

## CORDEX-FPS: Convective Phenomena over Europe and the Mediterranean

2020 Progress report (submitted 16.03.2021)

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The CORDEX-FPS on Convective Phenomena over Europe and the Mediterranean aims to produce and investigate a first-of-its-kind ensemble of convection permitting simulations. There are over 67 individual participants representing 16 modeling groups and 5 non-hydrostatic regional climate models. The fifth annual meeting was held December 1-2, 2020 in an online format due to COVID-19 restrictions. Despite this, each day had over 60 participants and the project as a whole continued to deliver through 2020.

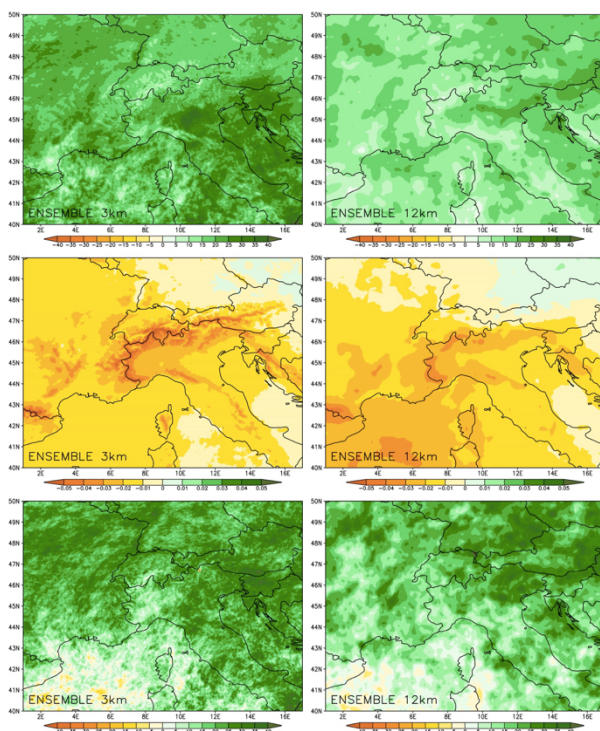


Figure 1: From Pichelli et al. (2021) showing the strong modification of the intensity and frequency response (top two rows) of precipitation to climate change in the CPRMs (left) and RCMs (right).

<https://link.springer.com/article/10.1007/s00382-021-05657-4>

2020 was a challenging year for all of us and in all ways (personal, professional, physical and psychological). Despite this the FPS consortium continued its work and now enters its final year with three clear goals: **1)** upload the ensemble to ESGF at year end, **2)** push to complete community papers and **3)** plan for, and ensure, our legacy. The two papers that have contributed to the next AR6 IPCC WGI assessment are now accepted and published (Figures 1 and 2). In total there are at least 14 FPS-related manuscripts published, in-press or in-review. The ensemble currently consists of 21 scenario simulations with 3 more on the way. We aim for an evolving ensemble that can accept new members provided they follow the experiment protocol.

During the annual meeting 14 scientific presentations were combined with longer discussions on key agenda items such as: i) coordinated research topics, ii) terms of use and data sharing, iii) addressing issues related to QA and ESGF. Also, a dedicated FPS Slack channel has been created where the community can interact and work on the completion of paper related to i) but also have a fast exchange on ii) and iii).

In a welcome development there were a number of talks on hybrid dynamical statistical approaches using deep learning approaches to emulate precipitation and temperature. The future looks very promising for these less-computationally intensive approaches and a few groups aim to apply these to CPRCM from the FPS in 2021. As with 2020 there is a strong push beyond analyses of the canonical surface fields to other aspects of the climate system (e.g. physical processes driving heat waves).

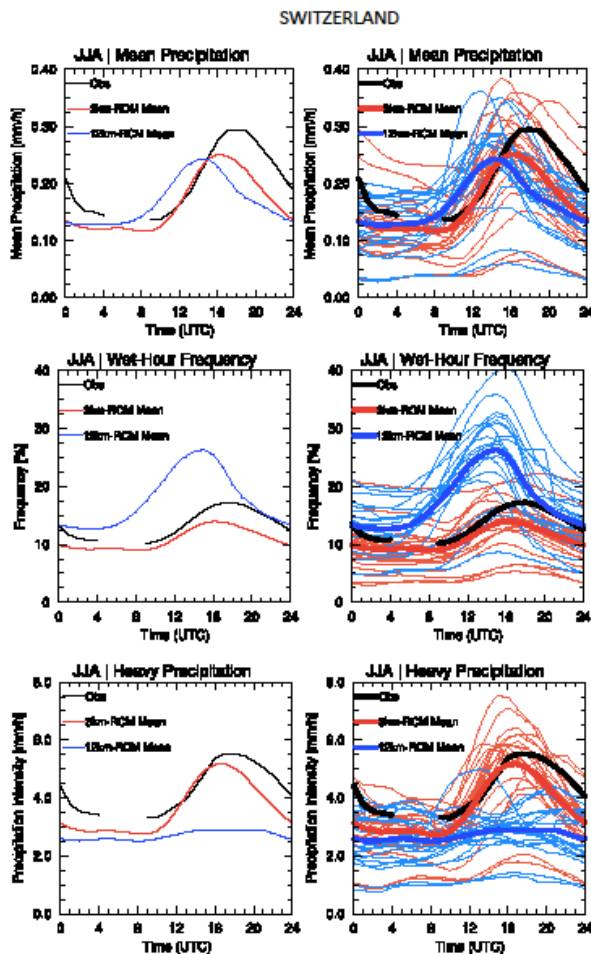


Figure 2: From Ban et al. (2021) showing the improvement in the ensemble mean of the diurnal cycles in the evaluation simulations when going from parameterized to explicit convection (left column) while also showing the large spread between models (right column).

## References

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The consortium also began discussion on the project's legacy and plans for post-2021. Some ideas being floated are a special-issue for FPS-themed studies, reaching out to other convection-focused FPSs for a joint workshop and branching out horizontally to other regions, consortia and investigations.

Documentation of the model metadata and status of simulations is currently freely available to the larger community via google spreadsheets.

## Plans for 2021

- A number of WRF groups are completing scenario runs.
- The file-naming convention is finalized but work still continues to prepare output from the FPS for ESGF. There are a number of issues which still must be resolved so that files pass the DKRZ-QA checker.
- A focus for 2021 is to push more community analyses and papers. Currently there are 14 efforts underway with 2 of those ready for submission before summer.
- Final meeting in late fall 2021.

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