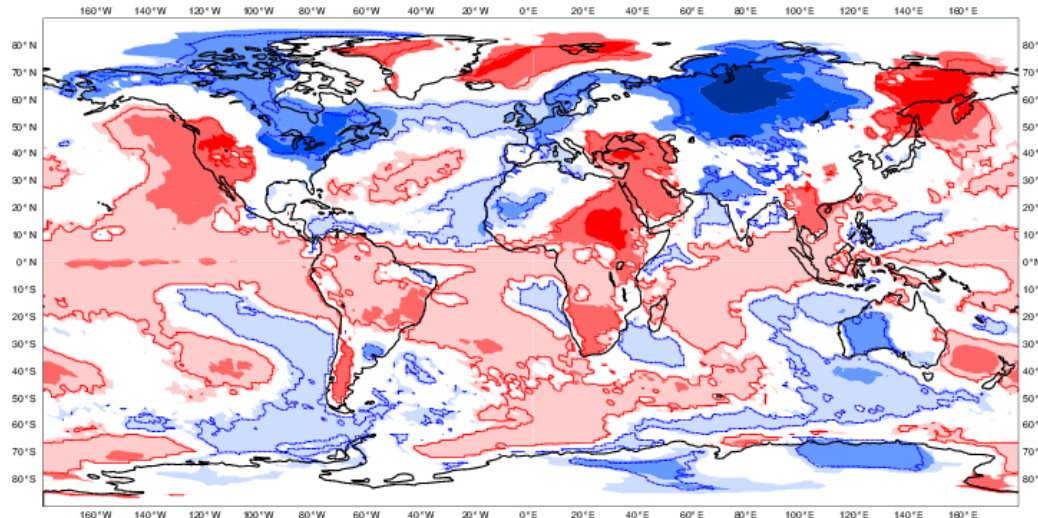
<-10deg -10..-6 -6..-3 -3..-1 -1.. 0 0.. 1 1.. 3 3.. 6 6.. 10 > 10deg



**Week 2**

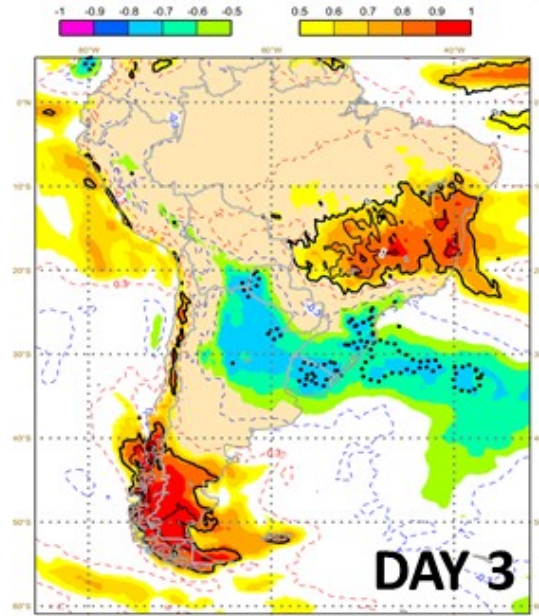
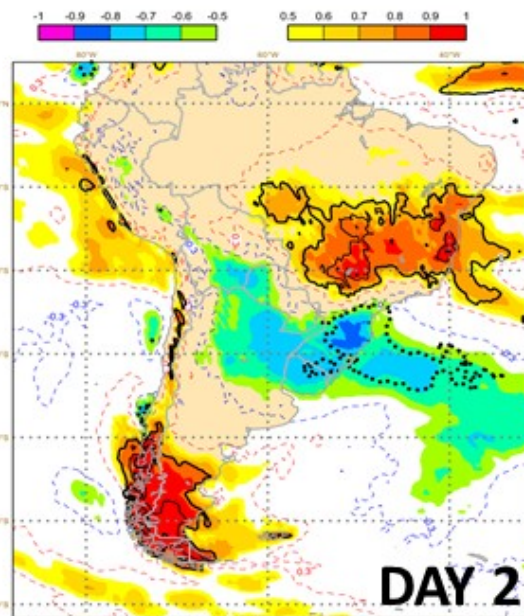
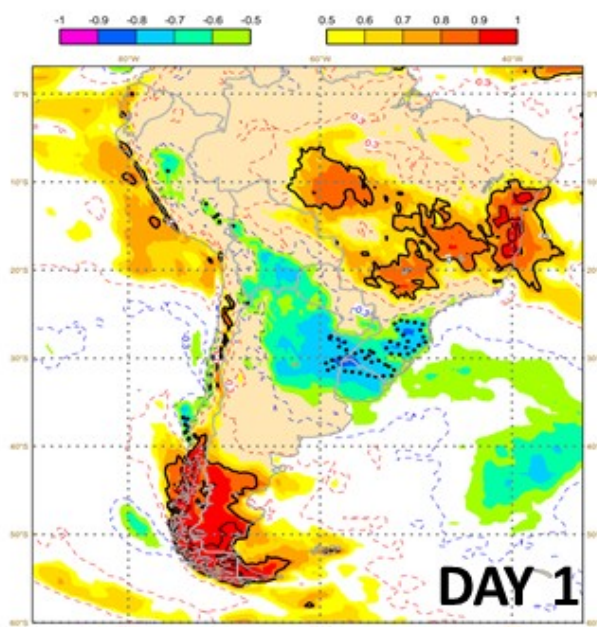
Sub-seasonal forecast

<-10deg -10..-6 -6..-3 -3..-1 -1.. 0 0.. 1 1.. 3 3.. 6 6.. 10 > 10deg



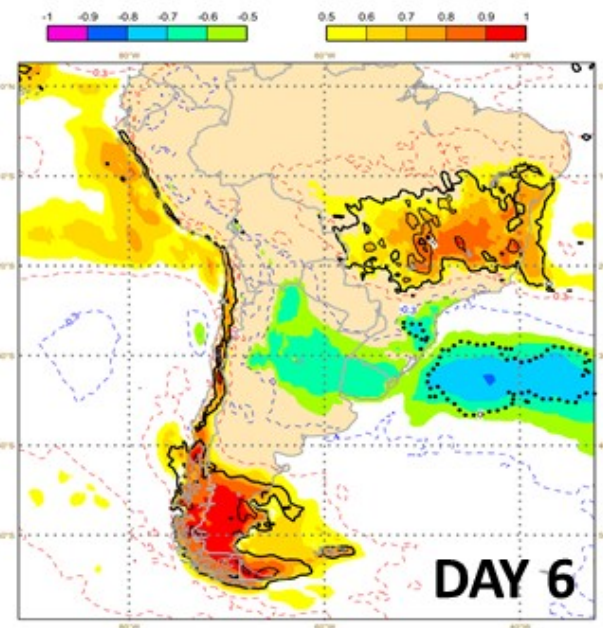
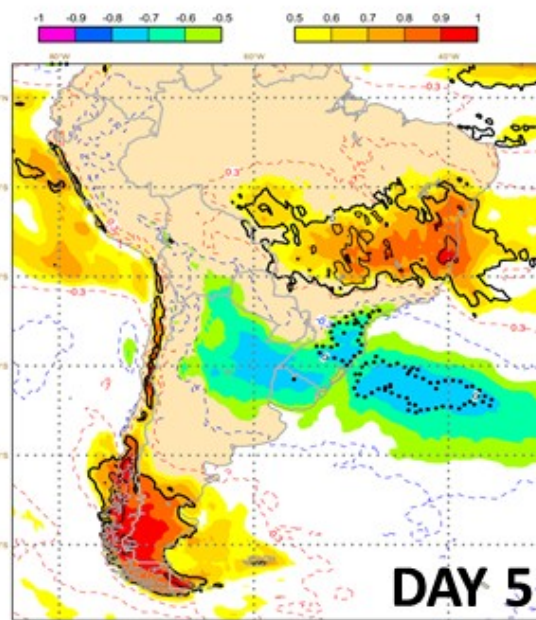
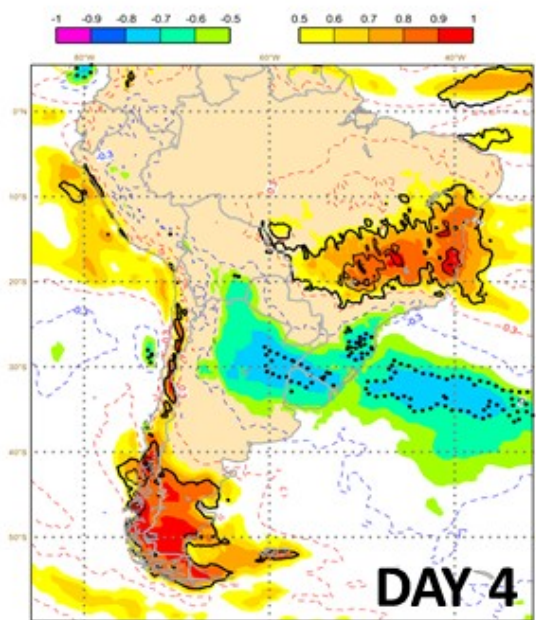
**Week 3**





