



Identification of the frequency of extreme precipitation events in southeastern South America

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1. Introduction

- Extreme precipitation events over Southeastern South America (SESA) during the spring and summer are responsible of more than 80% of the total accumulated seasonal precipitation.
- The occurrence of extreme precipitation in SESA is associated with specific synoptic patterns.

2. Objective

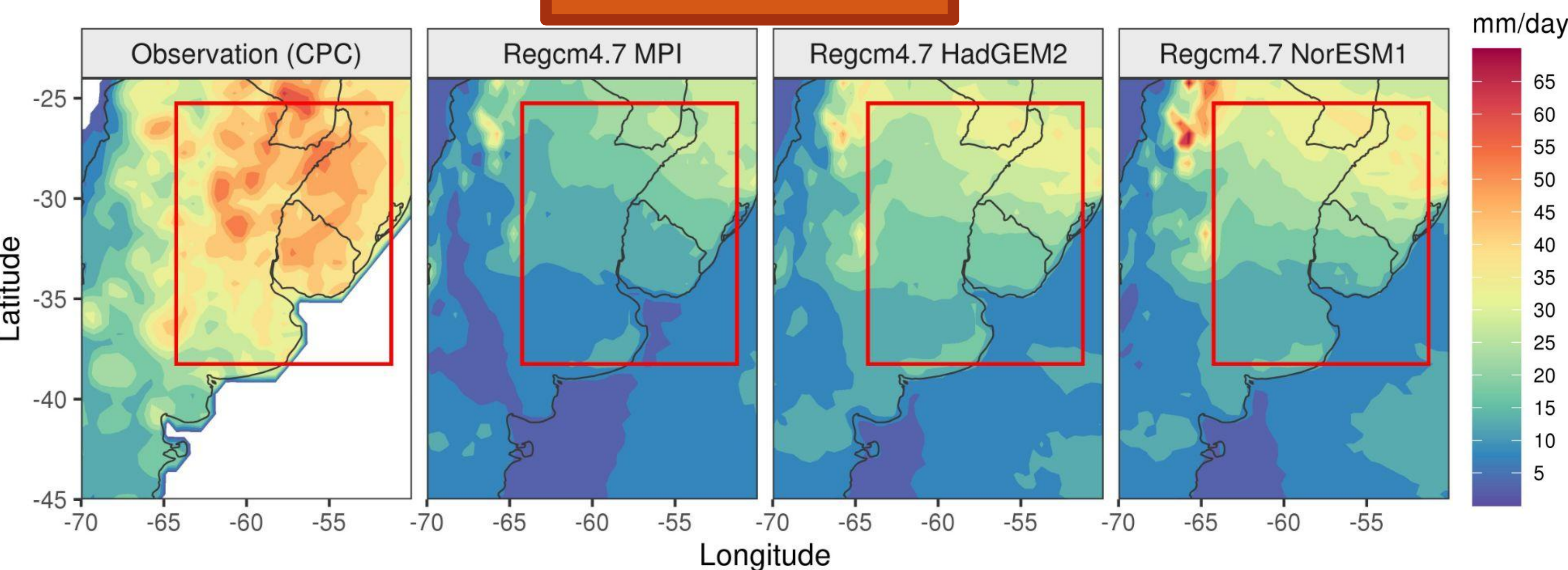
Detect the frequency of extreme precipitation events from the occurrence of certain synoptic patterns (analog method) in spring (October to December) in regional climate model (RCM) Regcm4.7

4. Concluding remarks

- 95th percentile of the models present lower values than the percentile observed in southeastern South America.
- Number of extreme precipitation events determined from the CPC (RCM) P95 is less (greater) than the number of observed events.
- Analog model with titaae underestimates the frequency of occurrence of the observed extreme events. On the other hand, the analog without titaae overestimates the frequency but it is similar to the observed frequency (particularly in the Regcm4.7 - MPI model).
- The high level patterns (V'200 and z'500) show the greatest difference in occurrence between the years with the highest and lowest number of extreme events.

