Interactive comment on "Optimal Site Selection for Sittinga Solar Park using Multi-Criteria Decision Analysis and Geographical Information Systems (GIS)" *by* Andreas Georgiou and Dimitrios Skarlatos

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We would like to extend our sincerest gratitude to the reviewer for the very useful comments and suggestions. The review was very motivating and inspiring. We will respond to the comments and questions below in the order that they were presented.

[COMMENT #1]: Paper is structured somehow awkward. Authors should re-organize specific parts of the paper e.g. methodology and results in more compact format for improving paper's clearness. For example, 2.2. paragraph can be merged in the methodology part as a preprocessing step, 2.3. paragraph is natural continuation from 2.2

and no further numbering is required since the derived index images are inputs for the muti-criteria analysis. Also, paragraph 2.4 is the mail methodology part and should be named like this. A clear methodology title is required where also 3.1 paragraph should be included.

[RESPONSE]: The structure of the paper rearranged like: 1 Introduction; 2 Material and Methods; 2.1 The AHP Method; 2.2 Simple Additive Weighting (SAW) method; 3 Case Study; 3.1 Study Site; 3.2 Preparation of the geo-database; 3.3 Landsat-8 OLI/TIRS data pre-processing; 3.4 Classification of main area categories; 3.5 Establishment of Constraints factors; 3.6 Establishment of Evaluation criteria and normalization; 3.7 Rationale for weights in AHP; 4 Results; 4.1 Suitable areas suggestions 4.2 Sensitivity Analysis; 5 Discussion; 6 Conclusions.

[Comment #2]: Please explain the Figures 2-7 in the text and especially the Figure 7. Results should be explained in detail.

[RESPONSE]: Figures 2 to 7 and the results are briefly explained through the text. We have made some changes in the order of the Figures to address the change in the structure of the paper. In addition, some changes were made in Figures 5 & 6 in order to present better the results and an additional Figure 7 created to present the classified results of the sensitivity analysis (Figure 4 removed as mention in Comment 5 of the MINOR COMMENTS section).

[Comment #3]: Discussion part is totally missing. Please add a short paragraph explain your results in comparison with other relevant studies.

[RESPONSE]: A new paragraph named "Discussion" added after "Results" section, where the results in comparison with other relevant studies are detailed explained.

[Comment #4]: Authors should explain their choice on Landsat-8 product. Why they didn't use Sentinel-2/Spot/Aster etc images?

[RESPONSE]: In section 3.2 named "Preparation of the geo-database" the following

sentence has been added to explain our choice: "...Landsat-8 OLI/TIRS image has been chosen, as the spatial resolution provided is suitable for the analysis and it is the same as DEM".

MINOR COMMENTS

[Comment #1]: Please add more info on the basic layers i.e. lines 105-110. For example which is the DEM spatial resolution?

[RESPONSE]: A more detailed description of the basic layers provided in section 3.2 "Preparation of the geo-database": "…The land use, built up areas and surface waters were produced from the analysis of a Landsat-8 OLI/TIRS image as further illustrated. Landsat-8 OLI/TIRS image has been chosen, as the spatial resolution provided is suitable for the analysis and it is the same as DEM. The image was acquired on September 26, 2015 and contains 11 bands. Vector data such as archaeological sites, road network, rivers and airport were digitized by 1:50.000 maps of Cyprus while NATURA 2000 areas and electricity grid were produced by Ministry of Agriculture Natural Resources & Environment and Electricity Authority of Cyprus (EAC) respectively. Finally, the DEM with spatial resolution of 30m was produced by the Cyprus Geological Survey Institute using three parameters. The main parameter for DEM construction were the contours derived from 1:50.000 maps of Cyprus; to this was then added several topographical points derived from aerial photography and photogrammetry; and finally, rivers were used for parameter identification and geographic correction".

[Comment #2]: Line 174: please explain the "random sampling method" selection.

[RESPONSE]: We explained briefly through the text how we use the "random sampling method": "…A GeoEye Ikonos with finer spatial resolution provided as base map in ArcGISTM was used as reference dataset from which the extraction results were compared. A random sampling method was used to visually check the classification results against the higher resolution satellite image".

[Comment #3]: Lines 243-245: Please omit or rephrase. If the method is correct no fine tuning should be required.

[RESPONSE]: We rephrase this paragraph in order to be more understanding and we added: ".... It should be noted here, that if the suggested method is to be used for investment analysis, then each of these cost functions can be further adjusted and updated to reflect local and contemporary financial practice. Further analysis of the cost functions will not be further analyzed here, as this is not the scope of the paper".

[Comment #4]: Reference in line 383. Please omit of add a proper reference i.e. product specifications of Landsat-8.

[RESPONSE]: We added a new reference: "Zanter K.: LANDSAT 8 (L8) Data users handbook, USGS, 17 – 65, 2016".

[Comment #5]: Figure 4. Please omit or change it. No info can be derived from it.

[RESPONSE]: We totally removed Figure 4.

