The fifth generation regional climate modeling system RegCM5: Description and model validation over all CORDEX domains at hydrostatic and conveciton-permitting resolutions

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EGU General Assembly 2022

The Abdus Salam International Centre for Theoretical Physics

NH core: RegCM4 vs RegCM5

RegCM4 MM5 NH Coppola et al., 2021	**RegCM5 Moloch NH**
Arakawa B grid	Arakawa C grid
Sigma pressure vertical coordinate	Height based ζ analytical coordinate
Status variables T,U,V,W,P',Qx	Status variables Θ,Π,U,V,W,Qx
Three time-step leapfrog time integration scheme with RA/RAW filter.	Two time-step Eulerian time integration scheme without time filter
Second order advection with local CFL weighted off centering, SL option for tracers	Weighted Average Flux (WAF) advection scheme, no SL option

NH core: RegCM4 vs RegCM5

RegCM4 MM5 NH Coppola et al., 2021	**RegCM5 Moloch NH**
Semi-implicit scheme for sound waves with time splitting	Time splitting for weighted average flux scheme and for the fully implicit solution of vertical velocity
Horizontal diffusion	No diffusion, damping of horizontal divergence in vertical implicit velocity scheme
Rigid lid at top pressure with upper radiative boundary condition	Zero vertical velocity at top height
Lambert, Mercator, Rotated Mercator and Stereographic projections	Same projections plus Rotated Latitude Longitude
Rayleigh damping with relaxation towards BC in top layers	No damping

NH core: RegCM4 vs RegCM5

RegCM4 MM5 NH Coppola et al., 2021	**RegCM5 Moloch NH**
5 cumulus schemes	4 cumulus scheme: Kuo not allowed
2 PBL, 3 Micro-physics, 2 Radiative schemes	2 PBL, 3 Micro-physics, 2 Radiative schemes
Full support for CMIP 5/6 boundary condition data	Full support for CMIP 5/6 boundary condition data
Prescribed aerosols	Prescribed aerosols
Fully coupled transport for aerosol and chemistry	Fully coupled transport for aerosol and chemistry

