

Interactive comment on “Dynamical analysis of sea-breeze hodograph rotation in Sardinia” by N. Moisseeva and D. G. Steyn

Anonymous Referee #1

Received and published: 20 September 2014

This paper is well-written, concise, and presents novel research with respect to sea breeze dynamics in the presence of complex topography and coastline. I think the paper is worth of publication as is, but would benefit from expanded discussion and analysis regarding the modeled hodograph rotation. These changes could be either a major or minor revision depending on how rigorous the response.

Specific suggestions:

1). The discussion of why the modeled and observed hodographs change as a function of location around the island would benefit from more discussion and background in general. For example, do inland penetration speeds and intensity of the breeze vary as a function of topography or land use types and subsequent sensible heat fluxes (which

C7291

might modulate the rotation rates/types), do the breezes on either side of the island ever converge in the middle of the island, and what is the prevailing large-scale flow (if any) and how might that play into the picture? If weak large-scale flow were to be changed, would that change the rotation or have little effect?

2) Do slope flows combine with the sea breezes, and are they distinguishable from the sea breeze (I don't think they are, but these flows should be mentioned). In addition to the blocking or whatever other effects the mountains have, the mountains generate their own flows as a function of slope, vegetation type, height, etc.

3). Is the synoptic forcing really 'synoptic' when it is apparently highly influenced by the breeze return circulation itself? I think this should be mentioned even if the forcing is still discussed as synoptic.

4). What does the advection term physically represent and why does it change between locations?

5). In Fig. 4 and 5, would presenting the analysis at a couple more locations around the island provide additional insight?

6). A brief mention of latitude dependence if any was found (I doubt given how small the island is) and reference to this paper's findings (and comparison to these findings) would be valuable. P. Alpert, M. Kusuda, and N. Abe, 1984: Anticlockwise Rotation, Eccentricity and Tilt Angle of the Wind Hodograph. Part II: An Observational Study. *J. Atmos. Sci.*, 41, 3568–3583. doi: [http://dx.doi.org/10.1175/1520-0469\(1984\)041<3568:AREATA>2.0.CO;2](http://dx.doi.org/10.1175/1520-0469(1984)041<3568:AREATA>2.0.CO;2)

7). No discussion of the SB hodographs as a function of distance inland from the coast were given. That would possibly be a topic of interest. The observations might not be there, but choosing a station from WRF model inland say 10 km from coast and seeing if there was any change from the coastal location could be of interest.