EMS Annual Meeting

MODEL EVALUATION AND FUTURE PROJECTIONS OF REGIONAL WINDS IN THE IBERIAN PENINSULA: CIERZO, LEVANTE AND PONIENTE

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1. INTRODUCTION

REGIONAL WINDS ARE THOSE THAT APPEAR IN SMALL SPATIAL SCALES (HUNDRED OF KILOMETERS OR LESS) AND TEMPORAL SCALES (SECONDS TO DAYS)

NEED FOR EVALUATION AND ASSESSMENT

NO SCIENTIFIC KNOWLEDGE ABOUT CLIMATE CHANGE EFFECTS OVER REGIONAL WINDS

CIERZO, LEVANTE AND PONIENTE

- WELL-KNOWN WINDS IN IBERIAN PENINSULA
- THEY REACH GREAT INTENSITIES DUE TO EBRO VALLEY AND STRAIT OF GIBRALTAR CHANNELING

MAIN OBJECTIVES

- EVALUATE HOW RMCs DESCRIBE REGIONAL WINDS FOR PRESENTE CLIMATE CONDITIONS
- STUDY THEIR CHANGES UNDER RCP8.5 EMISSIONS SCENARIO

* DIRECT REQUEST
** EURO-CORDEX SERVER
*** MED-CORDEX SERVER

2. DATA

SPATIAL RES.
TEMPORAL RES.
ATMOSPHERE-OCEAN COUPLING

NAME	TYPE	INSTITUTE	SR (KM)	TR (H)	COUP.
ERA5	Reanalysis	ECMWF	31	1	
COSMO-REA6	Reanalysis	DWD	6	1	
REMO *	Model	Max Planck	24	3	No
MPIOM-REMO *	Model	Max Planck	24	3	Yes
ALADIN63 (3h) **	Model	CNRM	12	3	No
ALADIN63 (6h) **	Model	CNRM	12	6	No
CNRM-RCSM4 ***	Model	CNRM	50	3	Yes
RegCM4-6 (3h) **	Model	ICTP	12	3	No
RegCM4-6 (6h) **	Model	ICTP	12	6	No

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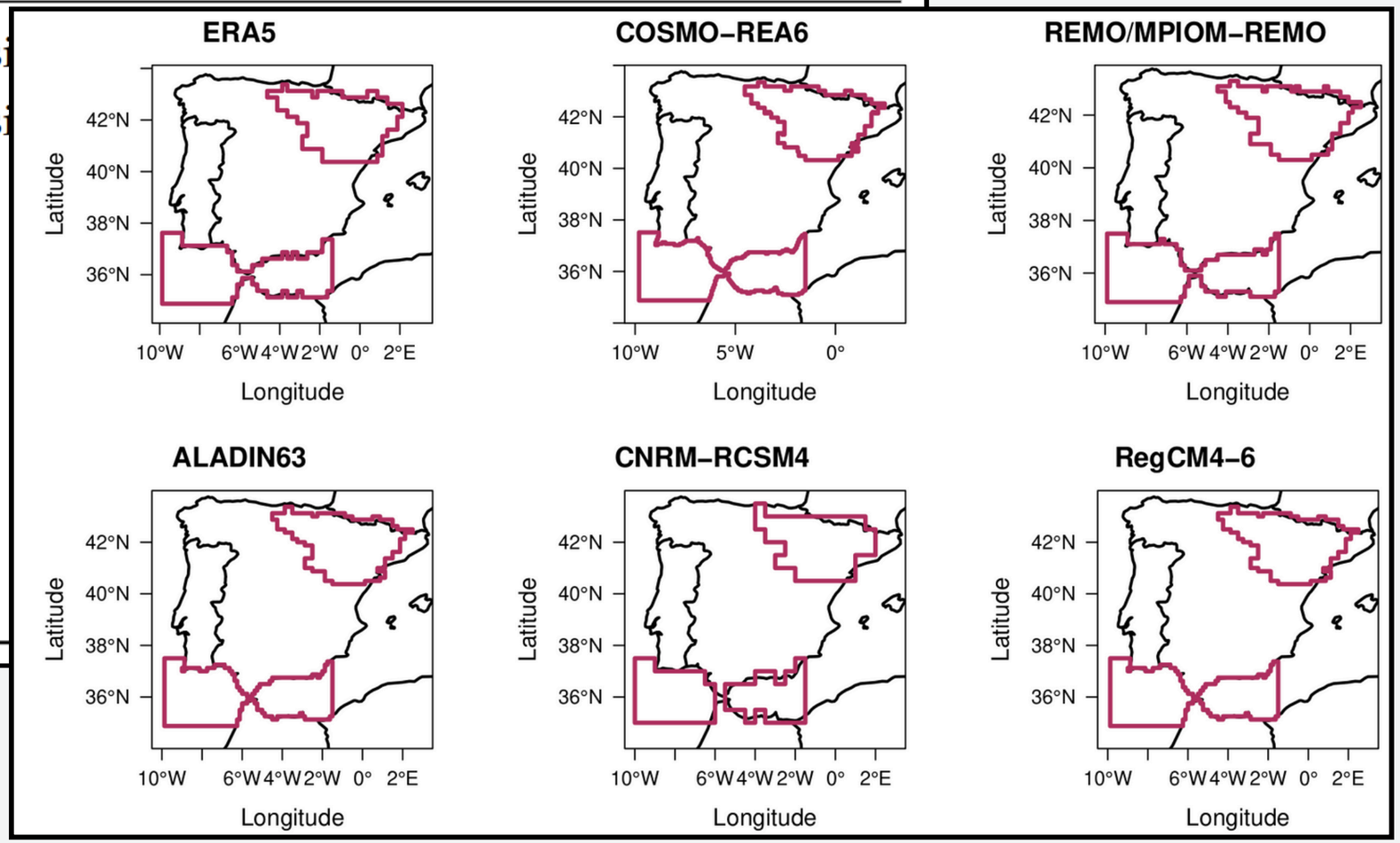