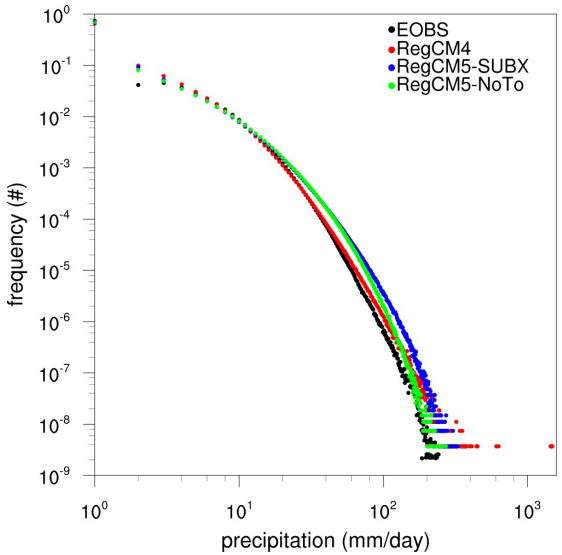
Euro-CORDEX

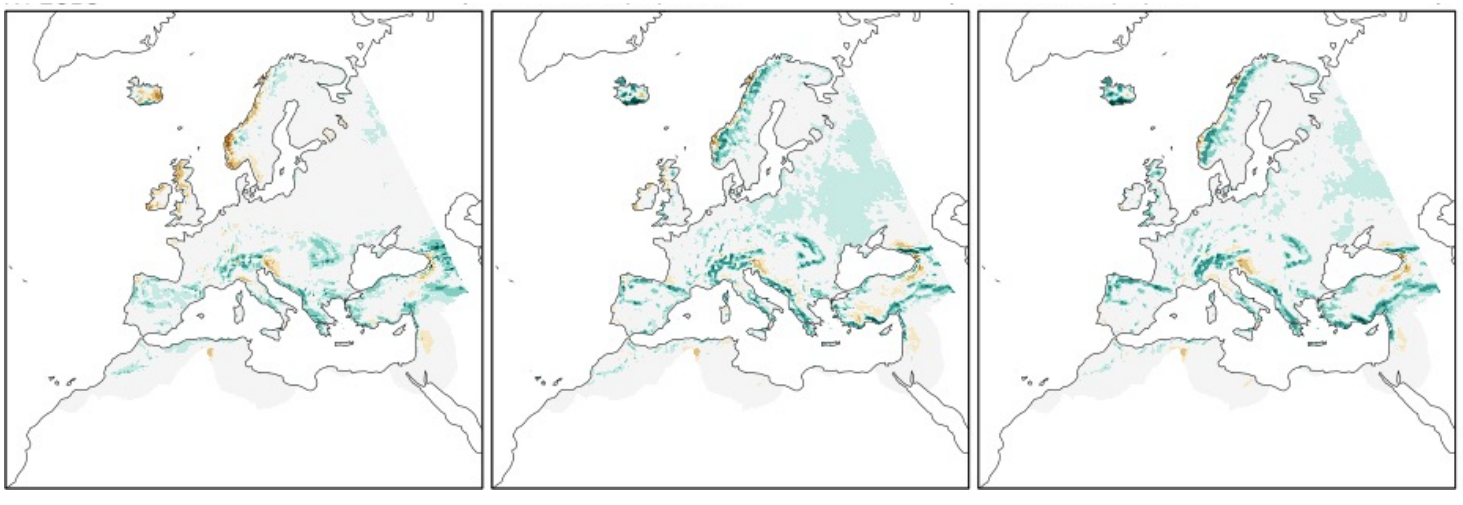
2000-2009 Annual

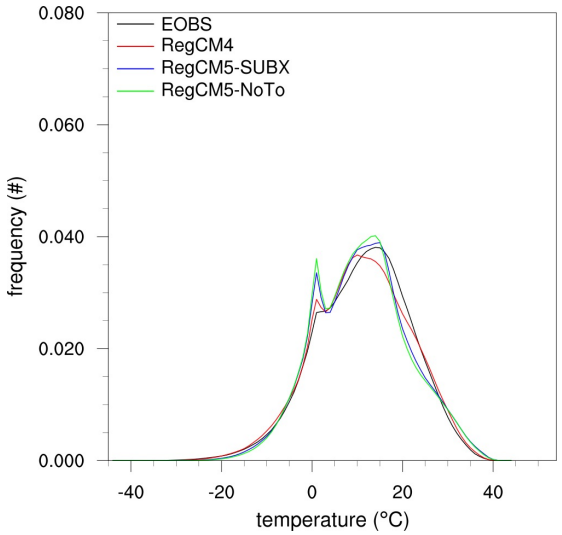
RegCM4-SUBEX