3. Results

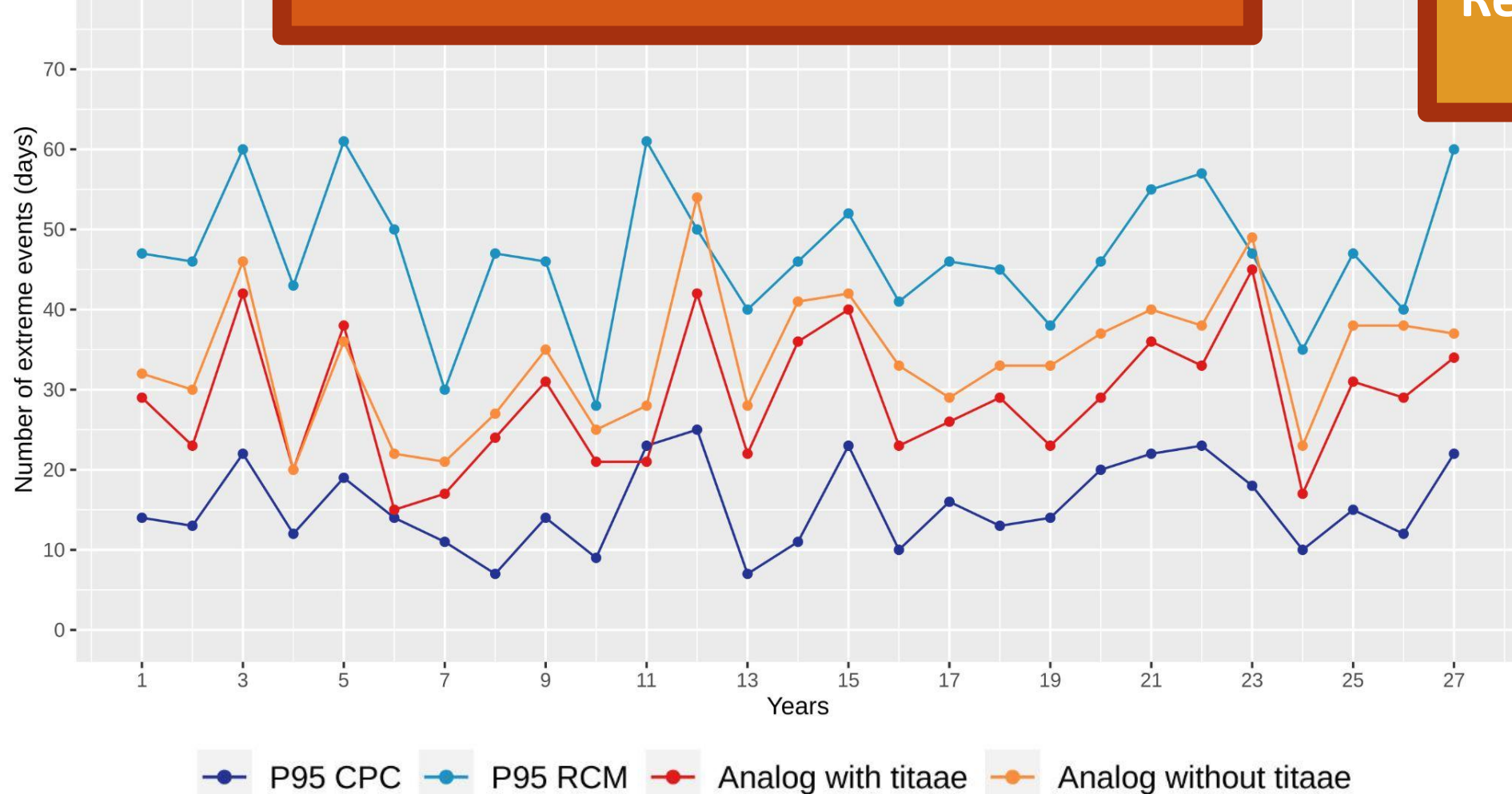
95th Percentile (P95)