2 m mean  
temperature EFI

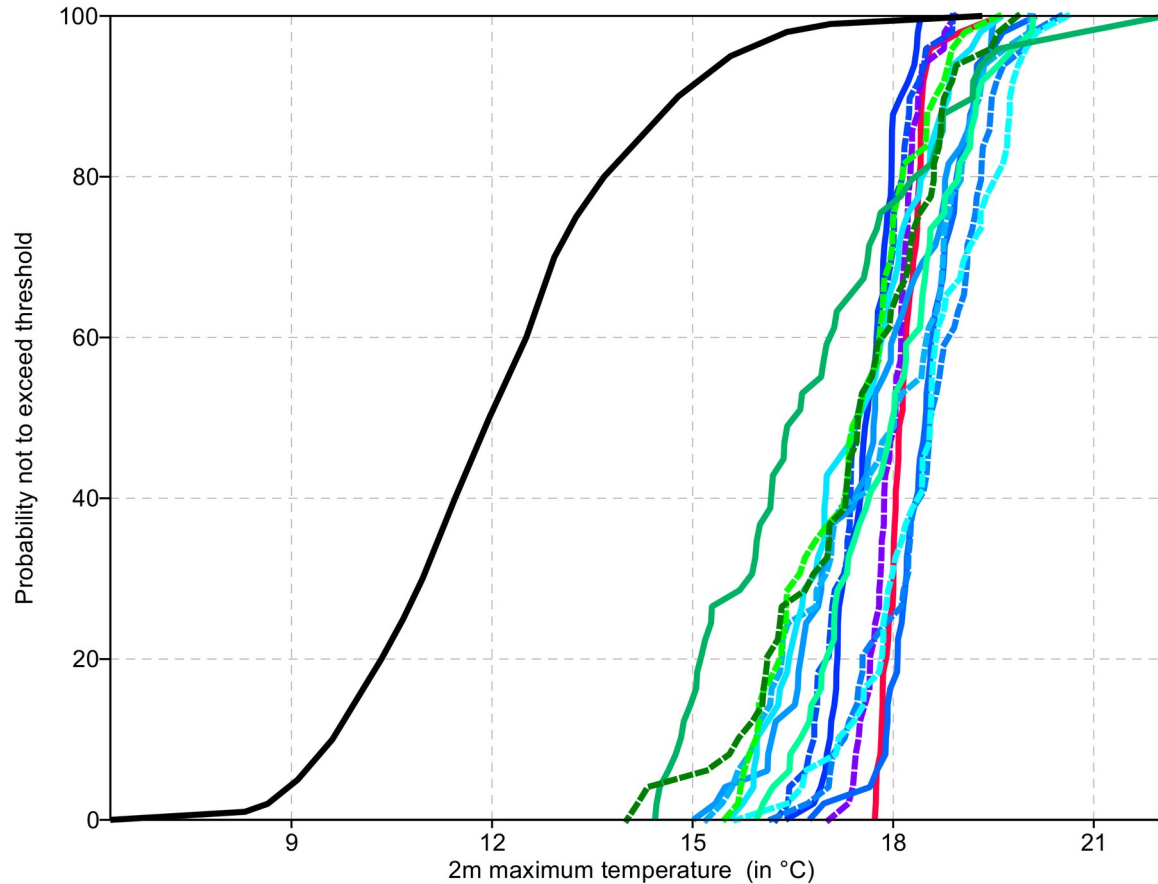
VT: 4<sup>th</sup> Feb 2019



# Rio Grande

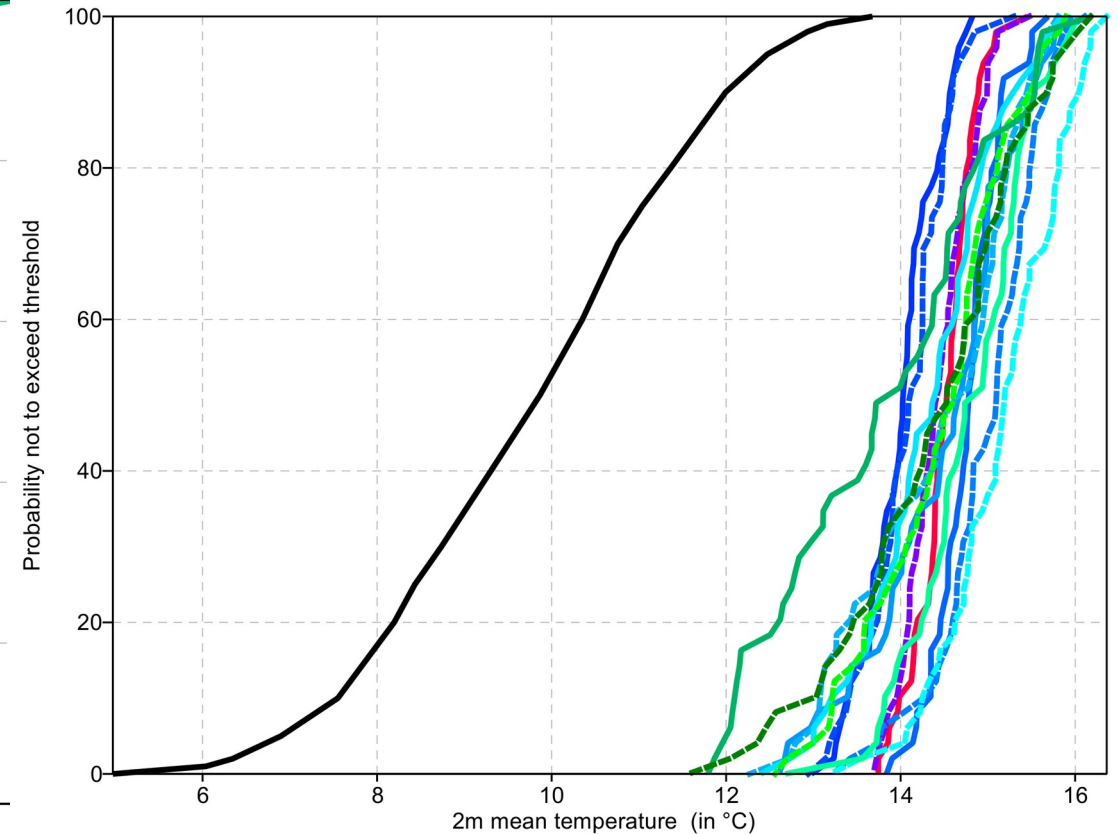
## 2m maximum temperature

Cumulative Distribution Functions for 2m maximum temperature at -53.78°/-67.7° VT: 04/02/2019 00UTC - 05/02/2019 00UTC



## 2m mean temperature

Cumulative Distribution Functions for 2m mean temperature at -53.783°/-67.7° VT: 04/02/2019 00UTC - 05/02/2019 00UTC

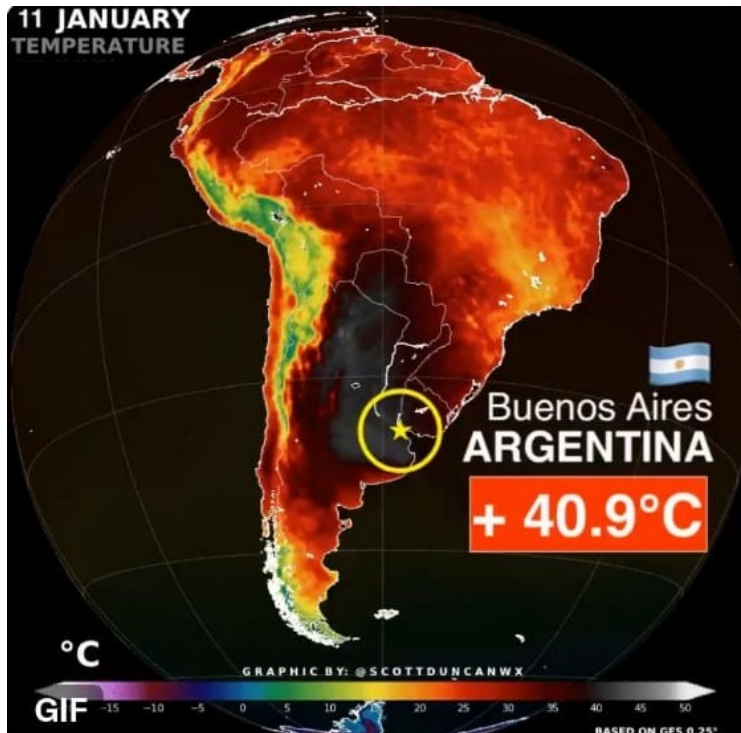


- ENS t+00-24
- ENS t+12-36
- ENS t+24-48
- ENS t+36-60
- ENS t+48-72
- ENS t+60-84
- ENS t+72-96
- ENS t+84-108
- ENS t+96-120
- ENS t+108-132
- ENS t+120-144
- ENS t+132-156
- ENS t+144-168
- ENS t+156-180
- M-clim t+24-48

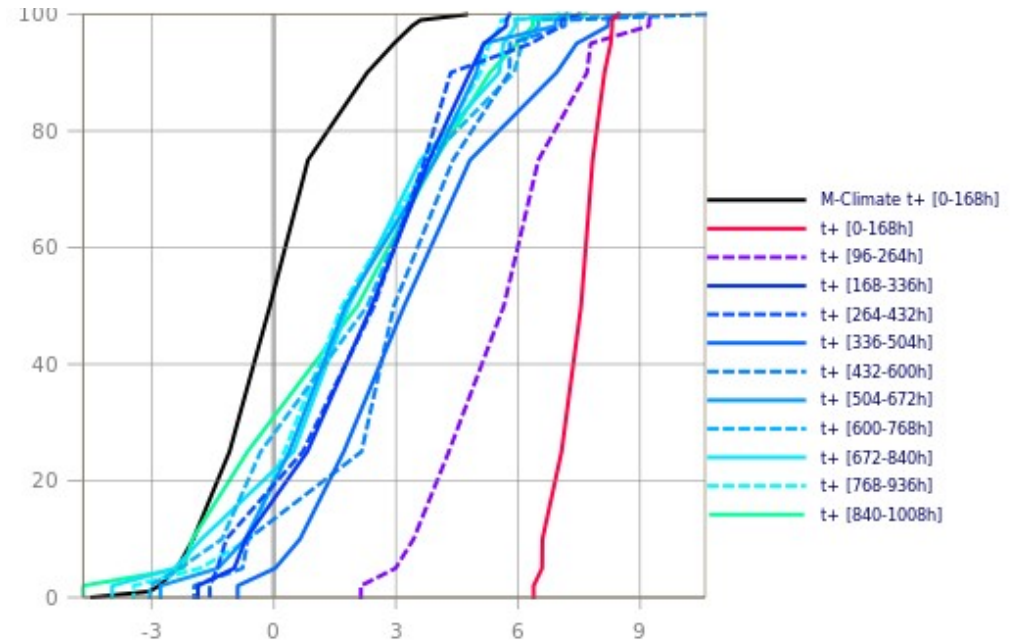
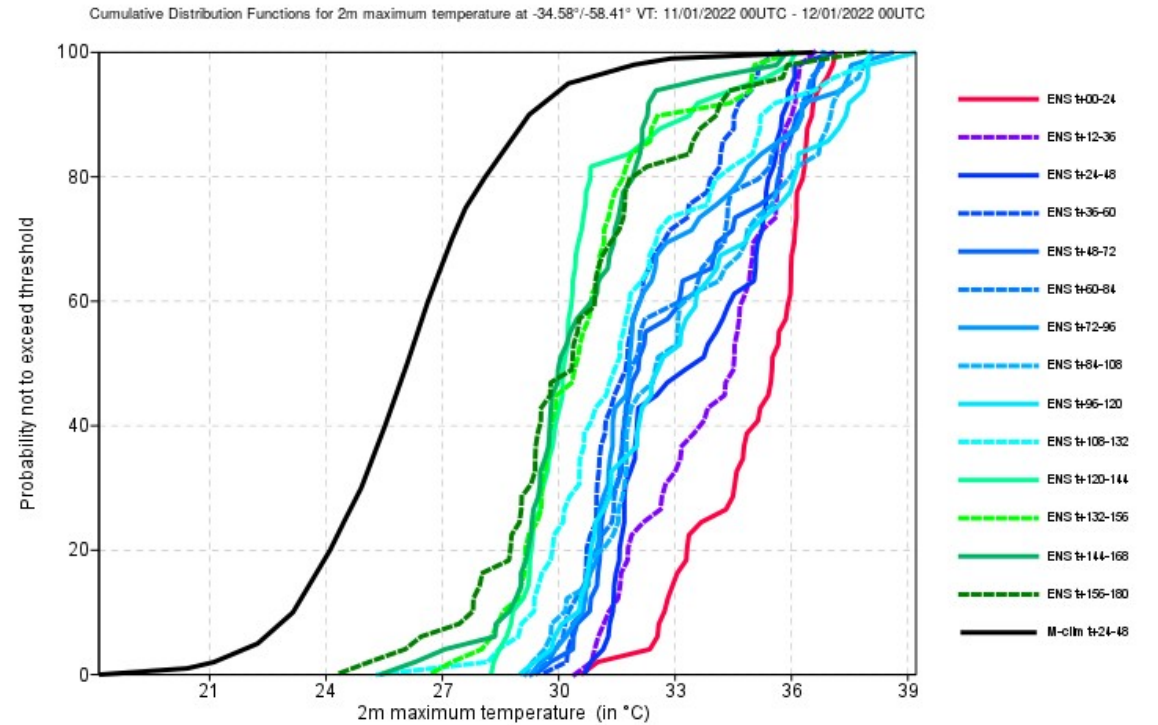