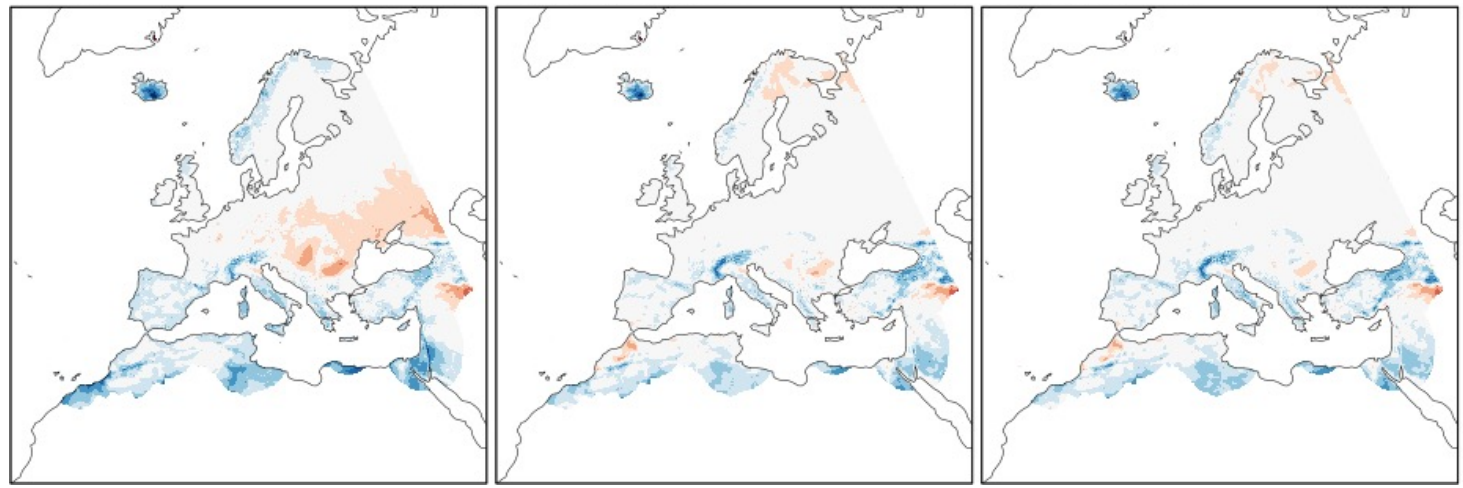
RegCM5-SUBEX

RegCM5-NoTo









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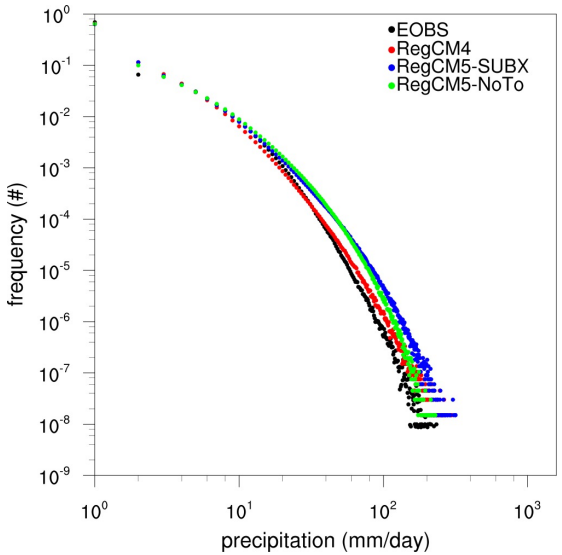
Euro-CORDEX