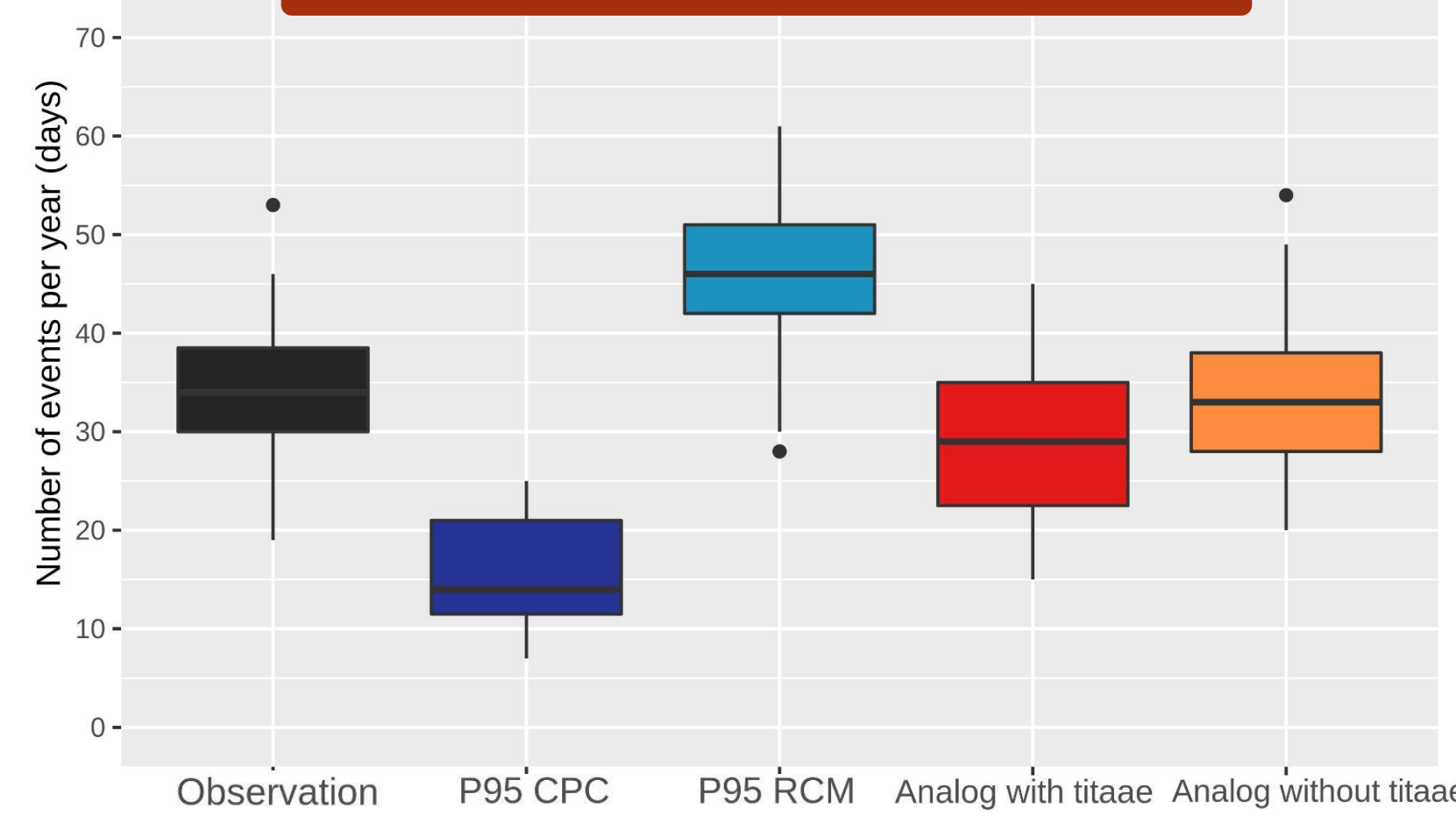
Number of extreme events (P95)

	P95 CPC	P95 RCM
Observed events (CPC)	909 events	-
Modeled events (Regcm4.7 - MPI)	419 events	1264 events
Modeled events (Regcm4.7 - HadGEM2)	694 events	1435 events
Modeled events (Regcm4.7 - NorESM1)	833 events	1611 events