3. METHODS

01

WIND SPEED THRESHOLD

WIND SPEED
> 5.6 / 5 M/S

02

WIND DIRECTION THRESHOLD

WIND FROM EAST (LEVANTE) OR WEST (CIERZO, PONIENTE) DIRECTION

03

EXTENSION THRESHOLD

> 10 / 20% EXTENSION OF THE STRAIT

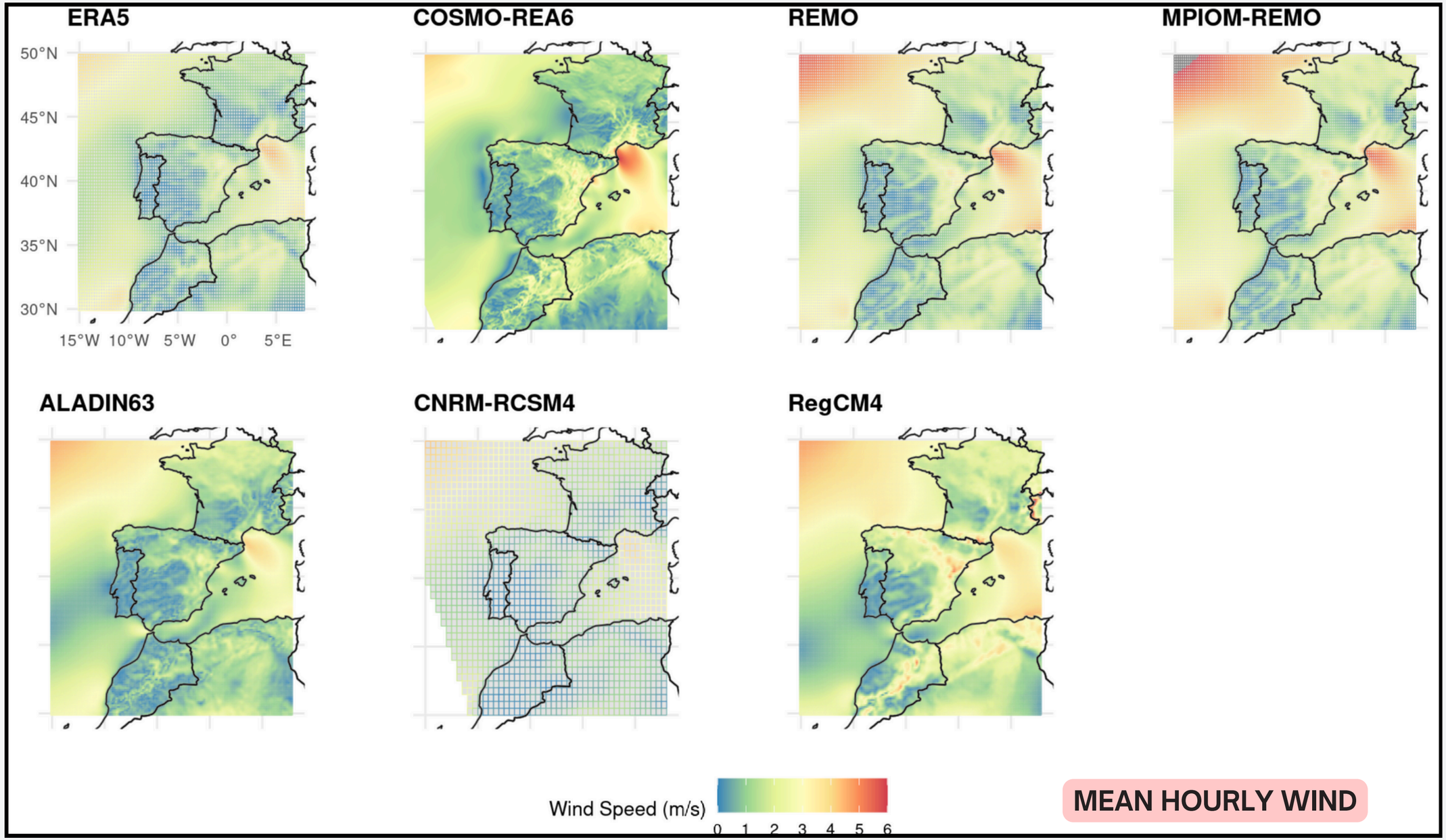
04

DAILY APPEARANCE THRESHOLD

CONDITIONS IN > 6 / 12 HOURS IN A DAY

BASED ON ORTEGA ET AL. (2023)

4. EVALUATION (1995-2011)



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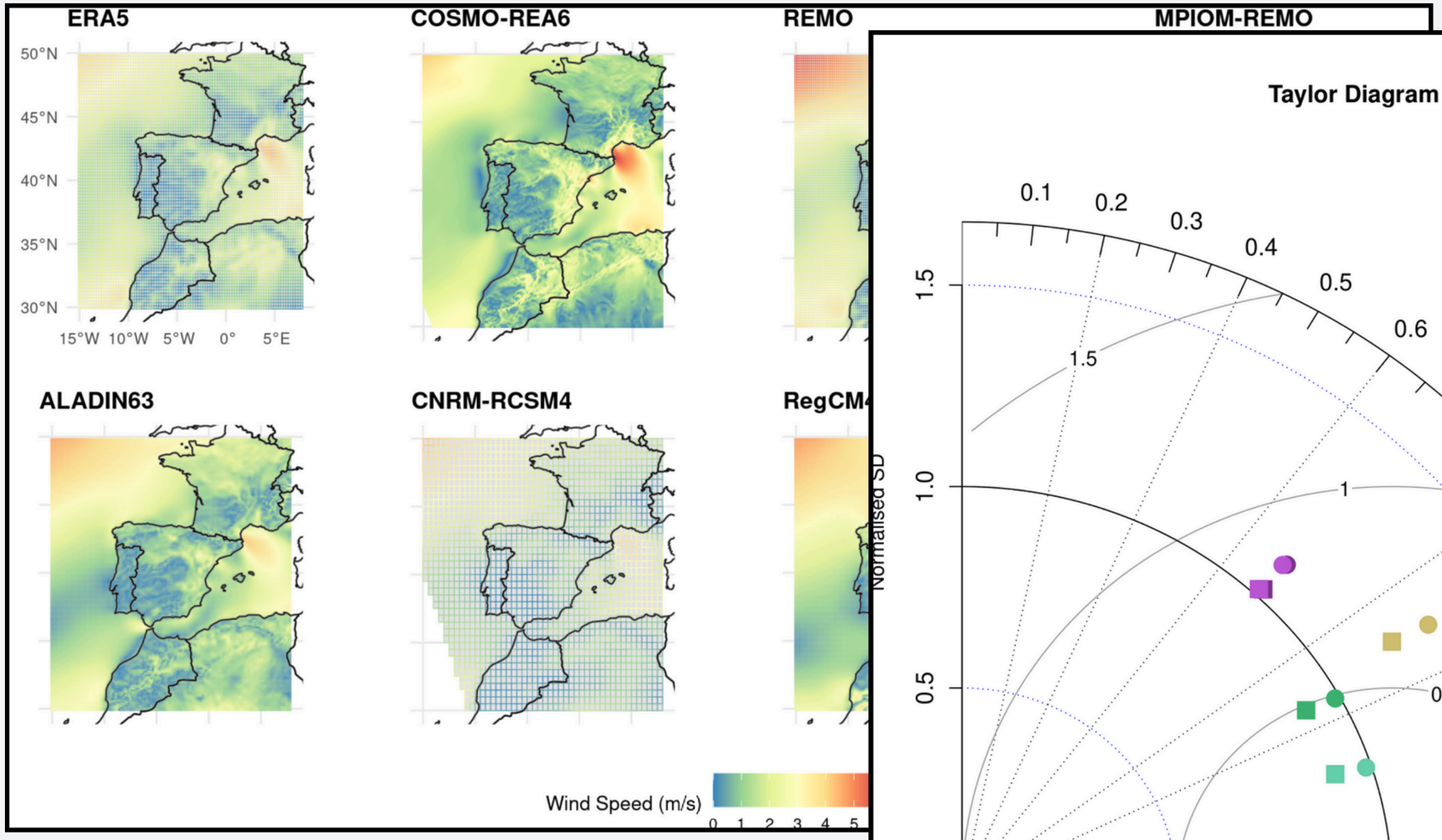