# Heatwave SouthAmerica January 2022

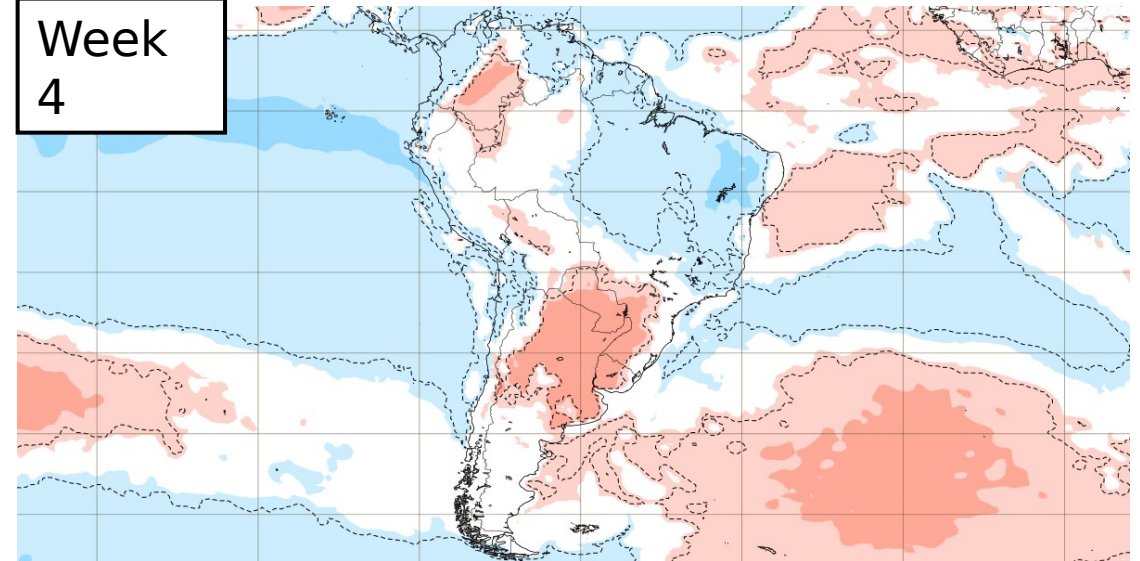
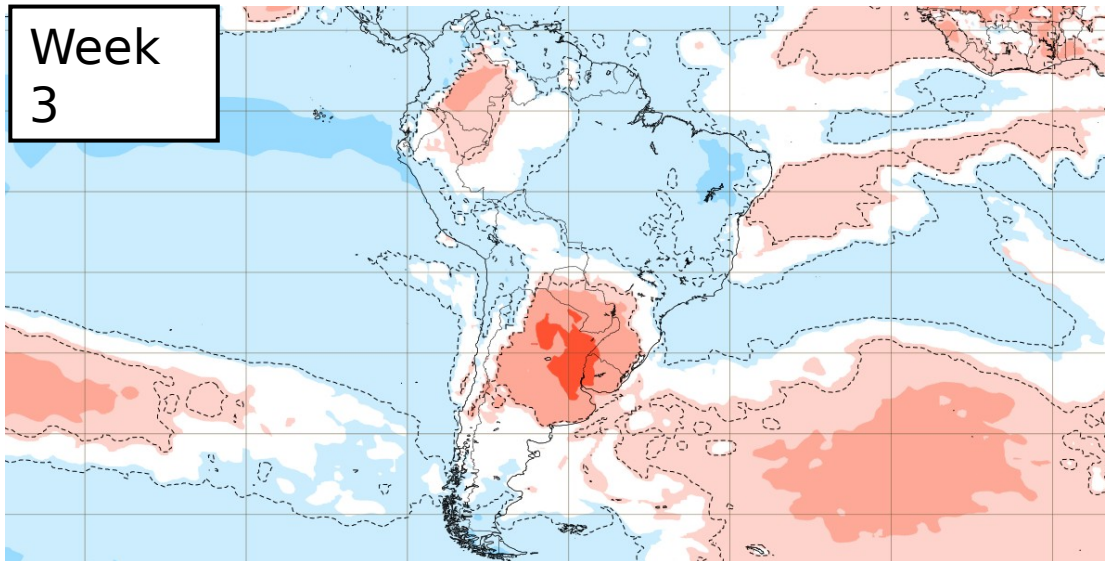
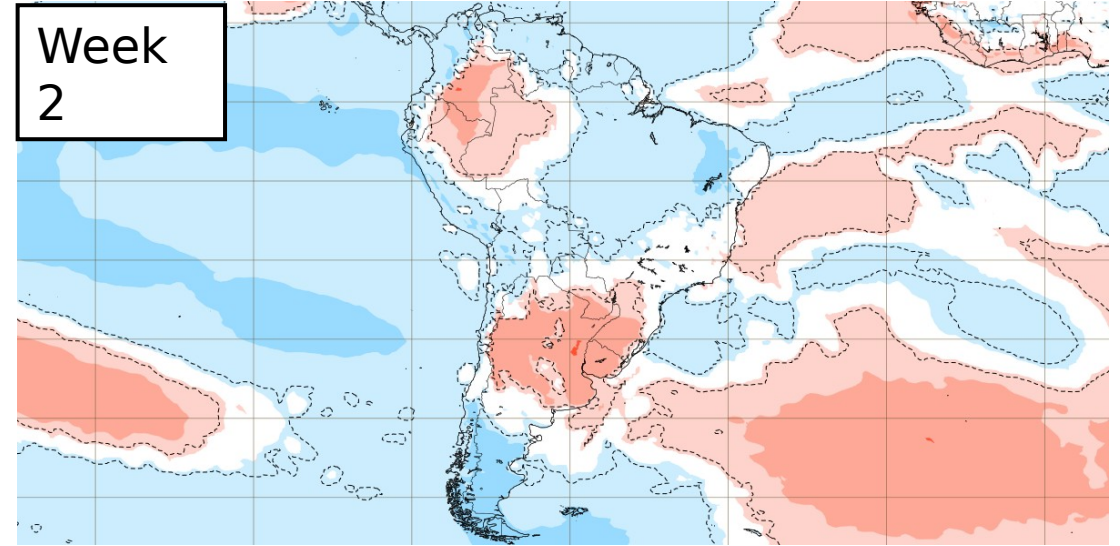
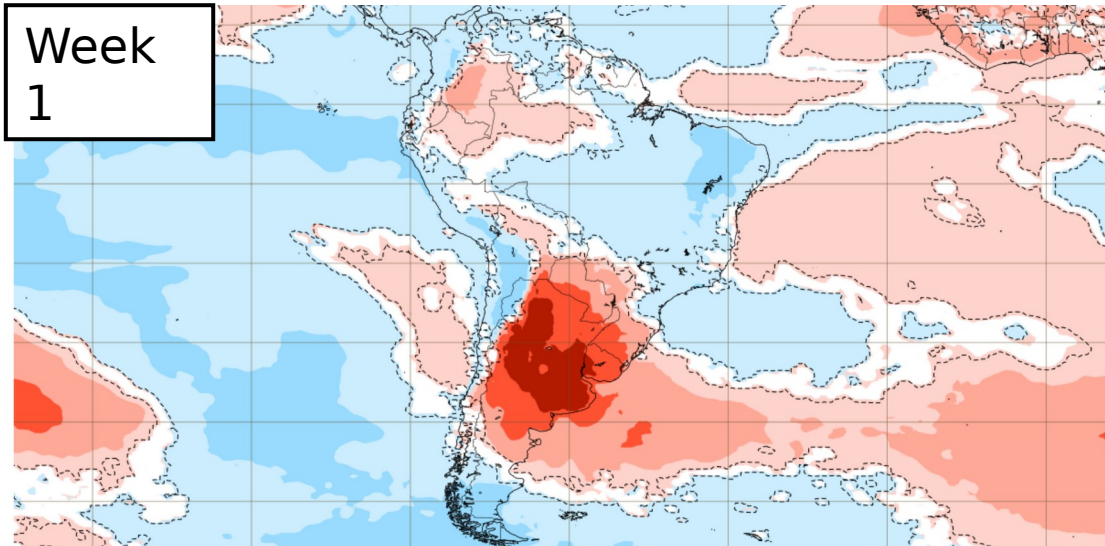
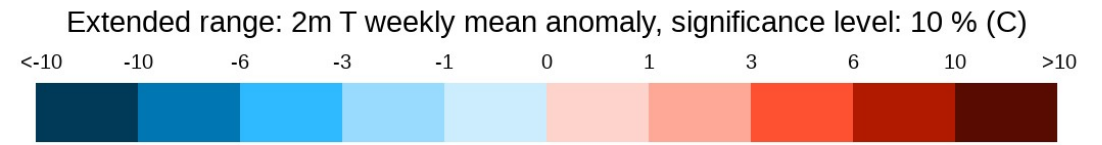
2 m maximum  
temperature in  
24h



Extended-range  
forecast of  
weekly mean  
anomalies for  
2m temperature  
in Buenos Aires.

