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Earth System Dynamics
Discussions

Interactive comment on "European climate change at global mean temperature increases of 1.5 and 2 °C above pre-industrial conditions as simulated by the EURO-CORDEX regional climate models" *by* Erik Kjellström et al.

Anonymous Referee #1

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This manuscript investigated European regional climate change at global mean temperature increased by 1.5 oC or 2 oC above pre-industrial conditions based on ERUO-CORDEX regional downscaling. Results showed that regional warming exceeds the global mean temperature in most parts of Europe while precipitation increased in the north of Europe and decreased in the south with larger uncertainty relative to those of temperature. The changes in temperature, precipitation and wind speed were shown modified by changes in mean sea level pressure indicating a strong relationship with the large-scale circulation and its internal variability on decade-long timescales.

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Discussion paper

It's an interesting topic but more deep analysis and discussion should be done. This manuscript adopted 31 CMIP5 modes just for calculating SWL1.5 and SWL2. The temperature, precipitation, and wind based on these CMIP5 modes might also be addressed to better show the differences with results based on RCMs. Additionally, in this manuscript, changes in temperature, precipitation and wind speed in Europe were attributed to changes in mean sea level pressure which was indicating a strong relationship with the large-scale circulation, but I think more discussion (such as humidity, wind profile, etc) is needed to support the conclusion. Finally, the overall quality of the manuscript should also be improved. Thus, careful and rigorous major revision is needed to bring the manuscript up to the standards for ESD.

List of specific (major and minor) comments:

Page 4, Line 24: Do you mean the other CMIP5 GCMs out of 31 selected models? Page 4, Line 28: It seems not suitable to say "RCMs change the climate change signal of the underlying GCMs" Page 4, Line 28: a large number of studies cited by Rockel and Woth (2017)? If not, please give more related citation. Page 5, Line 2, Line 6: Maybe "1.5 or 2.0 oC" is better. Page 5, Lines 8-10: The global warming between the pre-industrial and reference period based on observation (HadCRU4) is 0.41K. Does it better to calculate such global warming between these two periods for each CMIP5 model separately? Thus, each RCM could present the regional warming under the future temperature change above 1.5 or 2 oC subtracting the forcing GCM's warming between the two periods. Additionally, please change "0.41K" to "0.41 oC" to keep the unit consistent. Page 5, Line 20: There are too many subfigures in one figure. It's better to assign numbers to them and cite the subfigure in the main body. Same problems were found for other figures. Page 7, Line 9: The leftmost and rightmost colors of the label bar are too similar. Please revise the label bars of all related figures to make the spatial pattern clear to the readers. Page 7, Lines 11-12: Please give more detailed discussion such as horizontal wind. Page 8, Lines 1-11: When you discuss the connection between the precipitation and MSLP. Please give more discussion since

precipitation is high related to vertical and horizontal wind, humidity, etc. Page 8, Line 12: As a vector, wind direction is also important as well as wind speed. In section 3.4, why only wind speed discussed? Page 11, Line 3: Do you mean Table 2? Page 11, Line 18: Do you mean Table 2? Page 22, Table2: What's the meaning of the italic GCMs in Table 2. Page 23, Table 3: Please do not use "/" to separate the data since it's usually a sign of division. Page 24, Figure 1: Please present the latitude and longitude for the map. Same problems for other spatial plots. Pages 25-26, Figures 2-3: "seventeen RCM simulations", it seems 18 RCMs used in this study. Please give significant test of the diferences if possible. Additionally, please explain in the main body why the subfigure of WRF is blank.

Technical corrections:

Page 3, Line 28: works Page 3, Line 31: ; should be , Page 5, Line 16: two "."

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