Interannual variability



Frequency distribution of extreme events

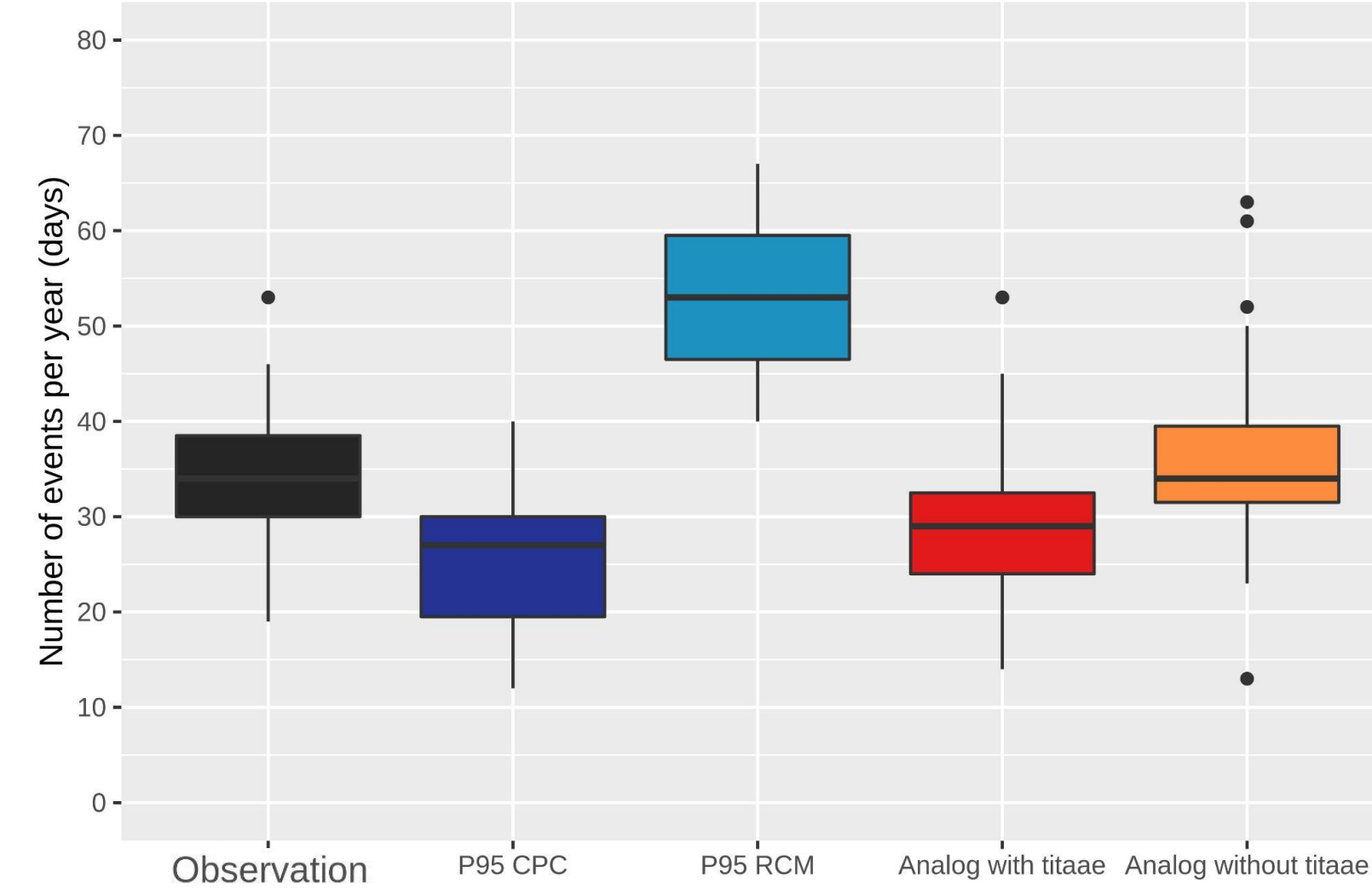
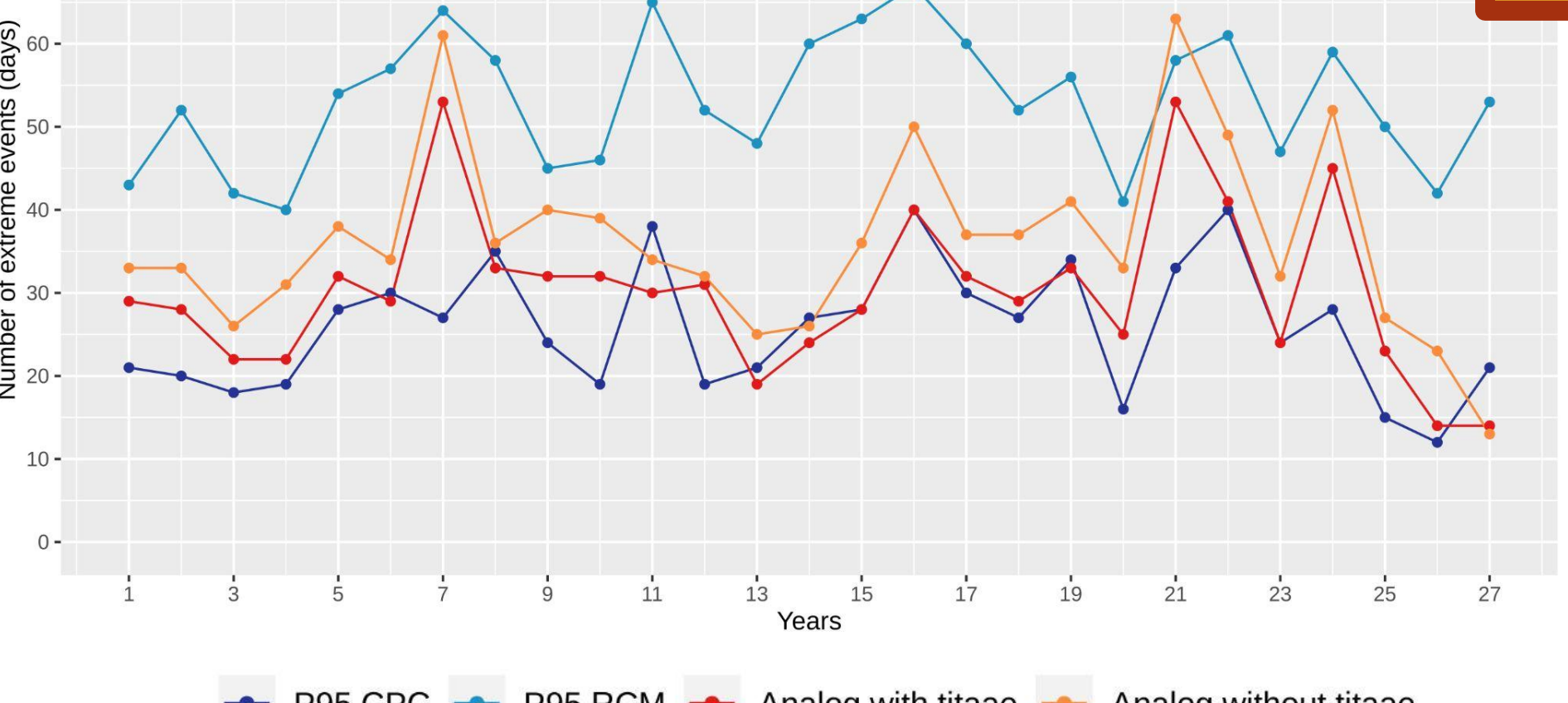