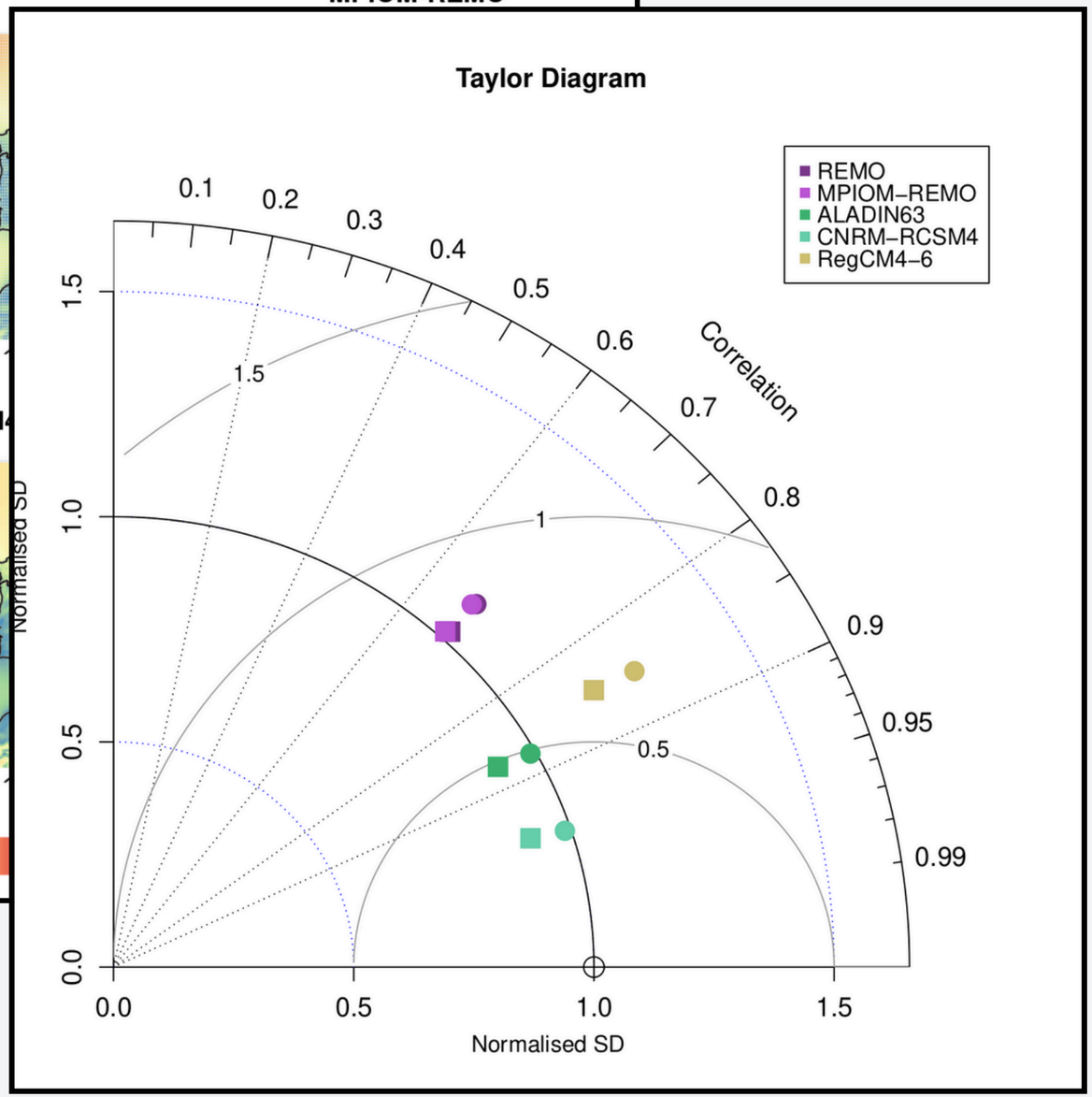

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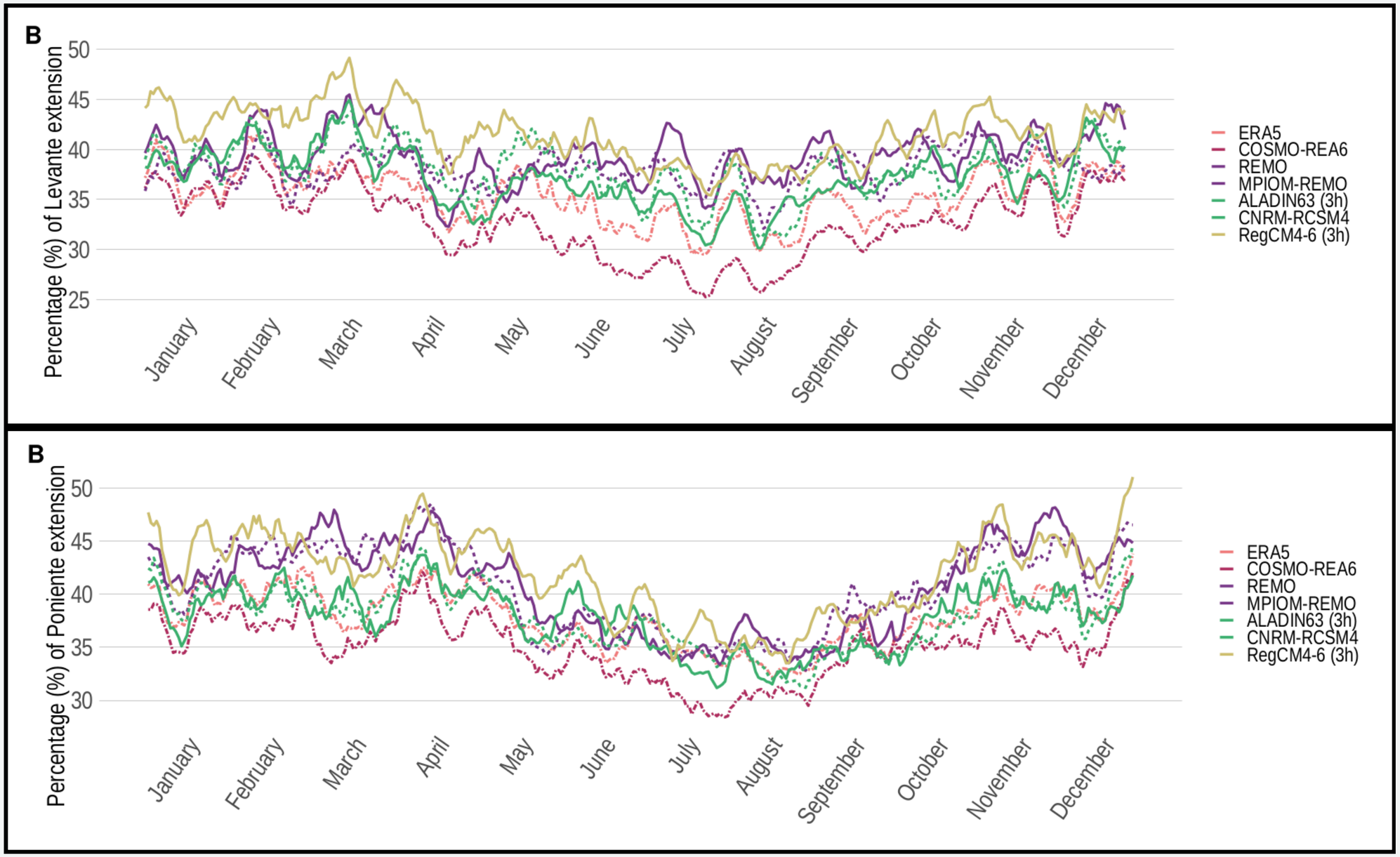