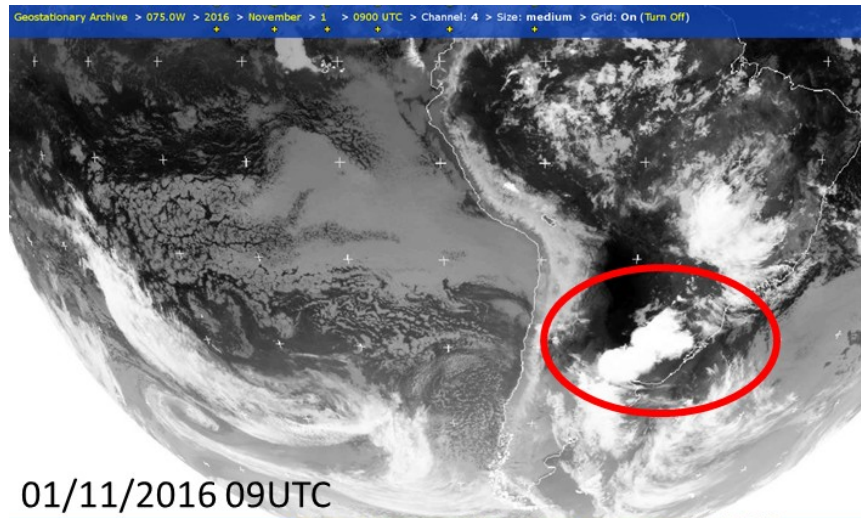


# 2m temperature weekly anomalies

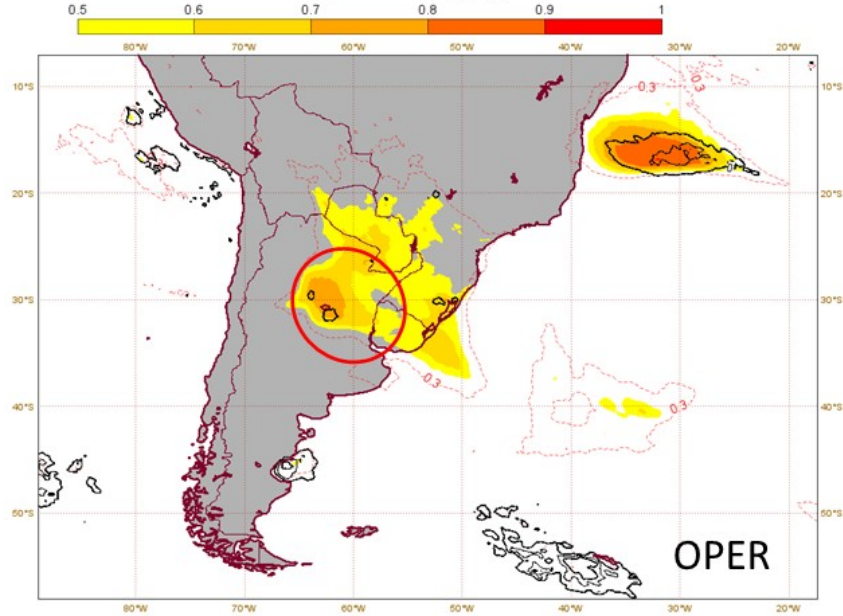




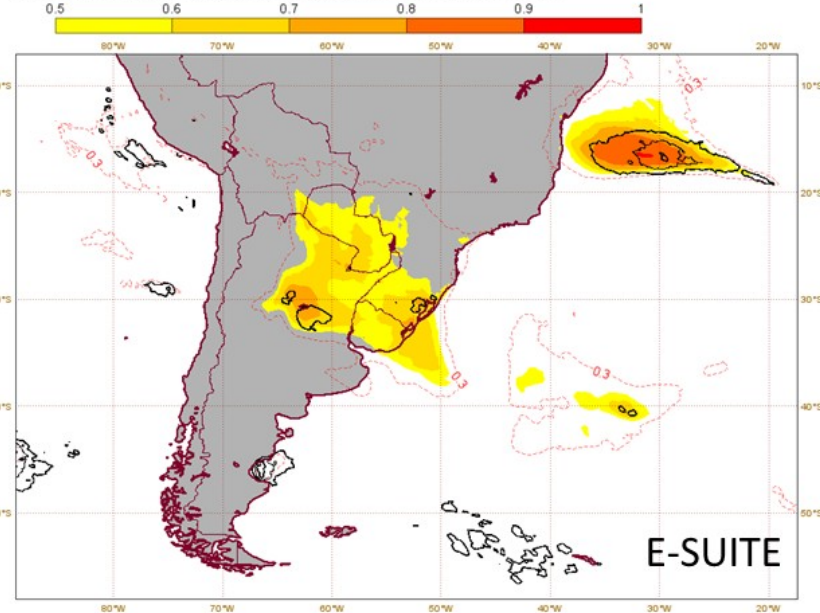
# Convective event with large hail (Santa Fe, November 2016)



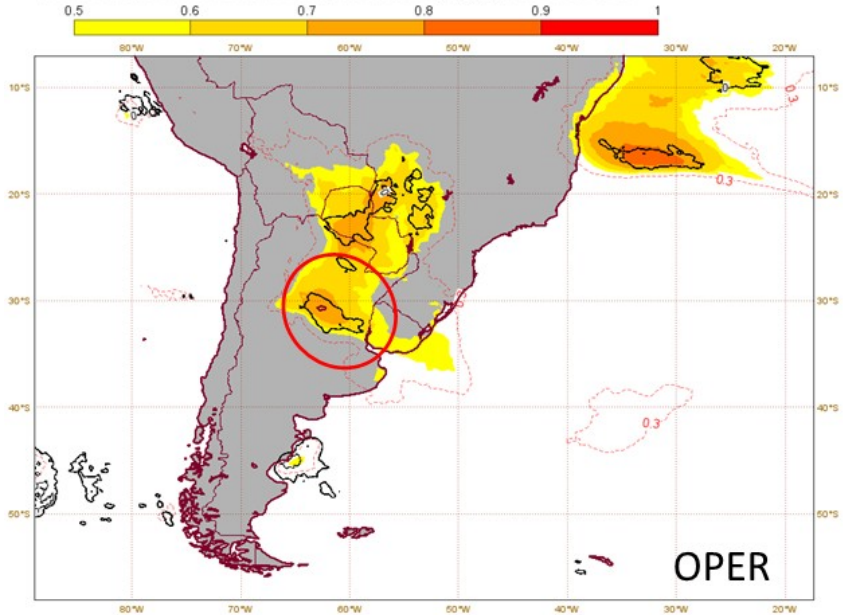
Sun 30 Oct 2016 00UTC @ECMWF expver = 1 VT: Tue 01 Nov 2016 00UTC - Wed 02 Nov 2016 00UTC 48-72h  
Extreme forecast index and Shift of Tails (black contours 0,1,2,5,8) for: CAPE



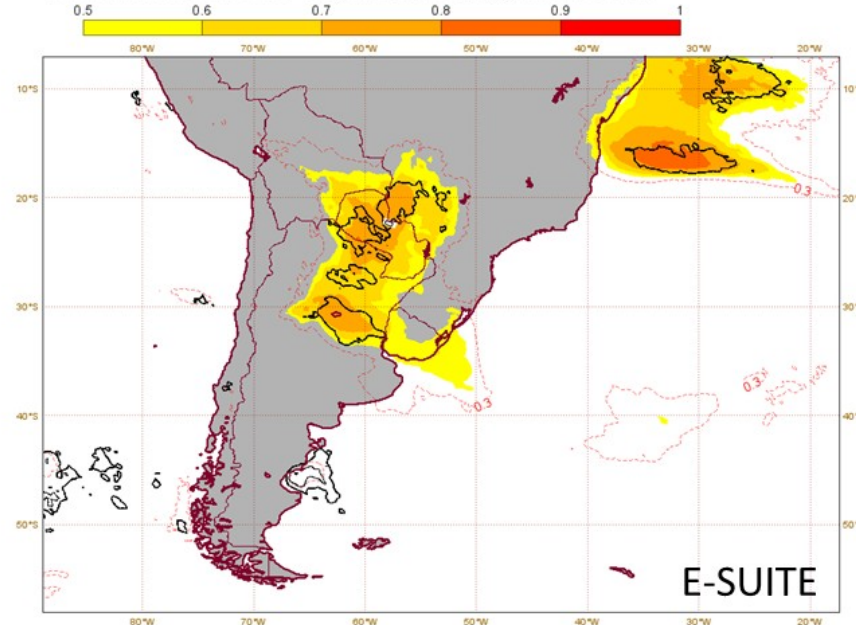
Sun 30 Oct 2016 00UTC @ECMWF expver = 70 VT: Tue 01 Nov 2016 00UTC - Wed 02 Nov 2016 00UTC 48-72h  
Extreme forecast index and Shift of Tails (black contours 0,1,2,5,8) for: CAPE



Sun 30 Oct 2016 00UTC @ECMWF expver = 1 VT: Tue 01 Nov 2016 00UTC - Wed 02 Nov 2016 00UTC 48-72h  
Extreme forecast index and Shift of Tails (black contours 0,1,2,5,8) for: CAPESHEAR



Sun 30 Oct 2016 00UTC @ECMWF expver = 70 VT: Tue 01 Nov 2016 00UTC - Wed 02 Nov 2016 00UTC 48-72h  
Extreme forecast index and Shift of Tails (black contours 0,1,2,5,8) for: CAPESHEAR