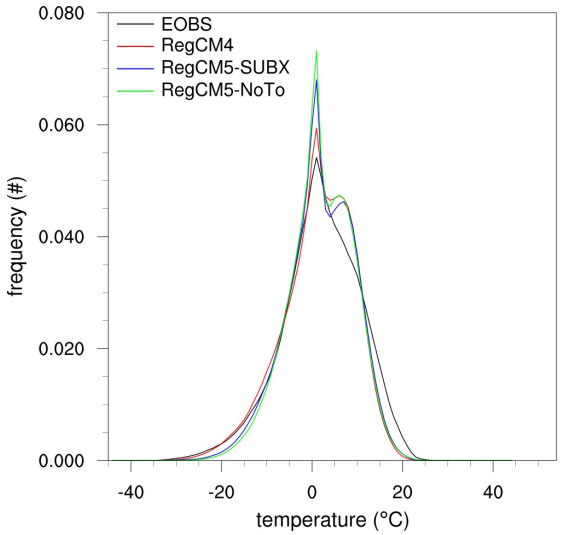
2000-2009 DJF

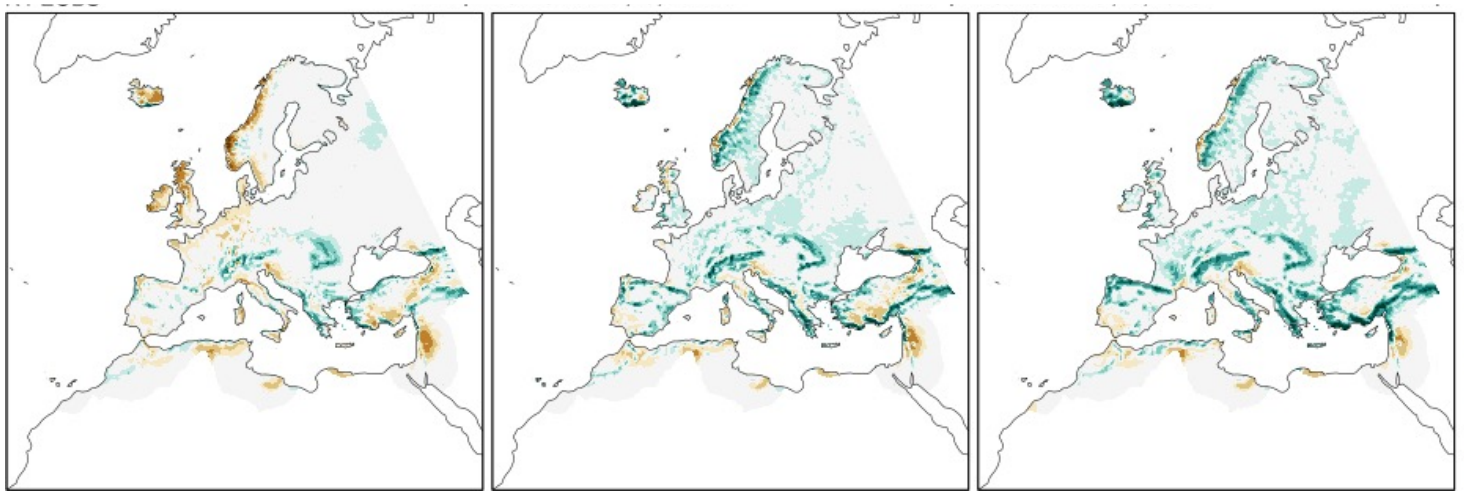
RegCM4-SUBEX

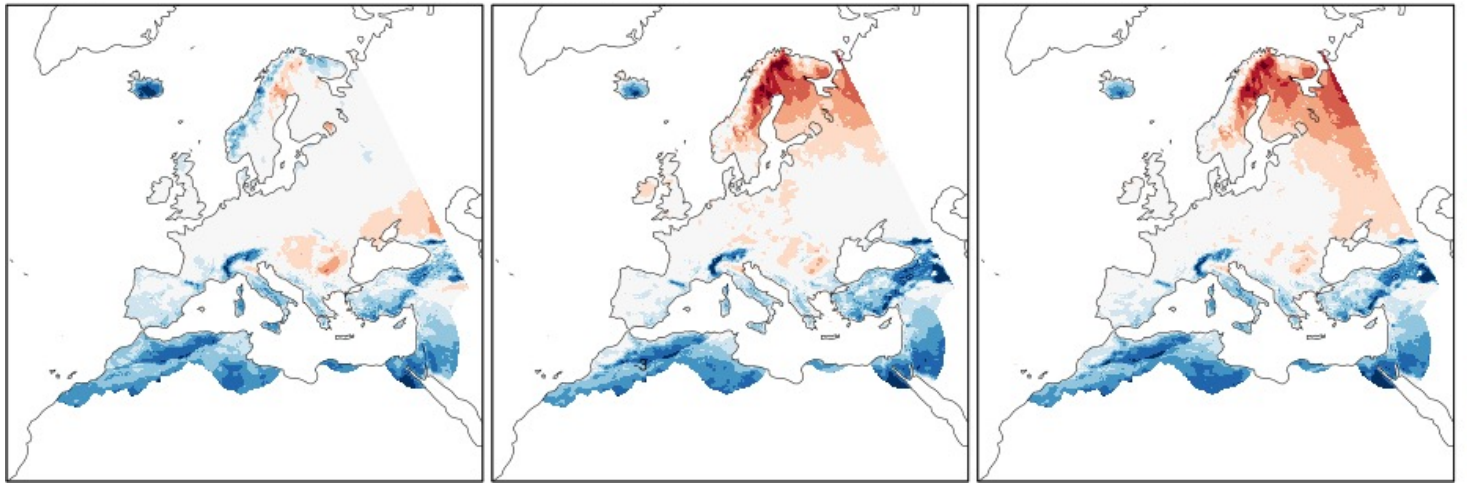
RegCM5-SUBEX

RegCM5-NoTo









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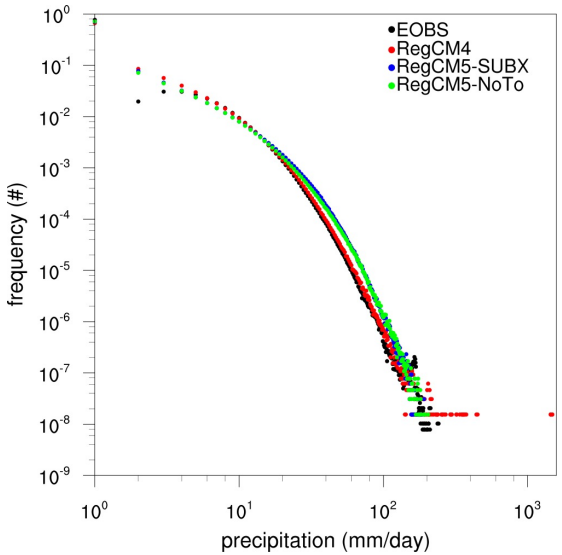
Euro-CORDEX

