This manuscript investigates hydroclimatic variability in the Levant during the Last Interglacial peak (MIS 5e) using PMIP4 paleoclimate model simulations in combination with a synoptic weather-type classification and moisture balance decomposition. The study mostly uses the AWI-ESM model to examine precipitation characteristics and the relative roles of thermodynamic and dynamic processes. Results indicate enhanced precipitation—particularly during Red Sea Trough and Cyprus Low events—driven largely by thermodynamic factors. The authors present integration of model and proxy data but the manuscript requires major revisions to address issues of clarity, internal consistency, and the robustness of methodological and interpretative claims. The manuscript is interesting and deseves publication in Climate of the Past, provided the authors address the comments and improve its quality.

Comments

Line 47-50:

First claim:

“The Levant experienced a relatively dry climate characterized by shorter, more intense rainfall events…”
This statement describes the entire Levant as relatively dry.

Second claim:

“Proxy-based reconstructions have indicated that the southern Levant experienced relatively wet conditions during this period…”
This says that the southern Levant was relatively wet.

Conflict:
These two statements describe opposite hydroclimatic conditions (dry vs. wet) for the same region and period, unless the author means to emphasize spatial variability within the Levant (north vs. south, for instance).

So unless the text explicitly clarifies that the southern Levant differed from the rest of the Levant, the passage reads as internally inconsistent – the same time period is characterized both as relatively dry overall and relatively wet locally.

To fix it, you could clarify the regional contrast explicitly, for example:

“While the Levant as a whole experienced relatively dry conditions, proxy records suggest that the southern Levant may have been comparatively wetter during this period.”

Line 111: 'The analysis was based on 40-year model runs for each period.' Which period, please mention.

In Table 1, please mention spatial resolution of each model. Please also mention for what time period the simulations are available. In Table 1 you listed 9 models, and then you mostly use only two models for your analysis, what is the justification for this?

Line 122: 'Sharav Lows', is it Sahara Lows.

Lines: 126-127: 'We compared the average Euclidean distances for the different periods to assess if the weather types
during the Last Interglacial peak changed or were similar to today's.' what do you mean here by different pereiods, please mention the periods to make it clear. What length of interglacial period you have compared with ERA5, and preindustrial.

Line 128: What preindustrial period you have chosen, please mention.
Line 140: the authors mention here the proxy data, the proxy data should be discussed in the data section before mentioning here. It is not clear which proxy is being used, and for what time period.

Fig. 2: Explain how you have appllied the bootstrap test in methods section. In sub-figure titles write the complete model name not just AWI, or EC, othewise mention these abrevations in the main text before using in the figures. In method section for clarity to the reader, please justify why you subtract interglacial period from the preindsutrial. If possible please demarkate Levant basin in Fig. 2.

Line 172: 'First, we evaluated the PMIP4 models to assess their reliability compared to proxy-based reconstructions (see Sect. 1.3).' I do not see any evaluation of PMIP4 models in Sect. 1.3.

Lines 175-177: 'AWI-ESM suggests wetter winters in the
Levant basin compared to the Pre-Industrial period, consistent with speleothem evidence from the Negev [Vaks et al. (2007)].
In contrast, EC-ESM shows wetter winters confined to the northern Levant.' This statatemt is not consistent with Fig. 2b (winter) as I see similar wetter condtions for both models (AWI, and EC).

Lines 180-182: 'Autumn
patterns also vary: AWI-ESM indicates drying in the northern Levant and increased precipitation in the south, while EC-ESM
suggests widespread precipitation increases across the northern region.' I do not find this statement consistent with Fig. 2A and 2E. Better demark Levant in the figure. It is not clear what you consider the Levant region, mention clearly in methods section.

Fig. 3: What the y-axis shows? In the main text, please, elaborate the sub-figure that comes first, not just randomly. Not clear what periods you have chosen for ERA5, preindsutrial, and interglacial, mention them also in the main text in methods section.

Line 189: 'We evaluated weather-type frequencies to explore potential drivers of precipitation differences between periods'. Which periods, not clear?

Line 190-192: 'In AWI-ESM, the frequency of
Cyprus Lows increases during winter, occurring on about 50% of winter days. At the same time, no significant changes are
observed in other weather- types during autumn or spring (Fig. 3 B).' What do you mean by changes/inrease here, is it the change in frequency, if so, then compared

to what, it is very confusing. While refering to results from the figures, please mention the sub-figure letter (e.g., Fig. 3A etc.) in the main text.

Lines: 204-206: 'Analysis of precipitation by weather type suggests a 17.3% increase in the daily average precipitation during Cyprus Low days in the AWI-ESM model compared to the Pre-Industrial period, with the most pronounced increase observed in the northern Levant, particularly over Turkey (Fig. 4A).' Isnt there also significant increase over parts of Mediterreanean sea.

Line 220:'At first glance, Figure 4 contrasts proxy-based findings,'. Which proxy based findings, it is not clear.

Lines 224-224: 'Proxy-based studies have frequently highlighted increased precipitation from southern sources rather than Mediterranean ones.' Which proxy based studies highlighted this, please cite them here.

Fig. 5 should be a table, not a figure. Further, the sub-figure numbers (e.g., 5A, 5C etc) are not marked.
In section 3.3 you are describing results with reference to the figure. please refer to the figure in the very first lines (236-239).

Lines 237-239: 'During winter and spring, the moisture balance remains largely unchanged across most of the Levant, with some localized decreases, particularly over modern Israel.' I this statement realy consistent with the Fig. 6 (DJF, MAM) when you say that colored regions show sinificant changes at 5% level, thus what I understand from this the changes, even thoug small, are still significant.

Line 280: 'Using proxy-based paleoclimate reconstructions and climate models ...' I do not see usage of proxy-based paleoclimate reconstructions in this manuscript, please clarify, how you used it.