**EFI**  
**CAPE-SHEAR**

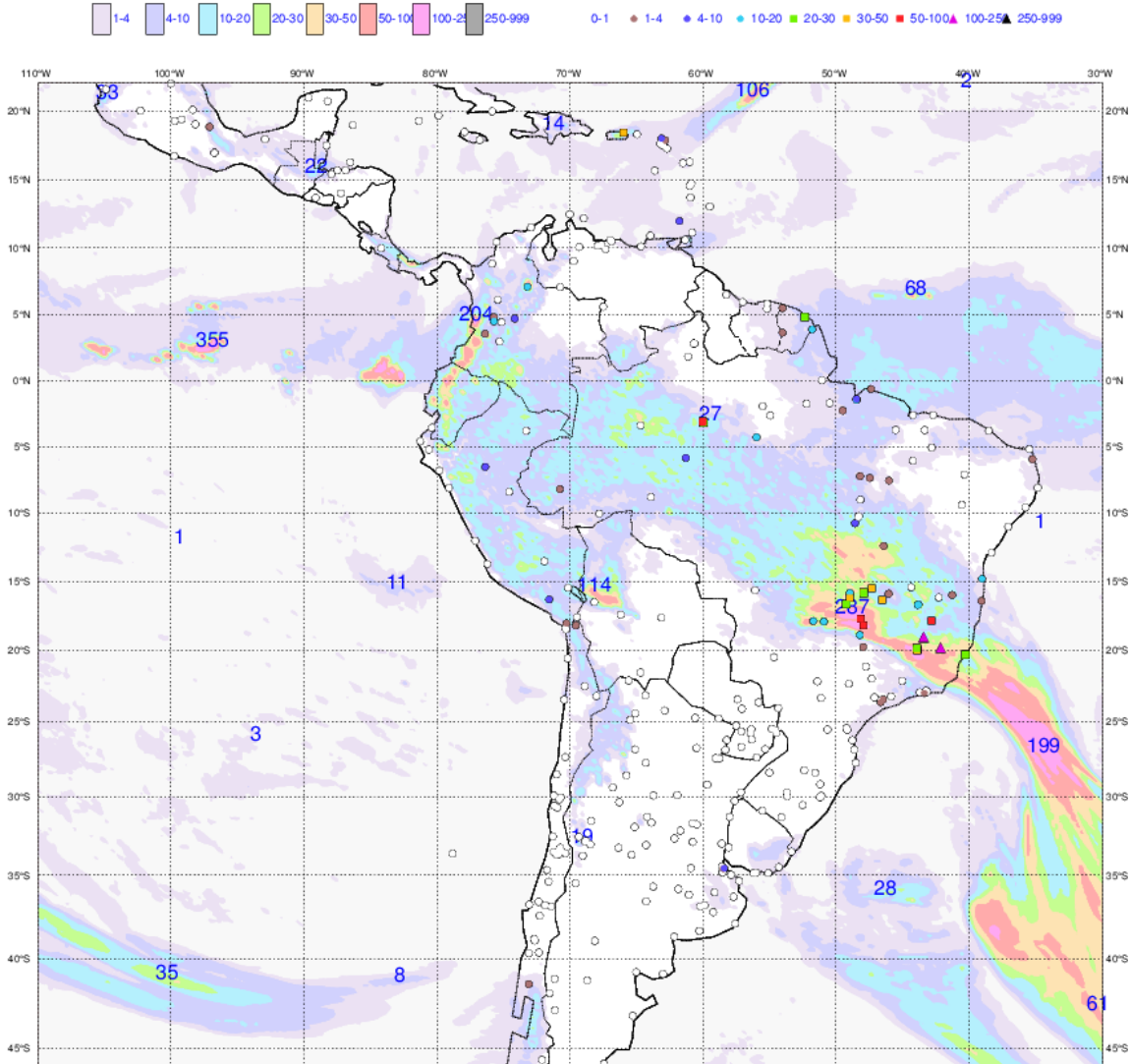


# Brazil

Case studies

# Extreme precipitation 25 January 2020

Total precipitation over 24 hours circles: observations  
 FC:2020-01-23 12:00:00 RANGE: 36 - 60 VT: 2020-01-25 00:00:00 to 2020-01-26 00:00:00  
 N=342 BIAS= -3.7mm STDEV= 13.3mm MAE= 3.7mm  
 errors for [north=-22.00, west=-110.00, south=-60.00, east=-30.00]

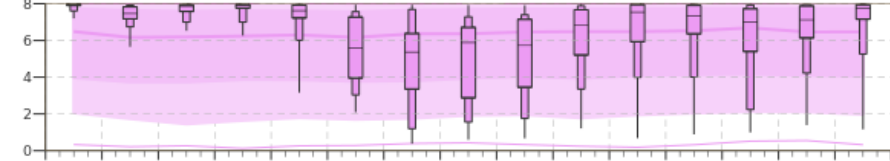


## ENS Meteogram

18.2°S 44.39°W (ENS land point) 556 m

Extended Range Forecast based on ENS distribution Saturday 25 January 2020 00 UTC

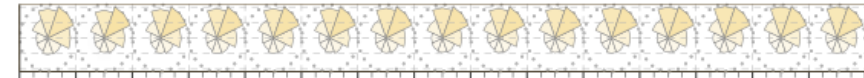
### Daily mean of Total Cloud Cover (okta)



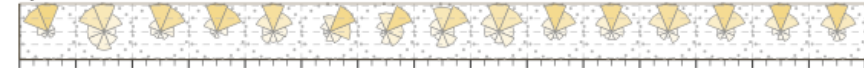
### Total Precipitation (mm/24h)



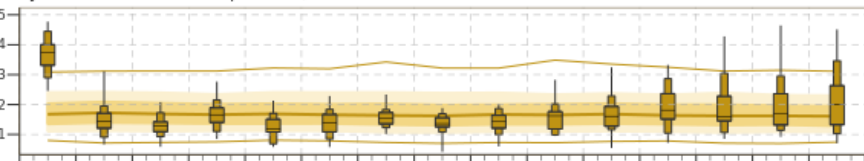
### M-Climate of the distribution of 10m Wind Direction



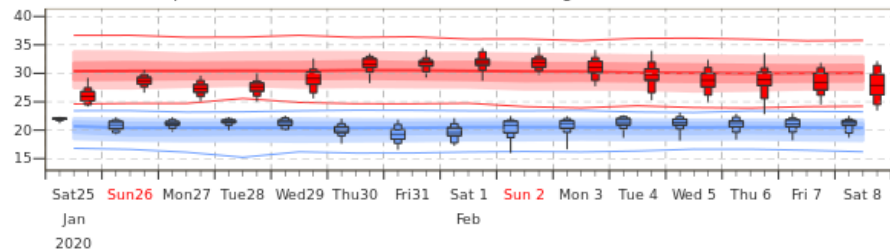
### Daily Distribution of 10m Wind Direction



