AUTHORS REPLY

Manuscript Title: Development of an operational modeling system for urban heat islands: an application to Athens, Greece (doi: 10.5194/nhessd-1-4963-2013).

Referee: Dimiter Syrakov, National Institute of Meteorology and Hydrology, Sofia 1784, dimiter.syrakov@meteo.bg

GENERAL REPLY

The authors would like to thank Dr. Dimiter Syrakov for providing insightful comments on the manuscript, allowing us to improve its scientific and presentation quality.

Following, we provide a point-by-point response to the submitted comments.

RESPONSES TO REFEREE'S COMMENTS

1. **Referee**: P4969, L8-16. The paragraph describes the procedure of incorporating CORINE LU data in WRF. First, this data is remapped to the IGBP 30'' database and this data is remapped to the model grid. Isn't it more natural to correct already mapped IGBP data to the model grid?

   Response to the referee: *We agree with the referee that CORINE land use data could have been incorporated directly to the model grid instead of being first remapped to the IGBP land use grid. However, we have selected to adopt the second approach in the study since it can be considered to be more robust than the suggested one. By remapping the CORINE land use data onto the IGBP land use grid and, thereafter, onto the model grid, there is no need to re-conduct the procedure should changes are made in the modeling domain. Conversely, by incorporating the CORINE land use data directly in the model grid, it would be necessary to repeat the process in case the topology of the grid would change (e.g. modification of the horizontal resolution). Therefore, we believe that the adopted approach for exploiting the high-resolution land use data is robust and versatile.*

2. **Referee:** Section 3.2. Describes the use of the ANN approach for downscaling WRF output. Maybe different ANN models would be constructed for Urban and Rural conditions. In this line, the space averaging used in presenting the comparison of ANN model output with the measured data probably masks the U-R diversions. It is confirmed by Fig. 7 (average diurnal variations of temperatures) – in rural conditions the measured and calculated temperatures almost coincide.

   Response to the referee: *We agree with the referee that urban-rural differences may be masked due to the spatial averaging of results. However, differences can be still observed and are reported in the manuscript. Further, the spatial averaging has been carried out considering stations of similar urbanization levels, as shown in Figs. 5b and 7, and Tables 4 and 5. As such, we believe that the differentiation in air temperature, as well as in thermal comfort, among the different stations is adequately addressed.*
   As regards the implemented downscaling approach, the neural networks have not been trained separately on urban and rural areas to allow for a great diversity in the

training/testing datasets. Ultimately, this enables a better training/testing process. Considering the remarkable performance of the modeling system in rural areas (Fig. 7d), it could be deduced that it results from both the neural network efficiency and the performance of WRF prior to downscaling over the considered land use type.

3. **Referee:** Section 5.1. It is interesting to compare not only temperatures themselves but also the U-R temperature differences.

   Response to the referee: *We agree with the referee that it would be interesting to also examine the urban-rural temperature difference. However, we believe that the presented analysis is sufficient for allowing the evaluation of the modeling system's performance. Nevertheless, the proposed analysis could be conducted in the context of a future study, extending the results of the current one.*

4. **Referee:** Technical corrections.

   Response to the referee: *The proposed technical corrections will be incorporated into the final version of the manuscript.*