

This is a nice paper and it serves as a valuable complement to the newly released, freely available source code for the RoadSurf model. The different components of the model are well described. The evaluation part shows that the model is capable of computing the surface temperature well. However, the central theme of the paper is not the model's forecasting capabilities for road surface temperature. Rather it is, like Crevier & Delage (2001), a description of a sophisticated road weather model. As such, the paper should focus its discussion on the model and how it differs from other similar models.

Below, you'll find a few comments and requests for clarification:

The paper would benefit from having a Discussion section.

Abstract: "well suited for forecasting road surface temperature."

The model has a sophisticated storage module that takes asphalt porosity as well as ice, black ice and snow into account. This, among other things, sets it apart from the METRo model. If well implemented, the RoadSurf model should also be well-suited for calculating road conditions, potentially more accurately than METRo. This could be interesting to address in a Discussion section.

Page 4 row 17: "The upward radiation". Explain how the upward radiation from the surroundings affects the road surface.

Page 10 row 23: Explain which items in table 1 refer to which storage term/wear factor x . Is ice₂=black ice? How is deposit different from black ice?

Page 11 row 8: What is the disadvantage of allowing water to freeze immediately without affecting the temperature?

Page 12 row 33-34: If the air is dry, can the dew point reach -50 in the north of Finland? "lower than -50 °C were removed from the air temperature, surface temperature and dew point temperature"

Page 12 row 46: Why not simply remove those forecasts? They would be of poorer quality than when the system is functioning as expected.

Page 16 row 1: "there was". Otherwise one might misinterpret it as though there is always a decreasing temperature trend in October and January (why not November and December?) in Finland, but the data only supports this for the specific winter season. "there is a general decreasing trend in temperature during those months."

Page 16 row 8-9: This seems counterintuitive. Please explain why! "The 00, 06 and 18 UTC forecast seem to have smaller RMSE values when the actual forecast time is around 12 UTC"

And some minor spelling/grammar errors:

Page 2 row 33: Two is misspelled as "Tow".

Page 3 row 13: "long waver radiation" should be long wave radiation.

Page 3 row 14-15: the forecast point "receive" direct solar radiation. (Karsisto and Horttanainen, 2023)". " should be receives and no period "." after radiation.

Page 4 row 13: This sentence should be rephrased: "The sun position calculation is based on book by Jean Meeus Meeus (1991)."

Page 4 row 27: "Both asphalt albedo snow albedo". Should include an "and".

Page 4 row 29: Albedo is misspelled as "alpedo".

Page 4 row 30: Albedo and calculated are misspelled as " alpedo is calucalted".

Page 5 row 16: The formatting of the citation "calculated with equation Campbell (1985):" should be like on row 23 "(Campbell, 1985)".

Page 7 row 10: Formatting of citation "equation Patankar (1980):"

Page 7 row 15: Formatting of citation "equation Campbell (1985):"

Page 7 row 26: "calculated as as a weighted", two "as".

Page 8 row 22: "divided to 16 " should be "divided into 16 ".

Page 10 row 30: Add "each"(time step) to the sentence "The amount of evaporated or condensed water in time step is calculated with equation:"

Page 11 row 7: Consider using "the entire" instead of "whole".

Page 11 row 9: Consider using "The entire" instead of "Whole".

Page 11 row 16: Add "the (temperature)" to "After calculating the available energy, temperature".

Page 11 row 23: "left over" is one word "leftover".

Page 11 row 24: Add "The (temperature)" to "Temperature for the uppermost layer".

Page 11 row 34: Rephrase this sentence " If water to snow ratio is higher than 0.1 and surface temperature goes below freezing limit, both water storage and snow storage and transferred to ice storage."

Page 12 row 23: Why 2? "stations in Finland 2."

Page 14 row 3-4: Should be "above (zero degrees)" in "the simulated temperature rises below zero degrees".

Page 14 row 9: Bias is in figure 5 and RMSE in 4, but Bias is mentioned first in the text. "Bias (forecast-observation) and root mean square error (RMSE)"

Page 14 row 10: Add "to" in "reffered to as"

Page 14 row 13: Should be forecasts in "always forecast the".

Page 15 row 3: "Each panel shows results" instead of "Each panel show results".

Page 16 row 8: "forecasts (seem)" in "The 00, 06 and 18 UTC forecast seem".

Page 21 Table A5: "one (time step)" "Evaporated/condensed water in time step"

Page 21 Table A5: "one (time step)" "Melted amount of snow in time step"

Page 22 Table A6: "(Deep) ground" "Deep round climatological temperature average"