### Daily mean of 10m Wind Speed (m/s)

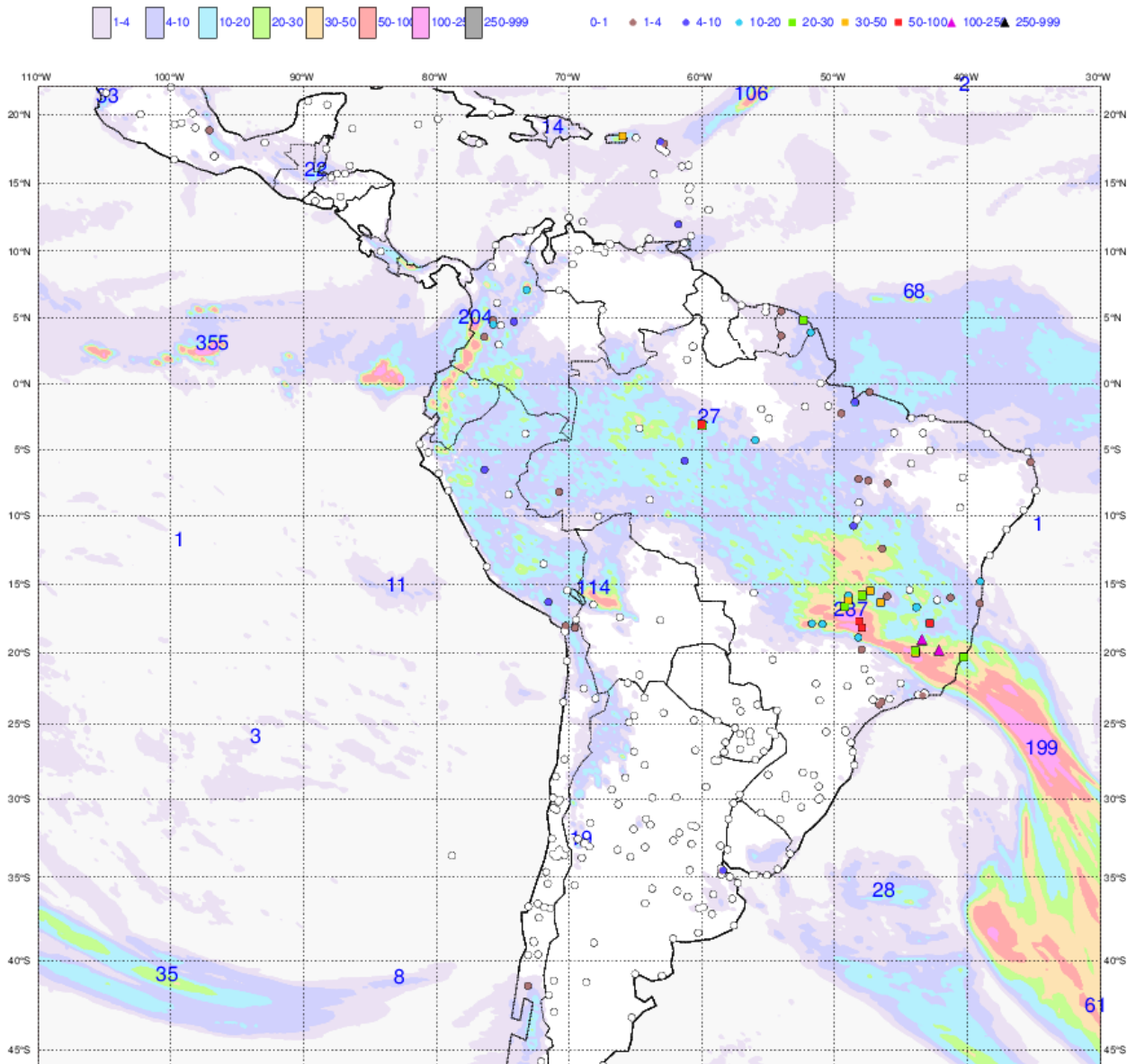


### 2m min/max Temperature (°C) reduced to 556 m (station height) from 591 m (ENS)

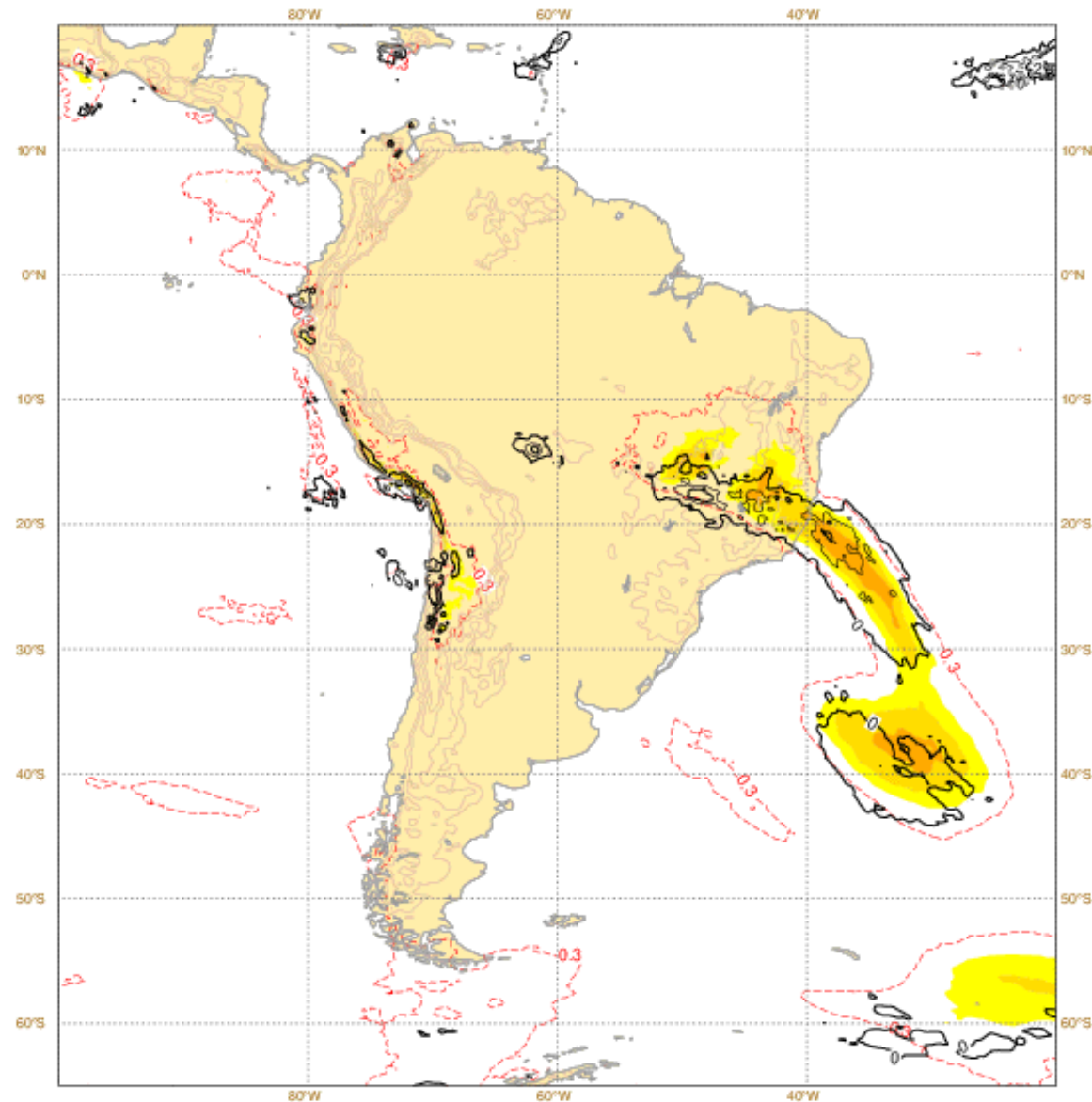




Total precipitation over 24 hours circles: observations  
 FC:2020-01-23 12:00:00 RANGE: 36 - 60 VT: 2020-01-25 00:00:00 to 2020-01-26 00:00:00  
 N=342 BIAS= -3.7mm STDEV= 13.3mm MAE= 3.7mm  
 errors for [north=22.00, west=-110.00, south=-60.00, east=-30.00]

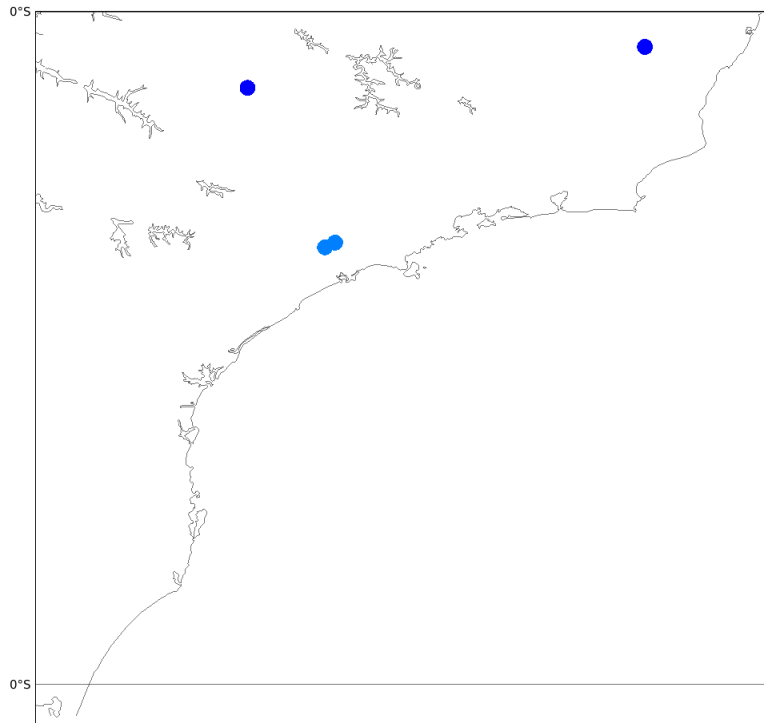


Sun 19 Jan 2020 00UTC ©ECMWF t+144-168h VT: Sat 25 Jan 2020 00UTC - Sun 26 Jan 2020 00UTC  
 Extreme forecast index and Shift of Tails (black contours 0,1,2,5,8) for total precipitation



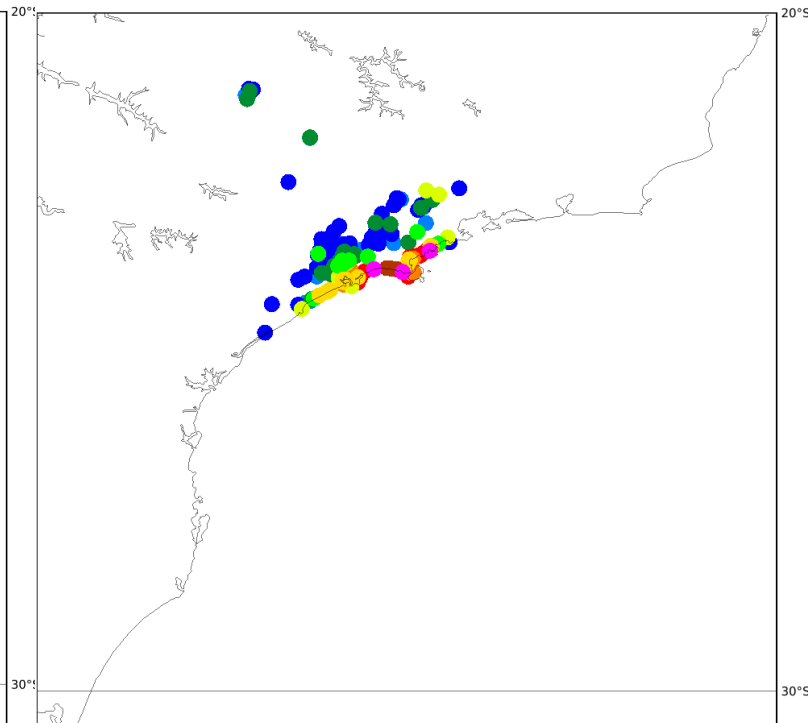
## Extreme precipitation coastal areas São Paulo 19-20 February 2023

Observed precipitation in mm (from GTS)  
19/02/2023 00UTC to 20/02/2023 00UTC



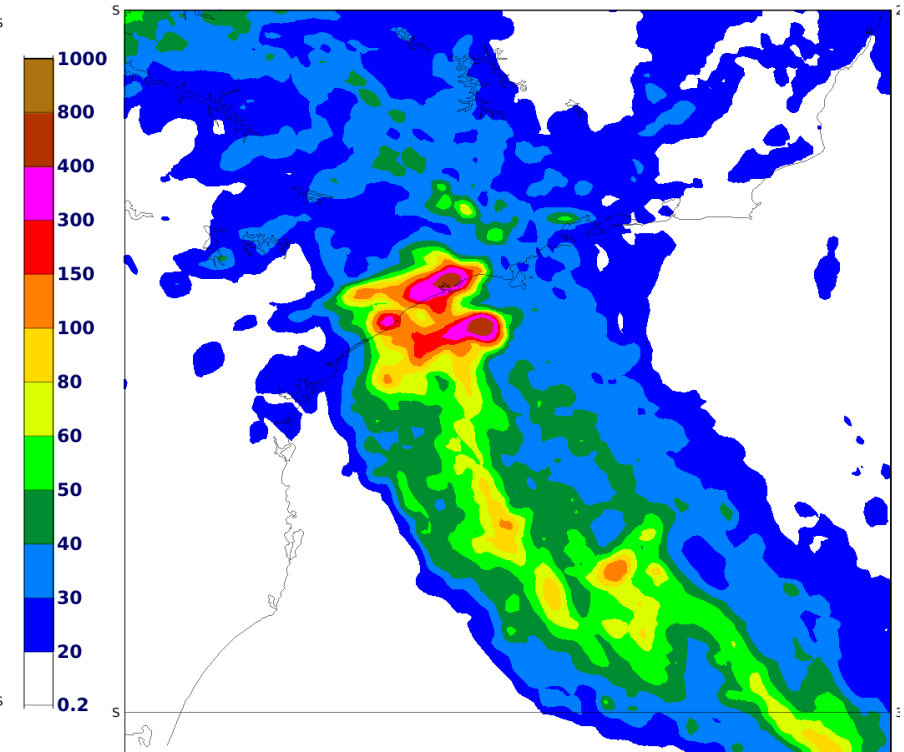
**GTS  
observations**

Observed precipitation in mm  
19/02/2023 00UTC to 20/02/2023 00UTC



**observations  
from CEMADEN**

Friday 17 February 2023 00 UTC ecmf t+72 VT:Monday 20 February 2023 00 UTC surface Total precipitation