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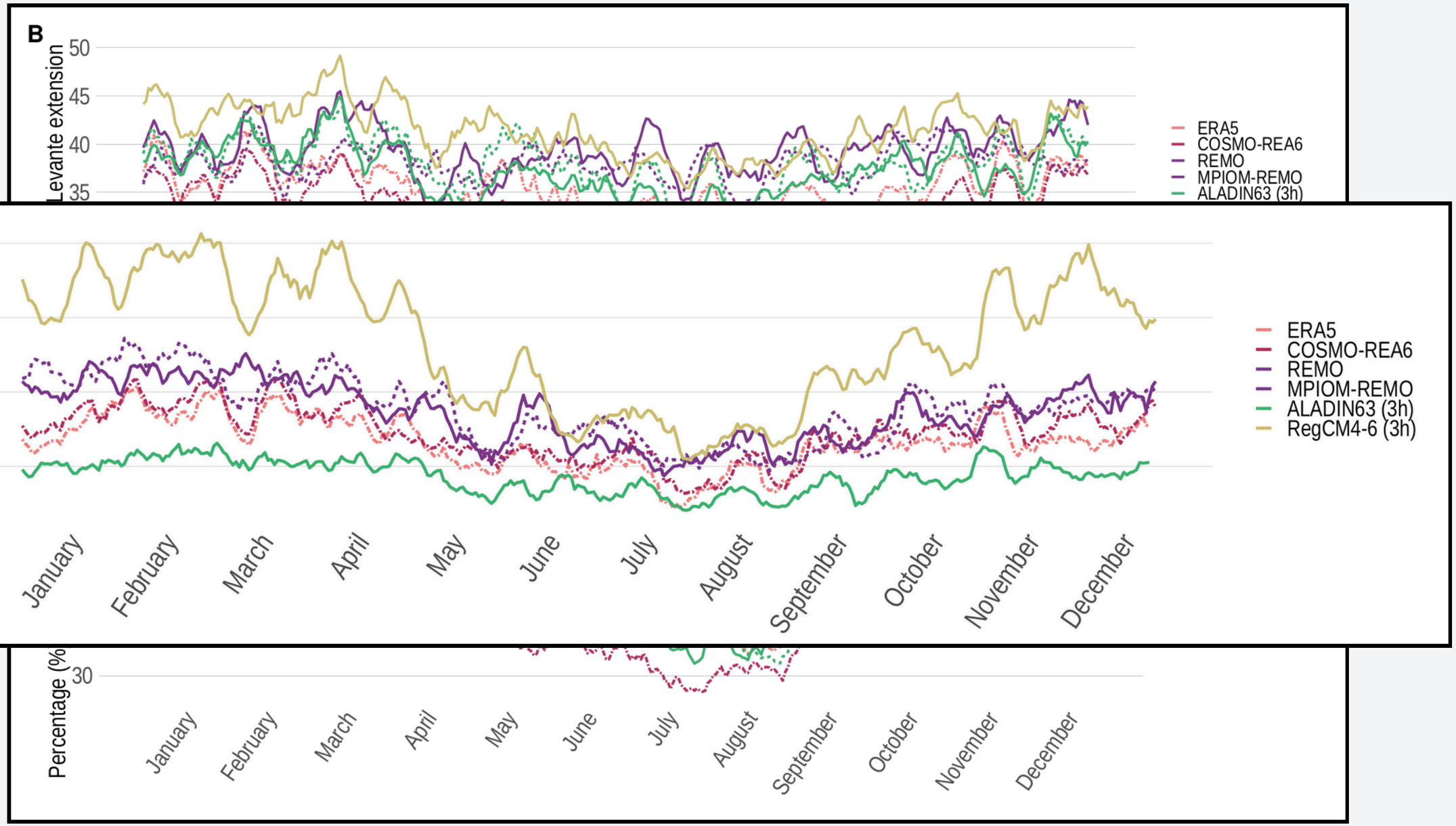