Number of extreme events (analog method)

Regcm4.7 MPI	Number of events
Analog with titaae	776 events
Analog without titaae	915 events

- Frequency of occurrence distribution of the analog model without titaae is similar to the observed distribution.

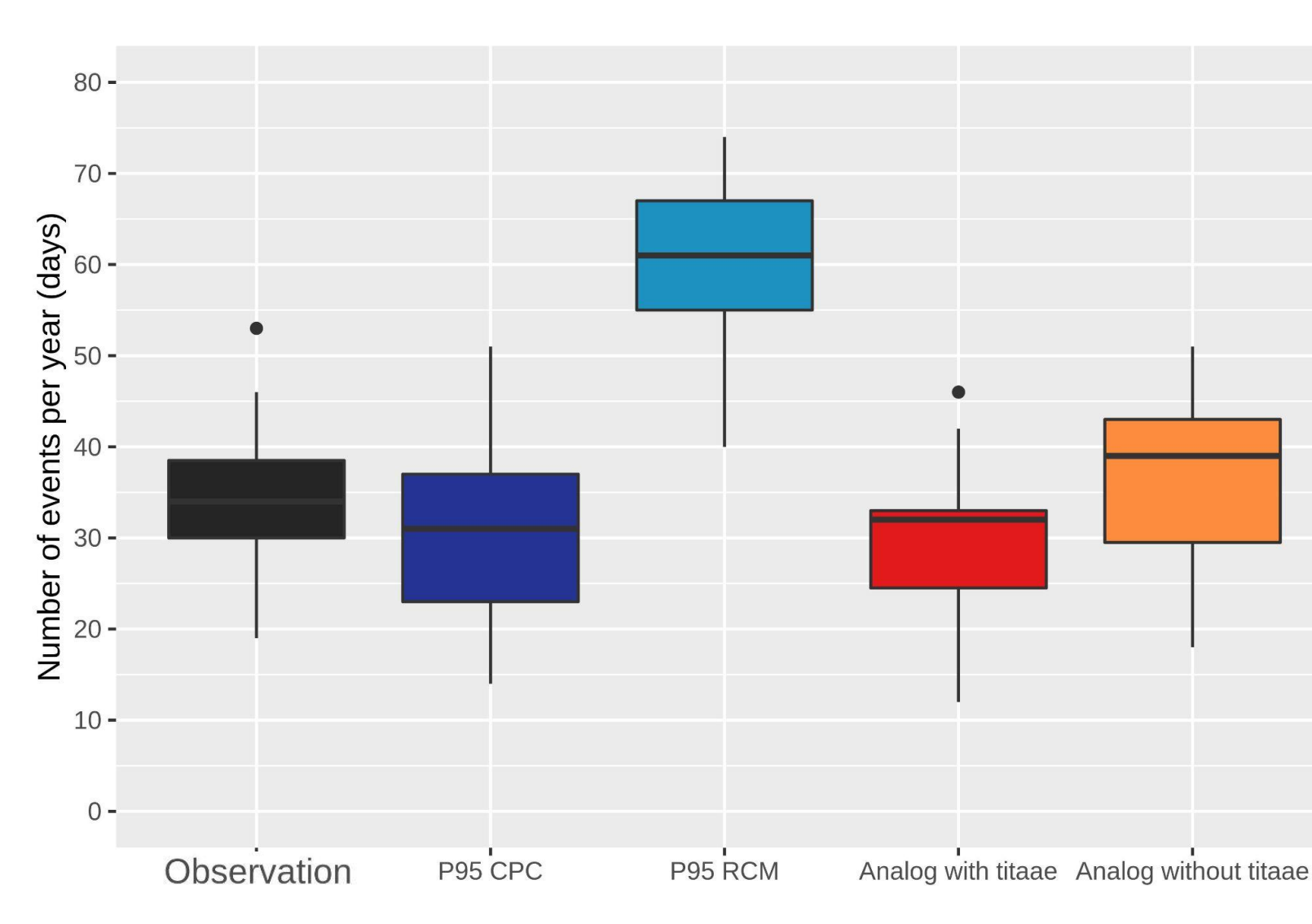
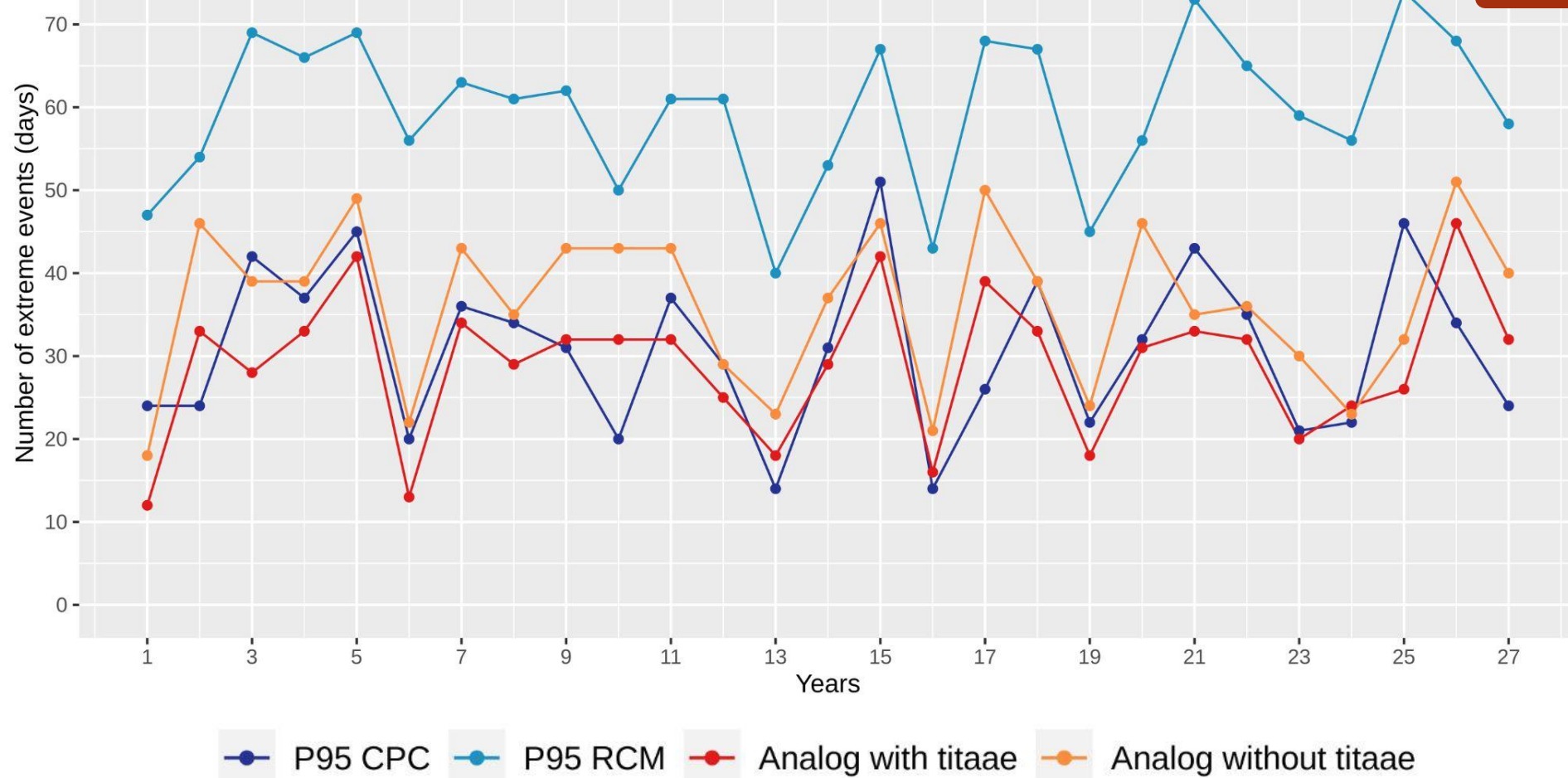
Regcm4.7 HadGEM2



