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Interactive comment on "Implementation of a roughness sublayer parameterization in the Weather Research and Forecasting model (WRF version 3.7.1) and its validation for regional climate simulations" *by* Junhong Lee et al.

Anonymous Referee #2

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Summary.

This paper discusses the addition of a roughness sublayer parameterization in the Weather Research and Forecasting (WRF) model. Following a description of the underlying theory, the implementation is validated in an offline simulation and a real-case scenario over the Korean peninsula. The authors show that the roughness sublayer parameterization leads to model improvements with respect to near-surface wind speed, temperature etc. This paper is of relevance to the research community and potentially for operations, and I encourage its publication following a minor revision.

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Discussion paper

General comments.

Please check the language used in the paper (grammar and spelling; see also specific comments below).

A key argument for the introduction of the roughness sublayer parameterization in WRF is the increase in computational power and the refinement of the vertical layers in the model. However, in the presentation of the simulations, no reference is made to how many vertical levels are used in the offline or real-case simulations. I encourage the authors to add this information. I would also encourage providing a note on how much more compute time is required in WRF, compared to the original MM5 approach.

Specific comments.

line 12 vs line 26: British or American English? line 12, modelling, is British English; line 26, parameterized, is American English. Please agree on one spelling and make the paper consistent.

line 20: for better weather and climate simulations (s in simulations missing)

line 54: gradient of "wind and scalar" and their corresponding fluxes in the RSL hould that be "wind and scalar variables" ?

line 65-66: "to implement it to the SL parameterization" "to implement it in the SL parameterization" ?

line 68: "to incorporate RSL parameterization" "to incorporate the RSL parameterization"

lines 76-86: this section would benefit greatly from a schematic of the vertical layout (from surface to RSL-ISL interface)

Section 2: all variables that are used need to be introduced, for example: l_m, beta_N, f, phi_m

lines 99-100: "because theoretical consistency" "because of theoretical consistency"

line 105: "iteratively update dt and β using Eqs. (5) and (6)" "iteratively update dt and β using Eqs. (5) and (7)" ?

line 106: "z0 is iteratively achieved with an accuracy of 0.0001 using Eq. (7)" "z0 is iteratively achieved with an accuracy of 0.0001 using Eq. (8)" ?

line 113-115: please rewrite this sentence and the short sentence in line 115

section 4 - vertical layers used in the experiments?

section 6 - please check the language in particular in this section

line 200 - I would make the discussion of the summer season a new paragraph

line 205-206: check language of this sentence

line 228: "these changes in the climate near the ground surface" - is climate the correct term to use here? also, "ground surface" could be just "ground" or "surface"?

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