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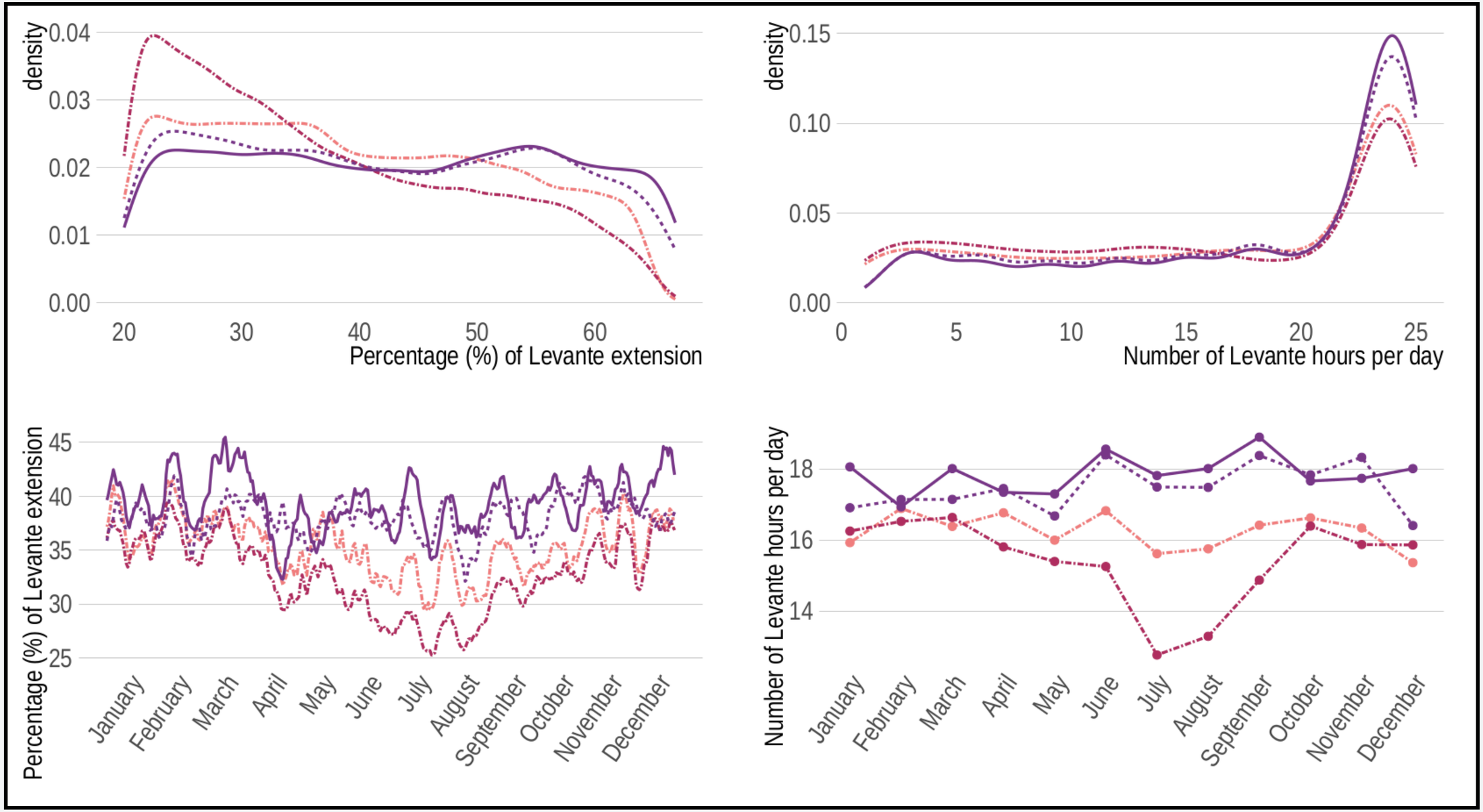

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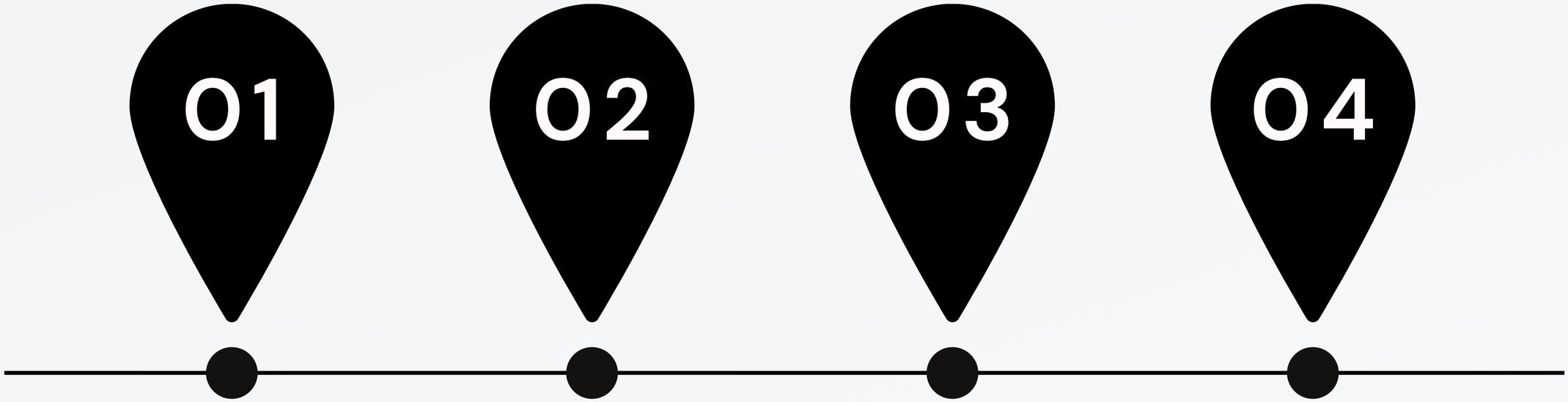