Regcm4.7 HadGEM2	Number of events
Analog with titaae	817 events
Analog without titaae	981 events

- The interannual variability series of the two extreme event detection methodologies (analogs and 95th percentile) show coincidence in the shape of the curves but not in the values of the series.

Regcm4.7 NorESM1



Regcm4.7 NorESM1	Number of events
Analog with titaae	784 events
Analog without titaae	982 events

- Regcm4.7 NorESM1 analog methodology (without titaae) and the P95 (RCM) shows the highest frequency of occurrence of extreme days.

Frequent Patterns

Highest number of events

	Hot spot criteria	Correlation criteria
V'200	45,3% days	18,5% days
z'500	27,5% days	22,5% days
z'850	21,44% days	16,3% days
v'850	19,2% days	5,43% days

Lower number of events

	Hot Spot criteria	Correlation criteria
V'200	26,9% days	12,8% days
z'500	11,3% days	14,6% days
z'850	14,8% days	15,4% days
v'850	15,9% days	4,8% days

Days of the years with the highest (left) or lowest (right) number of events meeting each condition of the analog method

- In the years with the highest number of events, the recurring patterns are the wind anomaly at 200 hPa (43% of the days the hot spot criteria is met) and the geopotential height anomaly at 500 hPa. These patterns show a greater difference in the percentage of days of occurrence between the years with the highest and lowest number of extreme events.

- In the case of the low level variables (geopotential height and meridional wind anomalies at 850 hPa) the percentage of days where each pattern occurs is similar in the years with more and less extreme events.

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