

Interactive comment on “Characteristics and evolution of diurnal foehn events in the Dead Sea valley” by Jutta Vüllers et al.

Anonymous Referee #1

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Review of: Characteristics and evolution of diurnal foehn events in the Dead Sea valley
I found this paper very important and interesting particularly the unique observations done in the DS area and described here. I recommend to accept the paper after making a revision in light of the comments below. P116 (page 1 line 6) “the mean maximum velocities of around 5m/s”. Mean of the maximum is an exact number please give the exact value. Section 3.1 It will be helpful if you will add some sentences describing the main differences between density and radiative driven flow, and their relation to potential temperature difference between the crest and bottom. What are the problems that the automatic mixture model deal with. p.6 line 5. The distinction between foehn and radiative flow are determined mainly by the potential temperature difference between the crest, Jerusalem 810 m and Masada, -7m p619 or Ein Gedi -427m p6110. In Fig. 3

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the temperature differences are shown. Please show the potential temperature differences instead. Also it looks like a mistake the positive temperature difference between Jerusalem and Ein Gedi, p6113, Jerusalem is always cooler than Ein Gedi.

P7116-119 The west wind observed at least 2 hours earlier at 14:00. The height of the maximum west wind at 14:00 is at 1750m, and so at 16:00. p8119-26 The mixed events. At least in August 28 it is not clear to me why you call it mixed event and August 16 strong event. Comparing Fig. 5f after 20:00 and Fig. 6 after 21:00 the wind behavior is similar and so both cases can be considered as mixed events. P9110 Please note that from the ground up to 900m the stratification is unstable or neutral i.e. The strong vertical mixing from the ground to 900m discussed in, P9118-20, is mainly due to the unstable layer close to ground, and not due to mechanical mixing. P9116 It is not clear that the western wind is the return flow. I think it is the residual wind from the night. P9123-34 What was the resolution in COSMO-EU model, may be the not observed front is a consequence of the resolution. The flow field is not shown and could be very helpful in interpreting the model results since the wind field plays a major role in understanding the foehn. I recommend to add a figure of the flow field. Please also show the mixing ratio (q) instead of RH fields in Fig. 11, since q is more relevant. p10-11 Stage III. You combine observations, model results and interpretation, I suggest to note what is based on observations and what is based on model and what is interpretation. I also suggest to add a model wind cross section at 21:00. The description of the hydraulic jump you refer to looks like a sea breeze front/ gravity current head. You did not address one of the main questions: is this sea breeze front developed over the plains much earlier and propagates into the DS, or it developed in the valley. The formation of the foehn is not clear, since the authors claim that the source of the air is the Mediterranean and we would expect high q of this sea air relative to the inland air. Please explain the formation of the dry air. It is not clear if the hydraulic jump observed in the DS is formed there or maybe it is the sea breeze front formed over the plains and mountains and propagates downslope into DS. If the hydraulic jump is the sea breeze front, this might explain the elevated foehn found in some cases since under certain conditions the front leaves

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the mountain and propagates on isopycnals. P12I7-12 The mixing is mainly due to convection from the unstable layer near the ground see my comment P9I10 above.

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