MEAN VALUES

CNRM-RCSM4 IS THE CLOSEST MODEL TO REANALYSIS VALUES

SPATIAL RESOLUTION

BEST MATCH IS COSMO-REA6 REANALYSIS (6-KM). FOR GREATER THAN 10-KM RESOLUTIONS, MODEL INTERNAL PHYSICS ARE MORE IMPORTANT

TEMPORAL RESOLUTION

USING 3-H VALUES OVER HOURLY VALUES DOES NOT INTRODUCE ERROR. HOWEVER, 6-H VALUES DO NOT DETECT LEVANTE/ PONIENTE EVENTS

COUPLING

ATMOSPHERE-OCEAN COUPLING EFFECT DEPENDS ON THE FLOW

2. DATA

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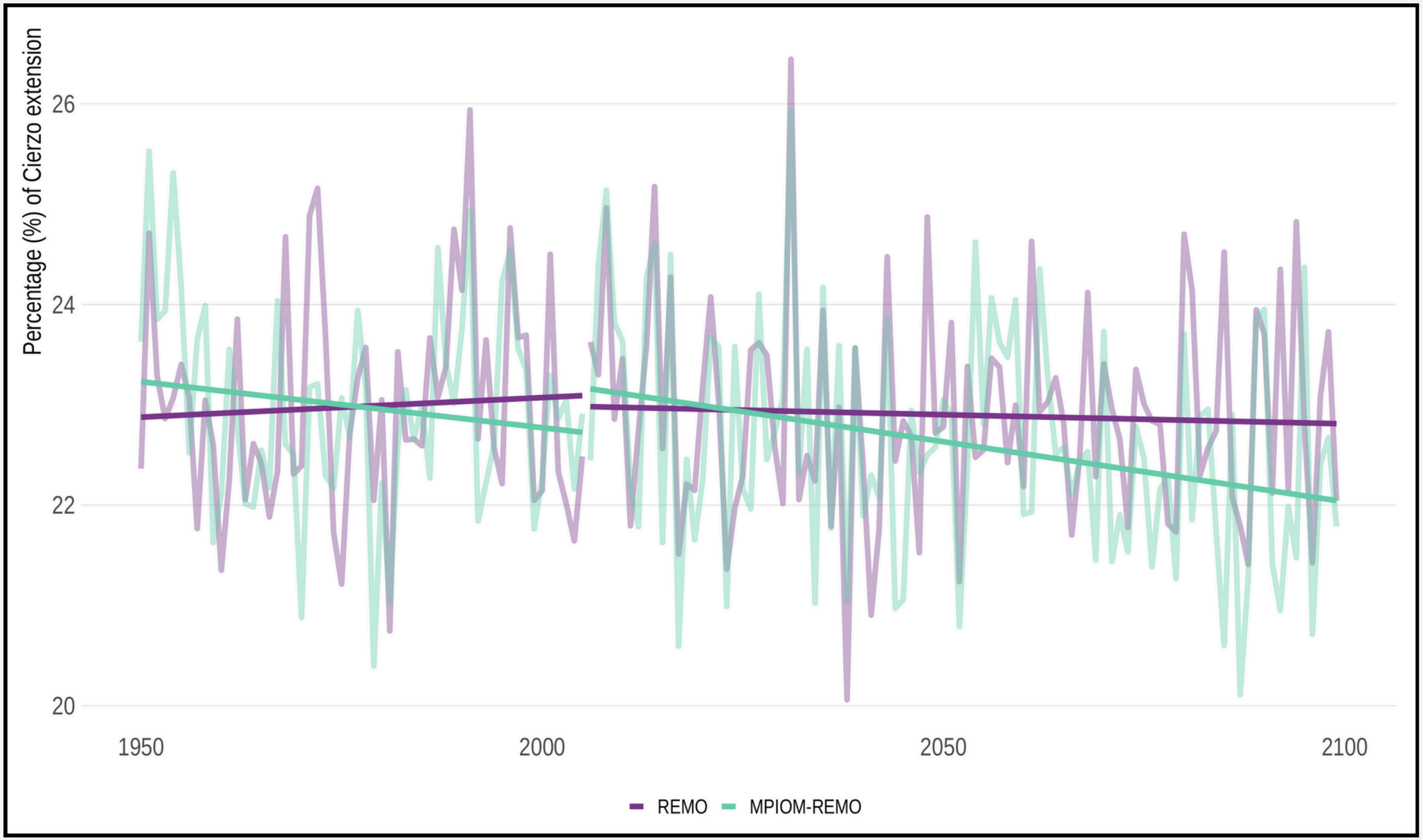
5. HISTORICAL (1950-2005) AND RCP8.5 (2006-2099)