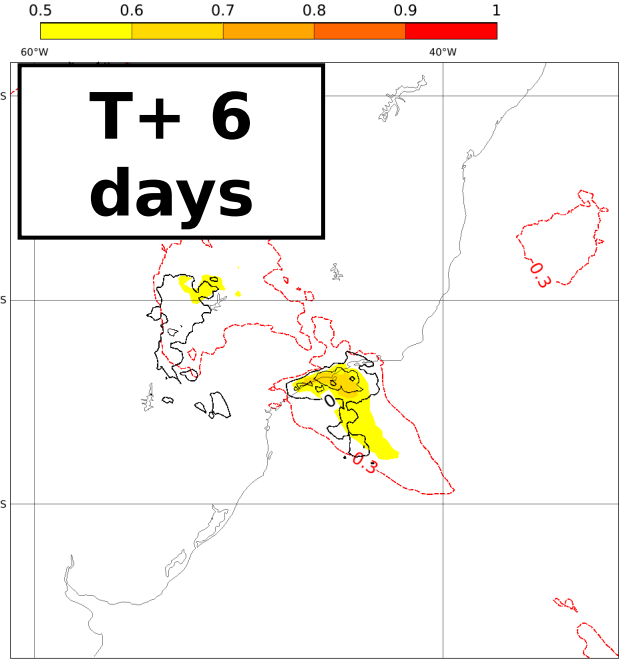


**T+72h**

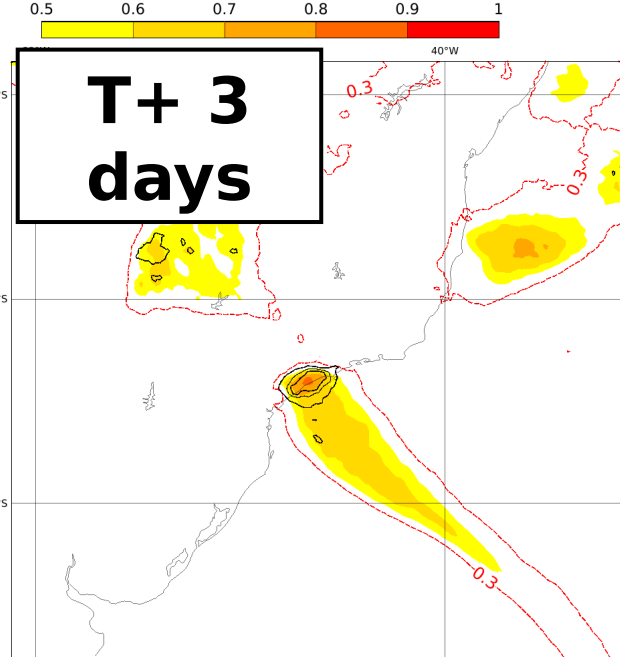
Importance of high-density  
observations!



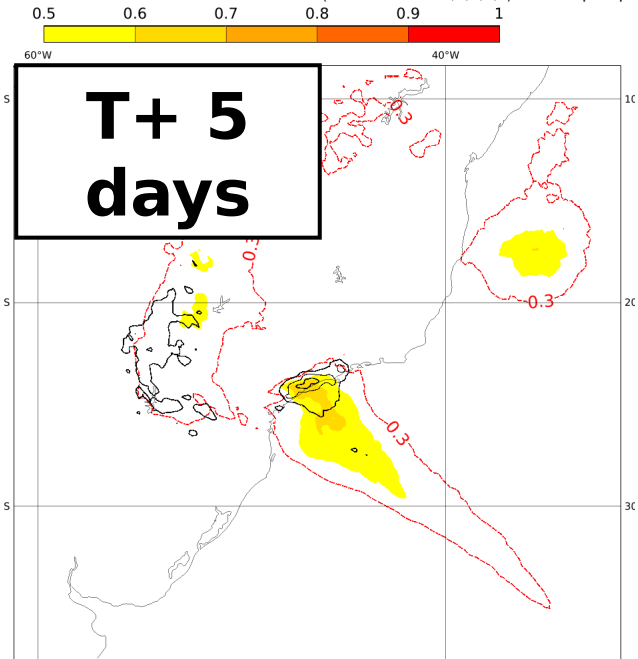
Tue 14 Feb 2023 00UTC @ECMWF expver = 1 VT: Sun 19 Feb 2023 00UTC - Mon 20 Feb 2023 00UTC  
Extreme forecast index and Shift of Tails (black contours 0,1,2,5,8) for: total precipitati



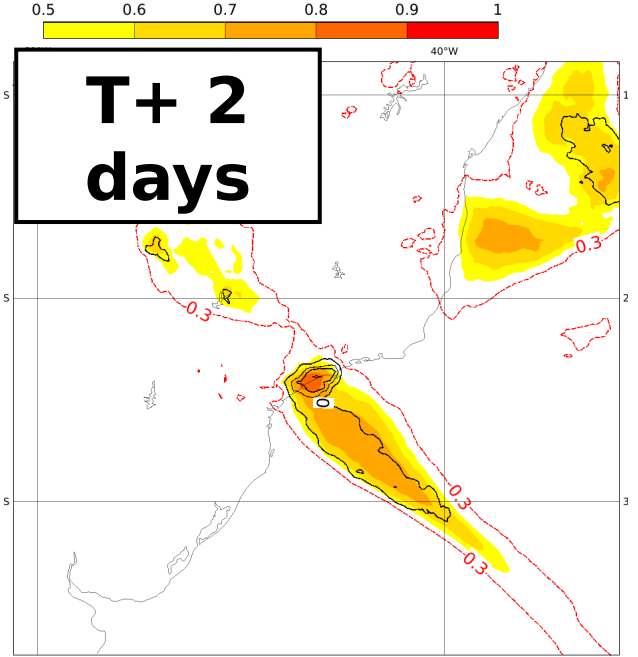
Extreme forecast index and Shift of Tails (black contours 0,1,2,5,8) for: total precip



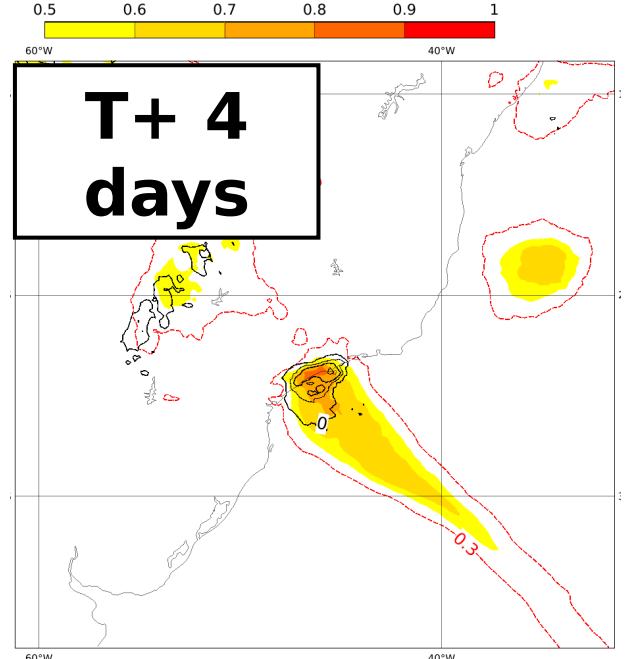
Wed 15 Feb 2023 00UTC @ECMWF expver = 1 VT: Sun 19 Feb 2023 00UTC - Mon 20 Feb 2023 00UTC  
Extreme forecast index and Shift of Tails (black contours 0,1,2,5,8) for: total precip



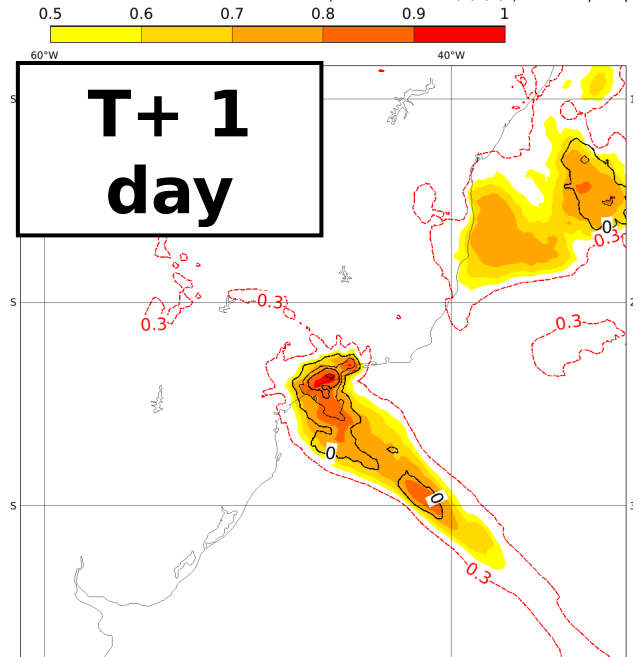
Extreme forecast index and Shift of Tails (black contours 0,1,2,5,8) for: total precip



Thu 16 Feb 2023 00UTC @ECMWF expver = 1 VT: Sun 19 Feb 2023 00UTC - Mon 20 Feb 2023 00UTC  
Extreme forecast index and Shift of Tails (black contours 0,1,2,5,8) for: total precip



