

Weather Clim. Dynam. Discuss., referee comment RC2  
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## **Comment on wcd-2022-47**

Anonymous Referee #2

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Referee comment on "The impact of the Agulhas Current system on precipitation in southern Africa in regional climate simulations covering the recent past and future" by Nele Tim et al., Weather Clim. Dynam. Discuss.,  
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### **Review WCD: The impact of the Agulhas Current System on precipitation in southern Africa in regional climate simulations covering the recent past and future**

Nele Tim, Eduardo Zorita, Birgit Hünicke, and Ioana Ivanciu

In general, the paper is well written, and it is easy to read and follow the study step by step. From a modeling analysis, the authors found that in the future, Southern Africa precipitations are mean to decrease. Thus, the novelty in this study is the impact of the Agulhas Current and the Agulhas leakage on Southern Africa precipitation in the future. As some few previous studies in South Africa region, the authors found that along the southeast coast, the reduction of the strength of the Agulhas Current is linked to a decrease of precipitation. They mention the fact that the more the Agulhas leakage is strong, the less the southwest part of South Africa is wet. This last result is quite new in the region, as there is only one study (Cheng et al. 2018) about the impact of the Agulhas leakage on Southern Africa rainfall. I therefore recommend minor revision. However, some comments need to be addressed.

#### Discussion

L133: generally, in regional climate models, precipitation is overestimated over the Drakensberg region. E.g: the weather research forecast model (WRF, see Koseki et al. 2018). How about the CCLM? Why does your model have more inland precipitation?

L320: you state that “trends over the past are spatially heterogeneous and strongly depend on the analysed time period as well as on the used data set.” How does your chosen period and your data influence your analysis?

There is a whole system for the formation of winter and summer precipitation (see the introduction of Imbol Nkwinkwa et al. 2021). What is the percentage of the contribution of the Agulhas leakage to winter precipitation?

The south coast of South Africa receives precipitation all year long (Engelbrecht et al. 2015; Engelbrecht and Landman, 2016). Could you tell from your analysis whether this phenomenon is due to the Agulhas Current or the Agulhas leakage?

Minor corrections:

Line 90: define CCLM because it is the first use.

Line 97: define FOCI.

Line 107: explain or give a reference for the method f-test.

Figure 2 is the annual mean or the climatology?

Caption figure 3, replace reanaylsis by reanalysis

L157 replace a extenuated by an extenuated

L180 replace “decreasing slightly close the the South African coast” by “decreasing slightly close to the South African coast

L197-L203: precise the figures you are referring to

L227: "to" is missing

#### References:

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Koseki, S., Pohl, B., Bhatt, B. C., Keenlyside, N. and Nkwinkwa Njouodo, A. S.: Insights into the Summer Diurnal Cycle over Eastern South Africa *Mon. Wea. Rev.*, 146, 4339–4356, <https://doi:10.1175/MWR-D-18-0184-1>, 2018