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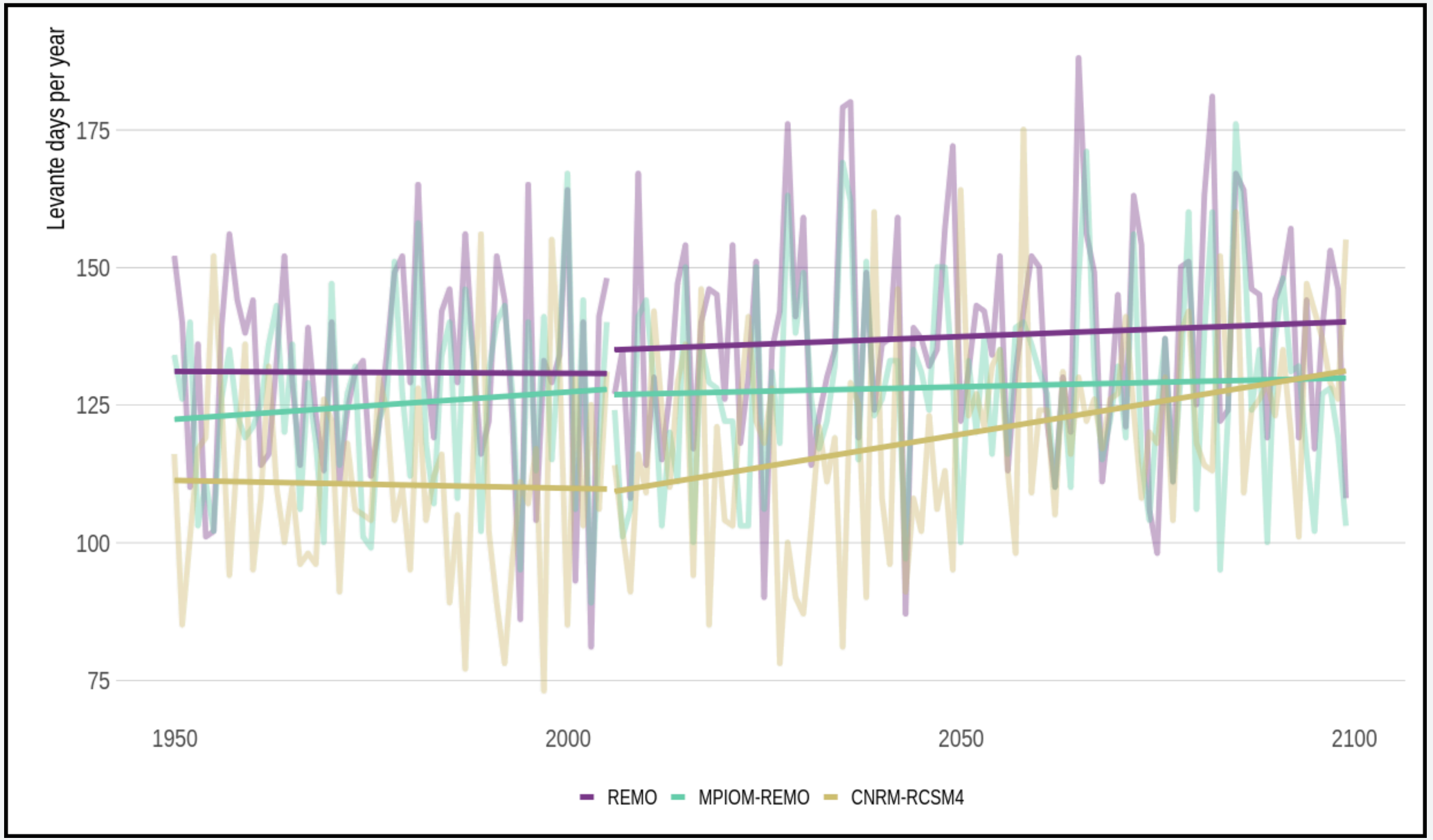

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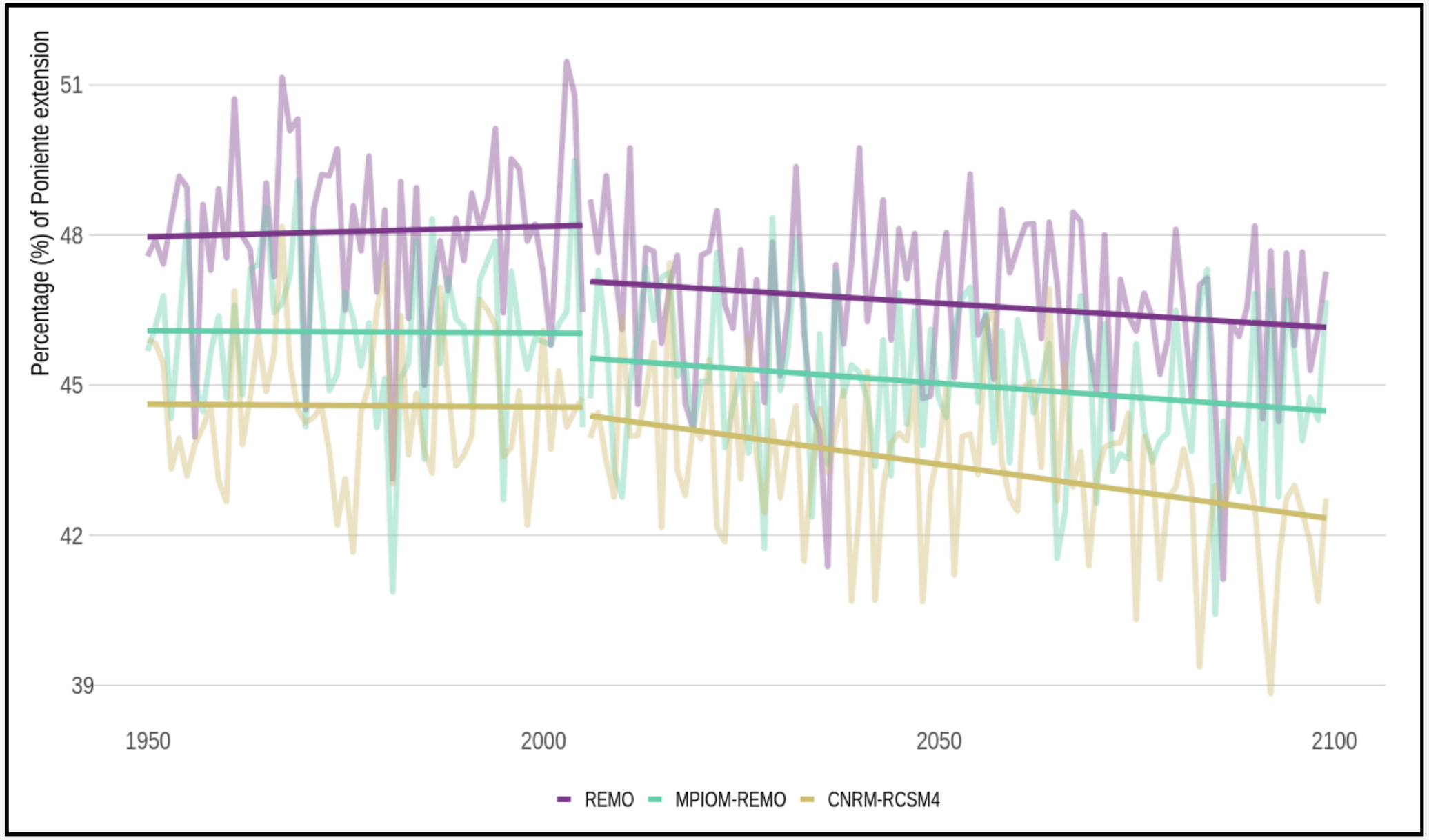