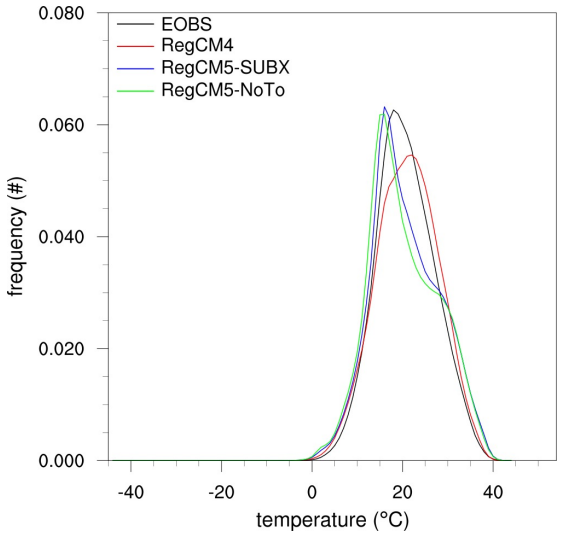
2000-2009 JJA

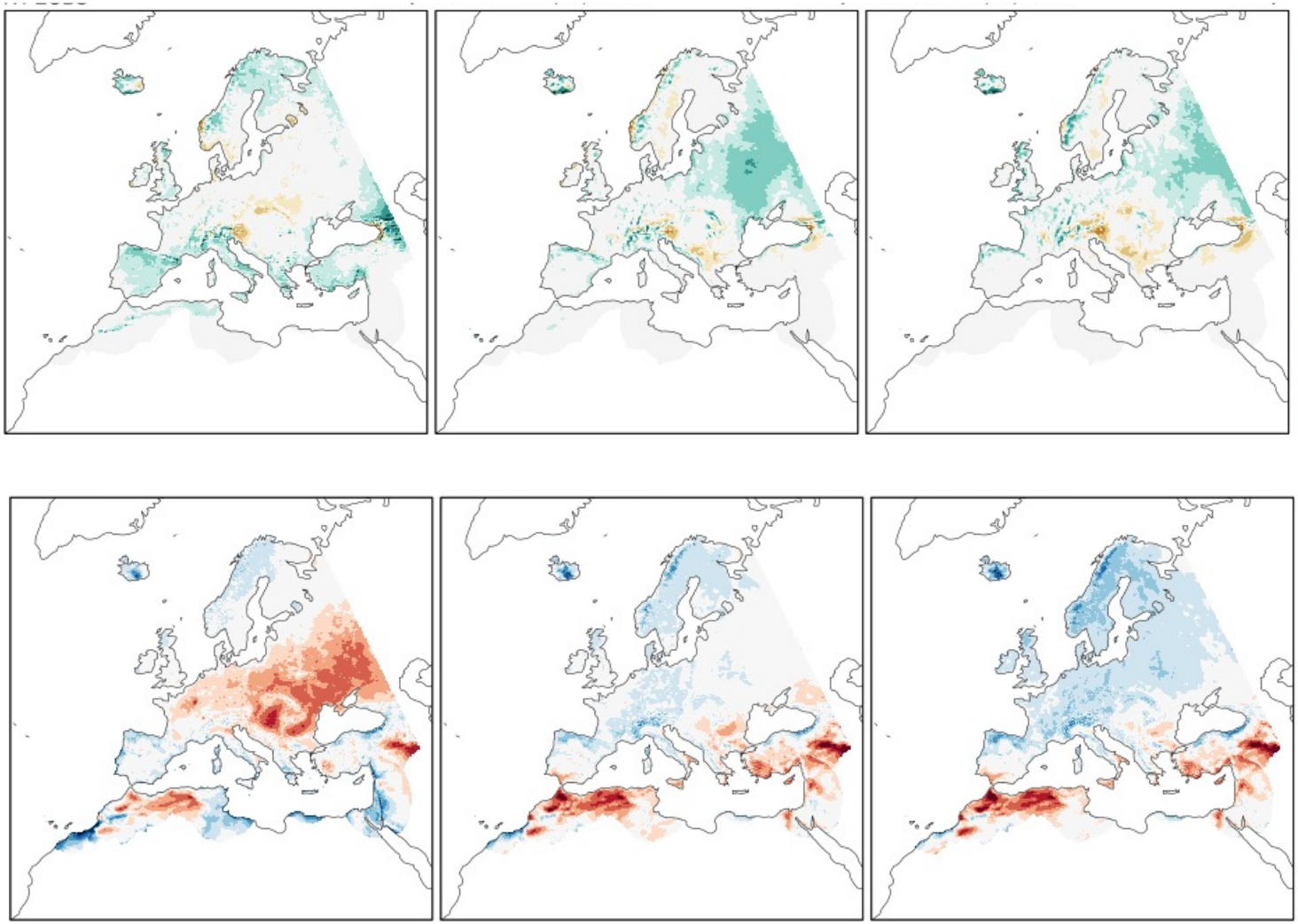
RegCM4-SUBEX

RegCM5-SUBEX

RegCM5-NoTo







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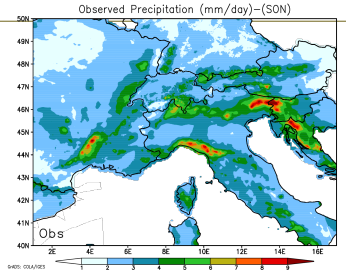
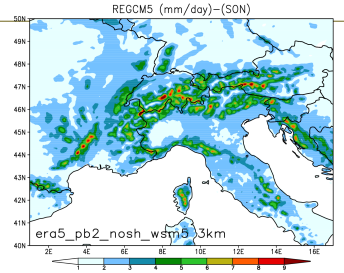
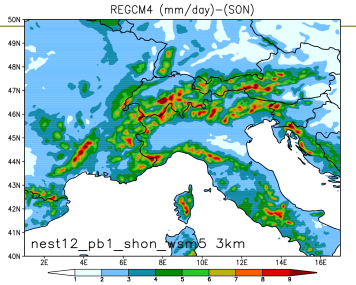
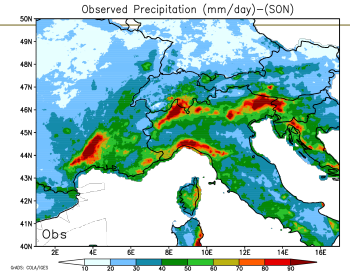
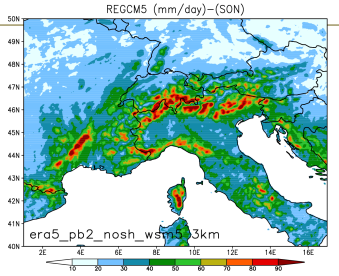
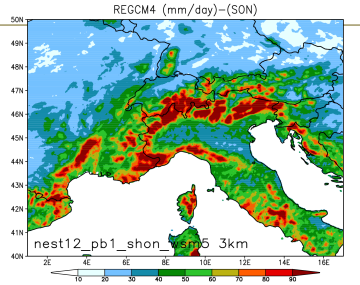
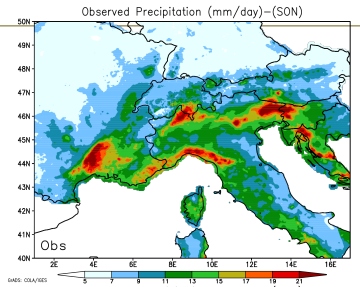
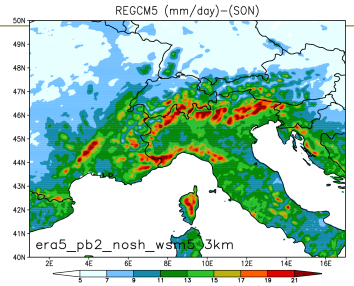
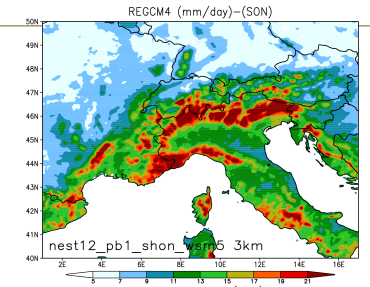
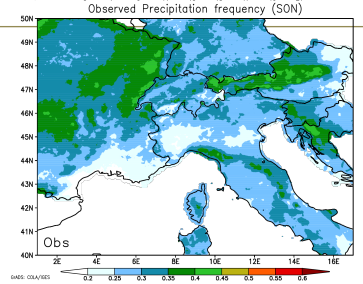
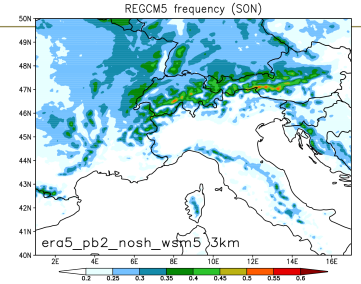
