

Review of the paper "Characteristics and evolution of diurnal foehn events in the Dead Sea valley", by J. Vüllers, G.J. Mayr, U. Corsmeier and C. Kottmeier.

This paper deals with the statistical and dynamical characteristics of an interesting diurnal mesoscale phenomenon (namely the foehn that sometimes is mentioned even in the non-specialist literature of the area). This paper is well written and the mesoscale analysis, including a detailed description of the different stages of the phenomenon, is rather convincing. Therefore, I consider this paper as worth of publication in Atmospheric Chemistry and Physics, but with a minor revision, taking into account my comments below.

Page 5, section 2.5: this section should be converted into an appendix (of course keeping here only the definition of symbols used below), because it contains just a summary of the reduced-gravity theory of shallow flow over obstacles (to be referenced below in paper), with no original aspects.

Page 6, from line 6 to line 10: the Jerusalem temperature is used as representative of T at the "crest". However, Jerusalem is located at about 50 km north of the cross-section of Fig. 1. Moreover, in the same sentence a "downstream station" is mentioned with no additional specification. Below, the Masada station is probably identified as such downstream station. The entire paragraph is rather involved and needs better explanation/phrasing.

Page 6, line 13: please specify the temperature differences (T crest minus T valley?).

Page 6, lines 13-15: this sentence is unclear. Most probably, "were" should be "where", but even with this correction, still the sentence needs to be improved a little.

Page 8, line 11: please refer to Fig. 1 for the radiosonde location. Moreover, "the other side" is ambiguous – it is probably the eastern side of the DS: please clarify.

Page 9, lines 20-21 (and somewhere else): here the word "inversion" refers to the profile of potential temperature Θ (fig. 8). However, normally the word inversion is used to denote temperature T increasing with height. It is not obvious if the stable layer of fig. 8 implies an increase of T with height. There is an ambiguity across the paper in the use of the word "inversion" that should be avoided unless a real "T inversion" is implied. A similar ambiguity is also in the use of "warmer" or "cooler": such words should refer only to T and not to Θ .

Page 9, line 26: Fig. 11 is introduced here, while Fig. 10 is referenced only below in sect. 3.3.3 for the first time. This should be avoided: I think that figures should be numbered in the order of citation.

Page 10, line 18: any hint for the cause of the earlier cooling in the COSMO model?

Page 12, lines 1-3: "depends on diurnal local and mesoscale processes": please try to be more specific - for instance the MSB is mentioned below (line 30) as the main cause of the westerly flow from which the foehn takes its energy. However, in sect. 3.3 a synoptic-scale pressure gradient is invoked as being important, at least for the strongest cases. I think it is not made clear enough to what extent the MSB alone is sufficient to initiate the DS foehn.

Page 12, line 18: is "the ridge cooling" due to radiation or also to cold air advection from the Mediterranean (arrival of MSB)?

Page 13, lines 5-7: however, in a warming scenario, temperature may increase also upstream and not only within the valley, so the impact on T profile is not obvious (or perhaps it is implicitly assumed that, the MSB being important, the Mediterranean sea temperature will increase more slowly than the continental temperature?).

Figures:

Fig. 1: perhaps the left panel (the map) should be enlarged.

Fig. 3: please specify in the captions where crest and valley temperatures are measured, respectively (or refer precisely to the text where this is explained).

Fig. 12 a: this is a laudable attempt to synthesize a conceptual model in a picture. However, it is difficult to appreciate the different hatchings in the green area, unless one enlarges the page on a (large) screen. Moreover, the small rectangles in the inset below (the legend) are not sufficiently clear.

Typos in the text:

p. 2, line 4: depend.

p.2, line 9: "and MAP" in place of "or MAP".

p. 5, line 15: drop comma after "hereby".