

Interactive comment on “On the assessment of the moisture transport by the Great Plains low-level jet” by Iago Algarra et al.

Anonymous Referee #2

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The following is a review of the article titled “On the assessment of the moisture transport by the Great Plains low-level jet” by Algarra et al. The article details a short study that is limited but well-defined and effective in demonstrating the utility of the WRF 3D water vapor tracers scheme as applied to southerly Great Plains LLJs. A Lagrangian FLEXPART model is used to identify the Gulf source region and from the ERA-INT distribution of GPLLJ strength as classified according to Rife et al. (2010), five representative case events are selected for detailed WRF-TT studies. For these five cases plus a control, non-GPLLJ case, the authors quantify the ratio of GPLLJ-sourced moisture/moisture flux across the continental U.S. A few selective latitudinal vertical cross section composites included provide a window into the vertical transport of GPLLJ moisture over time and space. The article is generally well-written, although a clear

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paragraph structure is lacking in parts (i.e., several apparent floating sentences) and some misspelling occurs (e.g., northeastern for northeastern). I provide a few general and specific comments below that should be addressed before publication.

General Comments:

1) The FLEXPART analysis, to my understanding, is largely underutilized here. Is it only to justify the location of the wall line? I think the wall line location is fairly intuitive and I don't believe the authors would find much sensitivity to its location (within reasonable limits). As a minimum, I would encourage the authors to include the FLEXPART-derived moisture source regions for each case study in Supplemental Material.

2) The article focuses entirely on July GPLLJs with the logic that southerly GPLLJ frequency is highest for this month. Firstly, have the authors found this to be the case? In my own work, I have found May to be the month of highest frequency. The authors should include a figure or table of the ERA-INT-derived monthly GPLLJ climatology. Secondly, are July GPLLJs representative of the springtime LLJs that are predicted to increase in frequency and intensity (Ins 6-10, ph 3)? The authors could have designed their study to be better aligned with their motivations/stated best projections of a future GPLLJ.

Specific Comments:

Abstract: mention of ERA-INT and “southerly” GPLLJ needs to be made

Introduction: the work of Claudia Walters and Julie Winkler on GPLLJ (northerly and southerly) climatologies needs to be referenced here. There are several works from which to choose between 2001-present.

Pg2,ln12 insert “southerly”

Pg2,ln21 specify whether Higgins et al (1997b) analysis was conditioned on GPLLJ occurrence

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Pg2,ln23 unclear meaning of “compared with the diurnal one”

Pg2,ln24 unclear if “this work” refers to Higgins or Mo reference

Pg2,ln27 suggest “found regional correlation at a distance between. . .” or similar

Pg2,lns30-32- one example of a “floating sentence” that needs to be grouped with another paragraph

Pg2ln31 meaning of “local” is unclear. Define local as opposed to non-local in this context.

Pg3,ln4 suggest replacing “common” with “frequent”

Pg3,lns3-10 more floating sentences

Pg3,ln17 word “total” may be deleted

Pg3,ln19 reword “and the at the point”

Pg3,ln27 on a monthly basis, I believe the max GPLLJ frequency is in May

Pg3,ln32 the native resolution of ERA-INT is closer to 0.75deg. How was it spatially interpolated (oversampled) to 0.25deg resolution?

Pg5,ln29 delete “30”

Pg6,ln17 clarify for the reader whether these events were chosen from the NLLJ distribution at 32.75N,99W or for the regional distribution (w/l cyan outline)

Pg6,ln25 should “LLJ” be “NLLJ”?

Pg7,ln22 “northeastern”

Pg8,ln8 clarify that this is done for a specific point (32.75N,99W)

Pg8,ln16 I do not believe it is true that GPLLJ occurs on more than 16/31 nights in July. Please quantify this using ERA-INT.

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Pg8,ln20 “northeastern”

Pg8,ln21 synoptic and land preconditioning will impact ratio of GPLLJ TPW (Fig 3).

Pg8,ln26 replace “leaded” with “preceded”

Pg8,ln31 suggest “. . .North America [using WRF-TT. Additional] simulations should. . .”

Fig. 1 the cyan color is hard to distinguish in my color print. Clarify whether these “frequency distributions” are derived for the region contained in the cyan outline or for a single point (i.e., 32.75N, 99W).

Figs 2-4. Lat/lon labels required on these figures.

Fig 4. Suggest adding state boundaries

Fig5-6. The order of Fig5 and Fig6 should be switched. Would it also be informative to plot the vertical cross section of relative GPLLJ humidity? E.g., $q_{TR}:q$; $\phi_{TR}:\phi$?

Table 1. Specify ERA-INT-derived as well as the lat/lon location or domain over which the frequency distribution was composed.

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