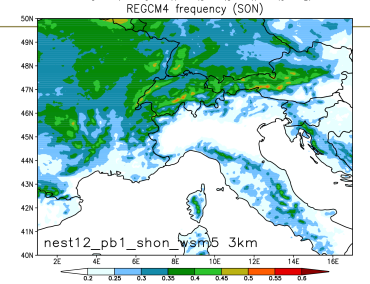
FPS-CP ALPS3

RegCM4-ALPS3	RegCM5-ALPS3
INIT:REGCM4-EUR (12 km ERA-Int driven)	INIT:ERA5
sh_cum_on	no_sh_cum
dt<=9s	dt<=45s 
	NEW PARAM mo_ztop = 25000.0 mo_h = 7500.0 mo_a0 = 0.0 level position
Coppola, E., Stocchi, P., Pichelli, E., Torres Alavez, J. A., Glazer, R., Giuliani, G., Di Sante, F., Nogherotto, R., and Giorgi, F.: Non-Hydrostatic RegCM4 (RegCM4-NH): Model description and case studies over multiple domains, Geosci. Model Dev., 14, 7705–7723, 2021,https://doi.org/10.5194/gmd-14-7705-2021	Giorgi et al. (in preparation)

FPS-CP ALPS3

SON 2000-2009	OBS	RegCM5	RegCM4
Daily pr			
Day HPE p99			
Daily INT			
Daily FREQ			