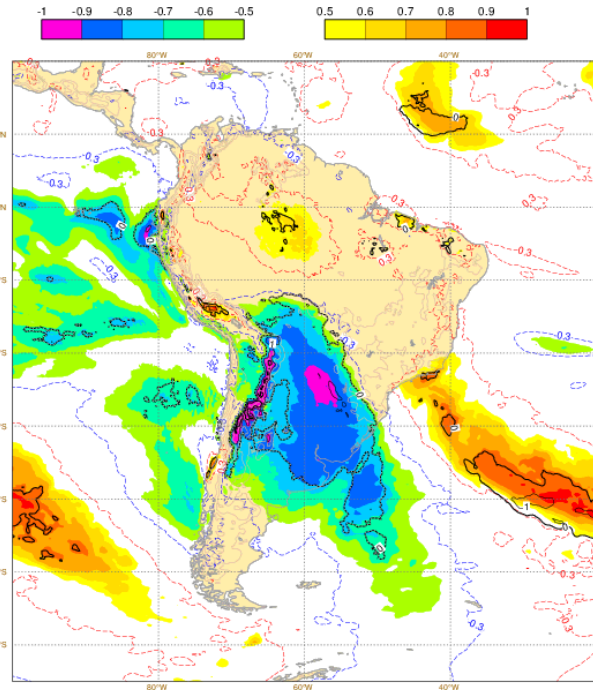
Sun 19 Feb 2023 00UTC @ECMWF expver = 1 VT: Sun 19 Feb 2023 00UTC - Mon 20 Feb 2023 00UTC  
Extreme forecast index and Shift of Tails (black contours 0,1,2,5,8) for: total precip



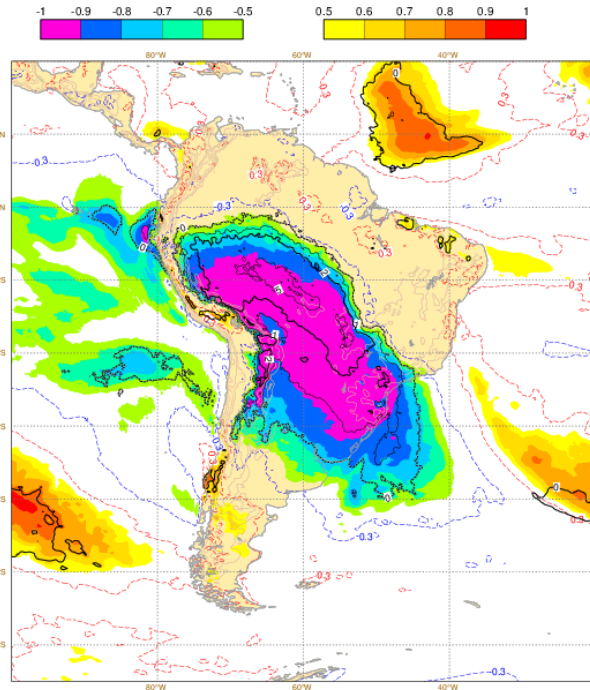
**EFI 24h  
precipitati  
on**

# Cold spell Brazil (and other South American countries) Oct-Nov 2022

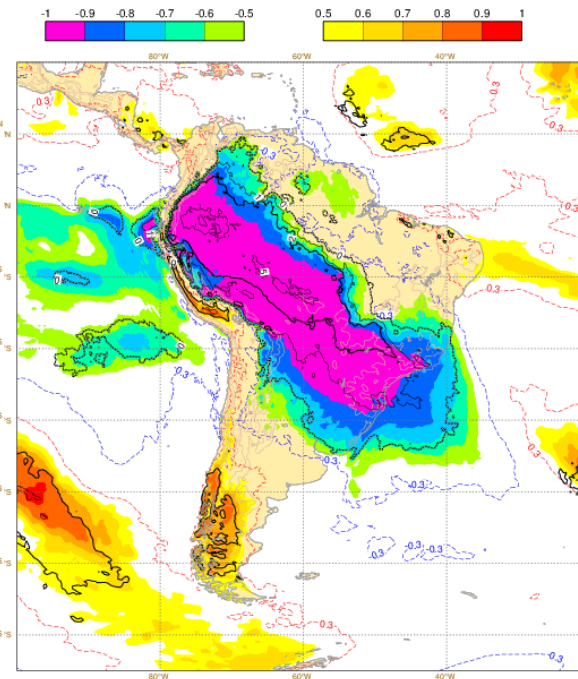
Fri 28 Oct 2022 00UTC @ECMWF t+72-96h VT: Mon 31 Oct 2022 00UTC - Tue 01 Nov 2022 00UTC  
Extreme forecast index and Shift of Tails (black contours 0,1,2,5,8) for 2m mean temperature



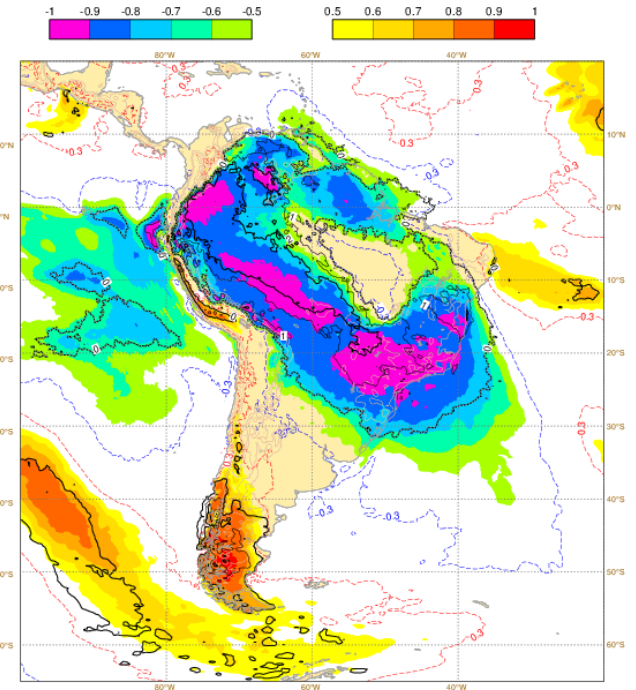
Fri 28 Oct 2022 00UTC @ECMWF t+96-120h VT: Tue 01 Nov 2022 00UTC - Wed 02 Nov 2022 00UTC  
Extreme forecast index and Shift of Tails (black contours 0,1,2,5,8) for 2m mean temperature



Fri 28 Oct 2022 00UTC @ECMWF t+120-144h VT: Wed 02 Nov 2022 00UTC - Thu 03 Nov 2022 00UTC  
Extreme forecast index and Shift of Tails (black contours 0,1,2,5,8) for 2m mean temperature

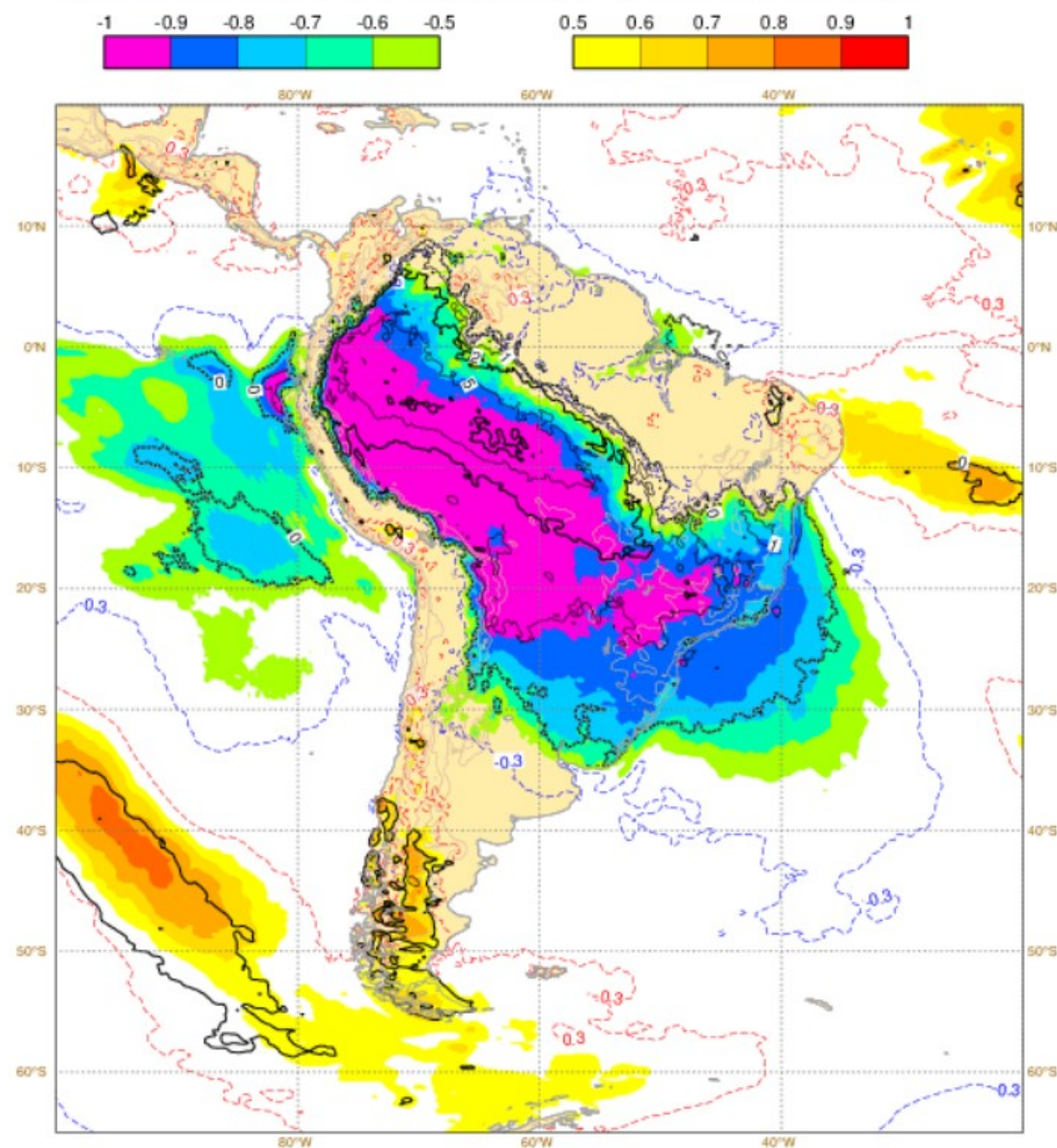


Fri 28 Oct 2022 00UTC @ECMWF t+144-168h VT: Thu 03 Nov 2022 00UTC - Fri 04 Nov 2022 00UTC  
Extreme forecast index and Shift of Tails (black contours 0,1,2,5,8) for 2m mean temperature





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ENS cumulative distribution function (CDF) for 24hr mean 2m temperature

Base date: Friday 28 Oct, 00 UTC

Valid for 24 hours from Tuesday 1 Nov, 00 UTC to Wednesday 2 Nov, 00 UTC, adjusted to 306m height