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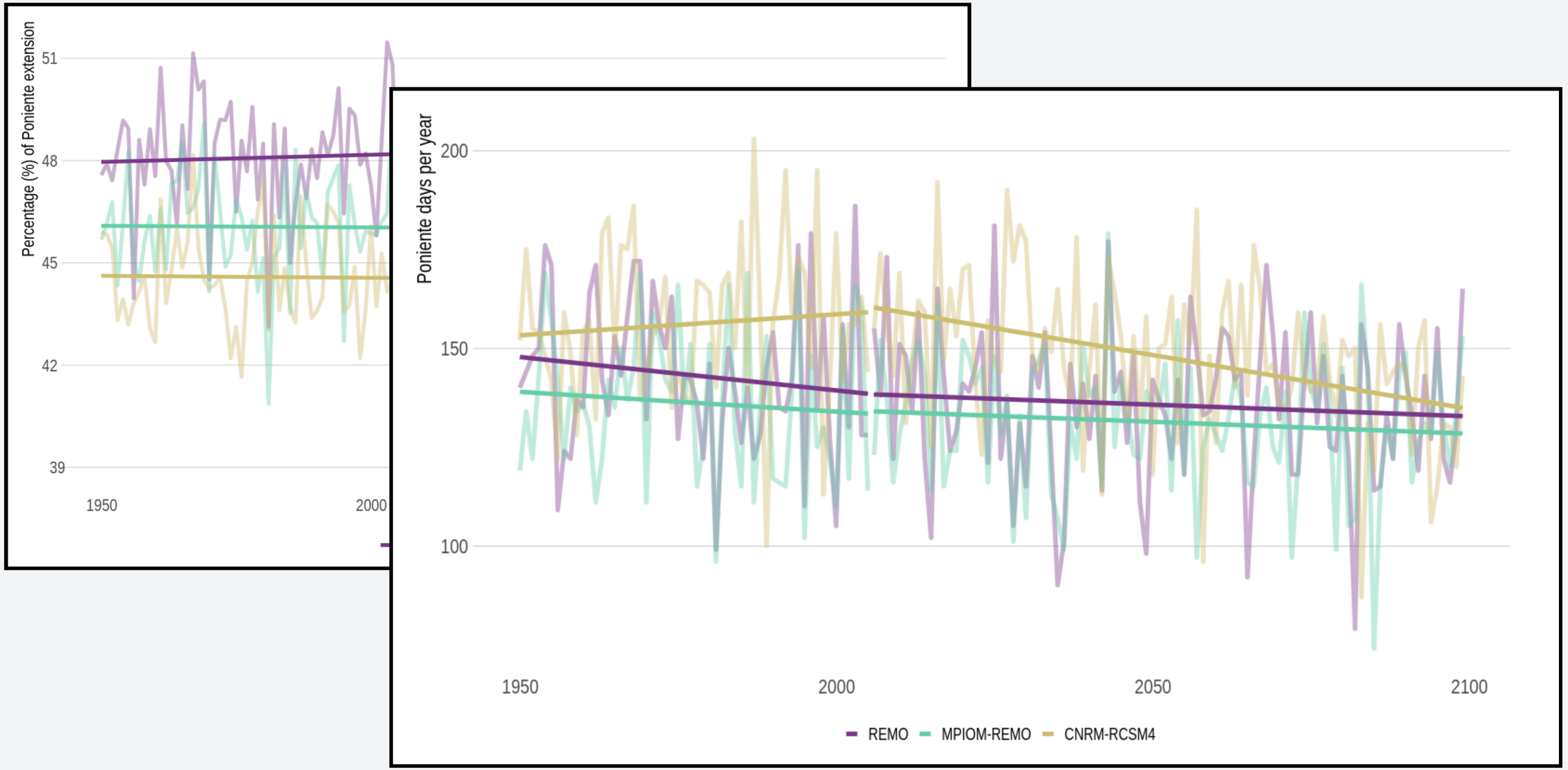


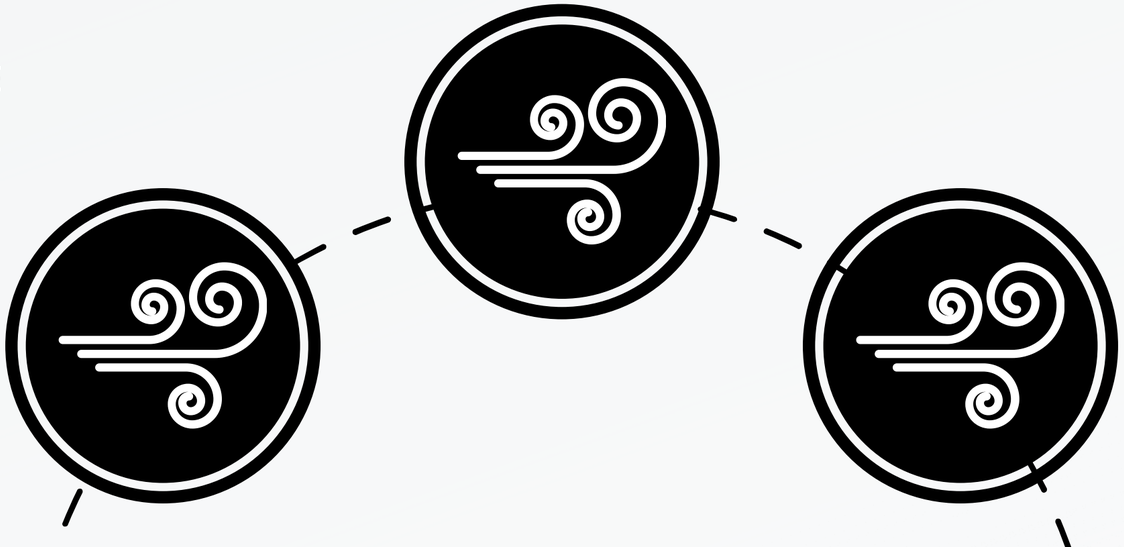
6. CONCLUSIONS

EVALUATION

AN INDEPENDENT EVALUATION OF ALL AVAILABLE MODELS AND FLOWS TO BE CONSIDERED IS NEEDED, SINCE INTERNAL PHYSICS AND FLOW CHARACTERISTICS ARE VERY IMPORTANT FACTORS

HISTORICAL VS RCP 8.5

CHANGES ARE DETECTED IN CIERZO AND LEVANTE EXTENSIONS AS WELL AS AN INTENSIFICATION OF THE NUMBER OF LEVANTE ANNUAL EVENTS; A GENERAL WEAKENING OF PONIENTE CHARACTERISTICS IS ALSO CAPTURED



FUTURE PERSPECTIVES

NEED FOR MORE ATMOSPHERIC AND COUPLED SIMULATIONS WITH AT LEAST 3-H TEMPORAL RESOLUTION, HOURLY IF POSSIBLE, AND HIGH SPATIAL RESOLUTION DATASETS