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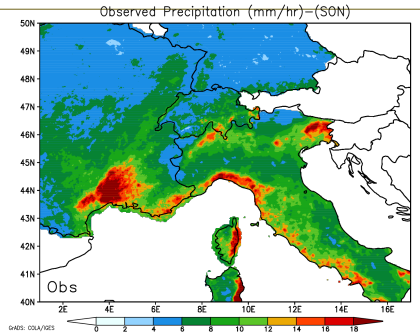
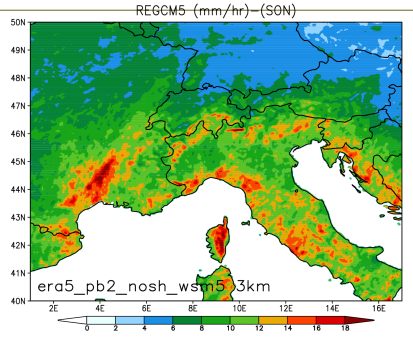
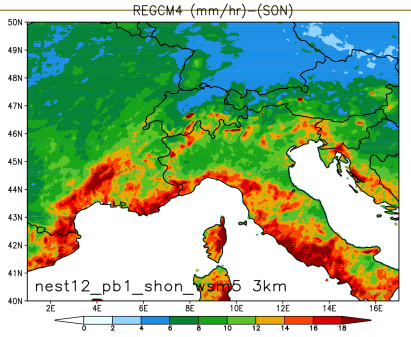
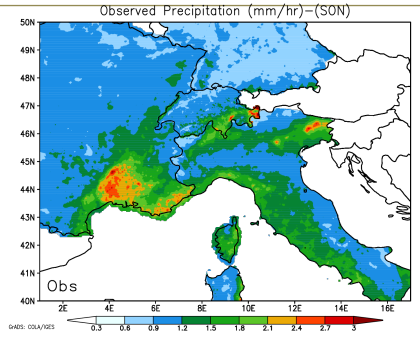
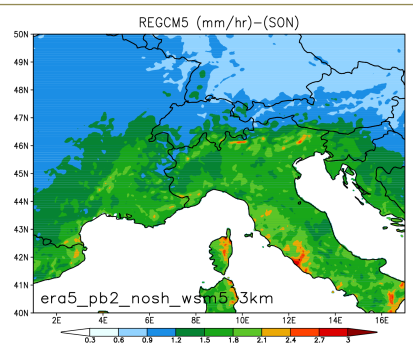
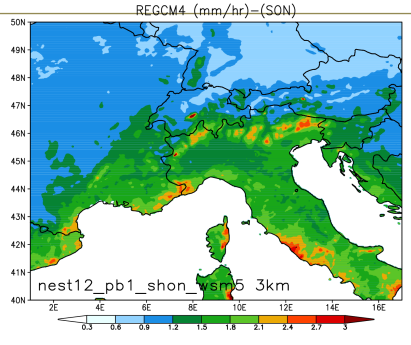
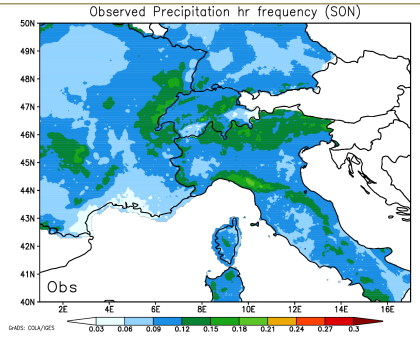
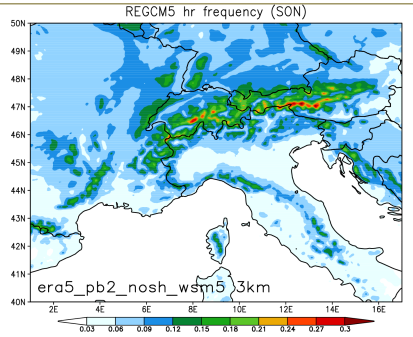
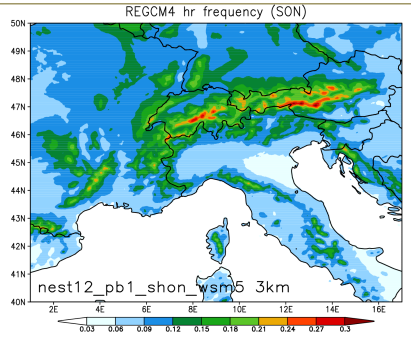
FPS-CP ALPS3

SON 2000-2009	OBS	RegCM5	RegCM4
Hourly HPE p99			
Hourly INT			
Hourly FREQ			

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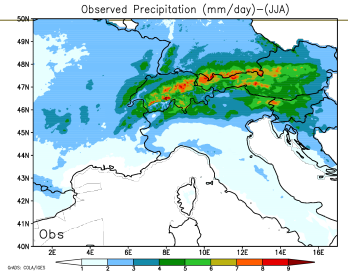
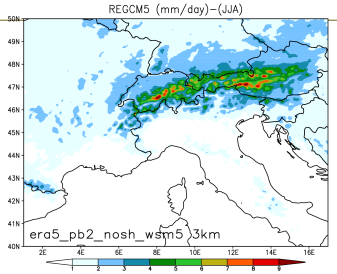
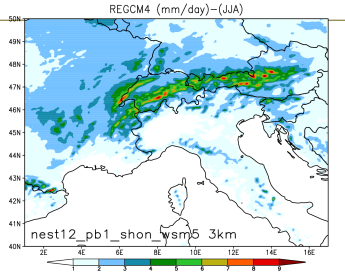
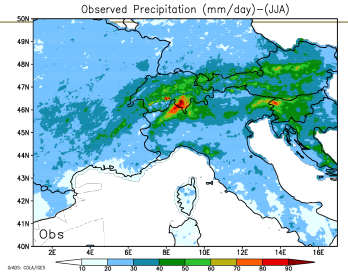
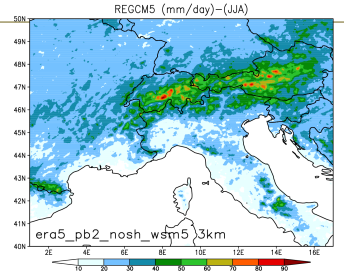
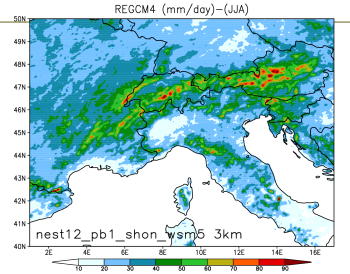
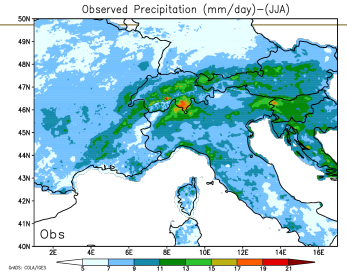
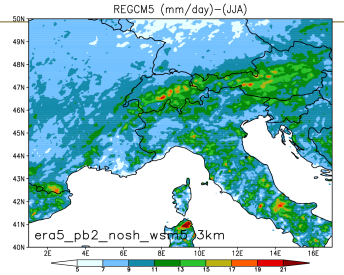
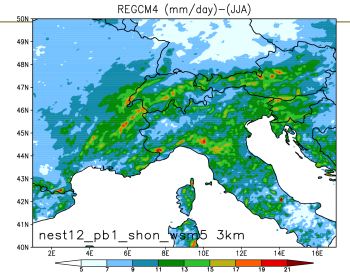
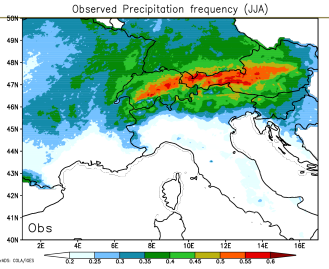
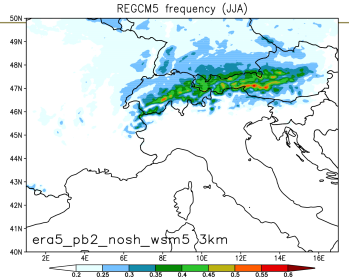
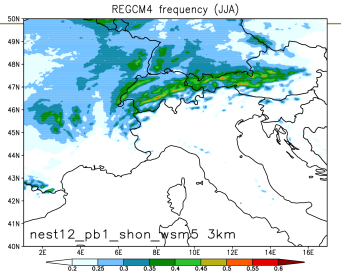
FPS-CP ALPS3

JJA 2000-2009	OBS	RegCM5	RegCM4
Daily pr			
Day HPE p99			
Daily INT			
Daily FREQ			

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Summary

- RegCM5 has good performance over the Euro-CORDEX and FPS-ALPS3 domain
- Improvement in summer mean precipitation bias and extreme precipitation
- Strong improvement in daily mean, extreme, intensity and frequency for CP simulation in fall season. Slight improvement in summer season
- On-going test for all the other CORDEX-CORE domains
- On-going tests for 2 others CP domains in Africa and South America

To know more about the model

THANKS

Postdoctoral Opportunity

For research in high resolution regional climate modelling

19/05/2022

Postdoctoral Opportunity

ICTP's Earth System Physics (ESP) section seeks applications for two postdoctoral positions in the broad areas of high resolution regional climate modelling, coupled regional earth system modelling, hydroclimate modelling and machine learning algorithm applied to climate data analysis. One of the two postdoctoral positions will be under the framework of the H2020 XAIDA (eXtreme events: Artificial Intelligence for Detection and Attribution) project (https://xaida.eu/).

Candidates must have completed a PhD in atmospheric science, geophysical science or related disciplines prior to the start of their fellowship and have experience in the research areas mentioned above.

ICTP offers internationally competitive remuneration and a number of benefits. The appointment will be initially made for one year, renewable for up to an additional two years, to start as soon as possible. Candidates should apply through the ICTP online application system.

The application deadline is 15 July 2022. Candidates should apply online at https://e-applications.ictp.it/applicant/login/EE22

https://www.ictp.it/about-ictp/media-centre/news/2022/5/esp-postdoc-positions.aspx