Constraint Map

(a)

Constraints
Available

Evaluation Map

(b)

TIMES →

Suitability Map

(c)

Suitability Index

90

30

(d)
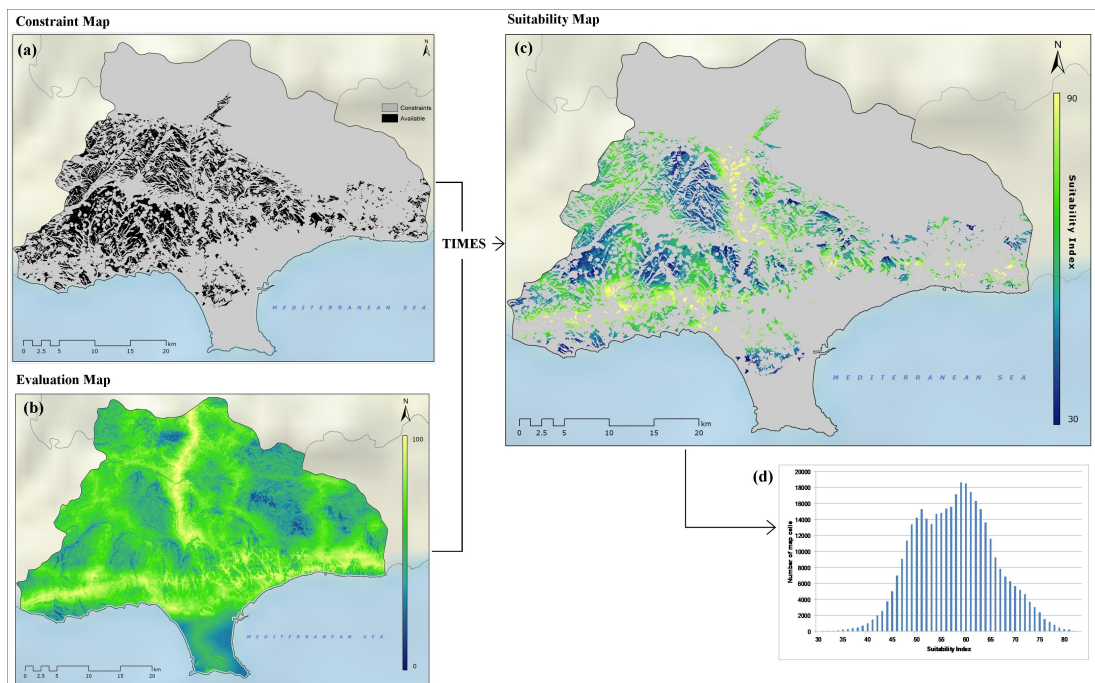
Fig. 1. (a) Constraint map; (b) Evaluation map; (c) Final SI map of study area as extracted from the multiplication of the Constraint map with the Evaluation map; (d) Distribution of SI pixels over final map
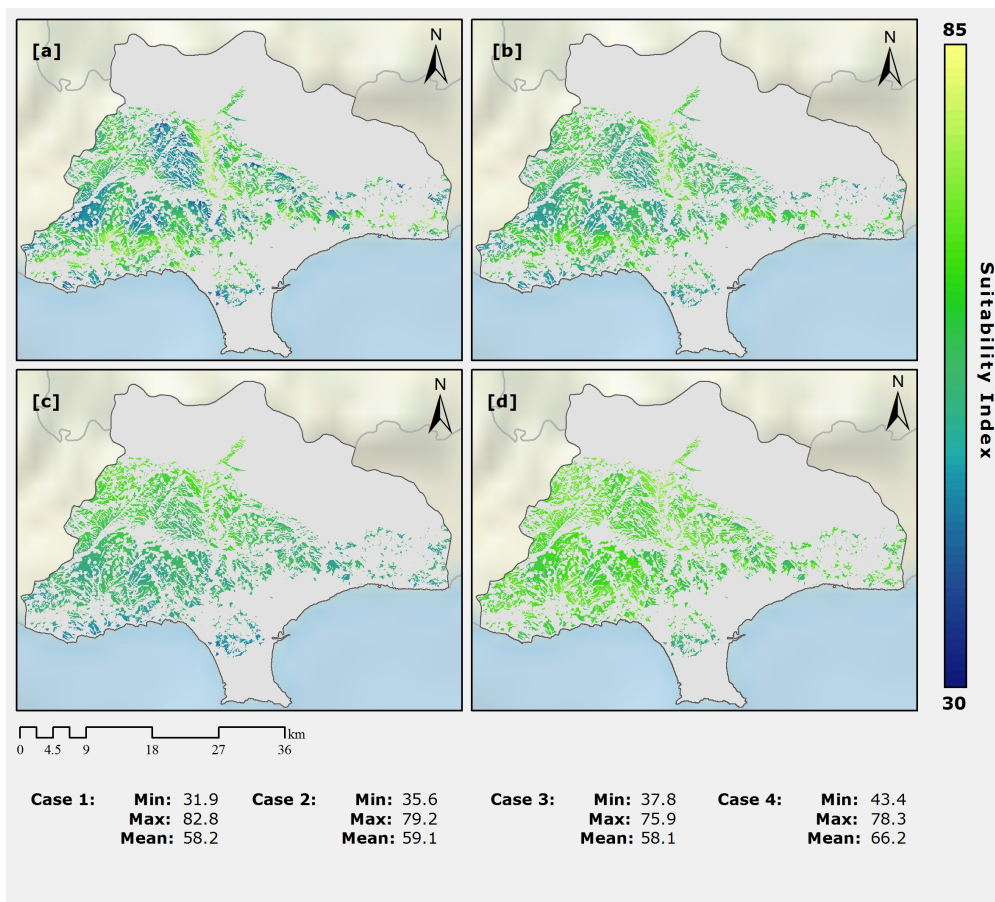
Fig. 2. Sensitivity analysis results and comparison among different scenarios, which are not differentiating results (a) Case 1; (b) Case 2; (c) Case 3; (d) Case 4

Case 1: Min: 31.9 Case 2: Min: 35.6 Case 3: Min: 37.8 Case 4: Min: 43.4
Max: 82.8 Max: 79.2 Max: 75.9 Max: 78.3
Mean: 58.2 Mean: 59.1 Mean: 58.1 Mean: 66.2

[a] N

[b] N

[c] N

[d] N

0 5 10 20 30 km

Suitability Index (SI)

SI: < 30 SI: 30 - 45 SI: 45 - 60 SI: 60 - 75 SI: > 75
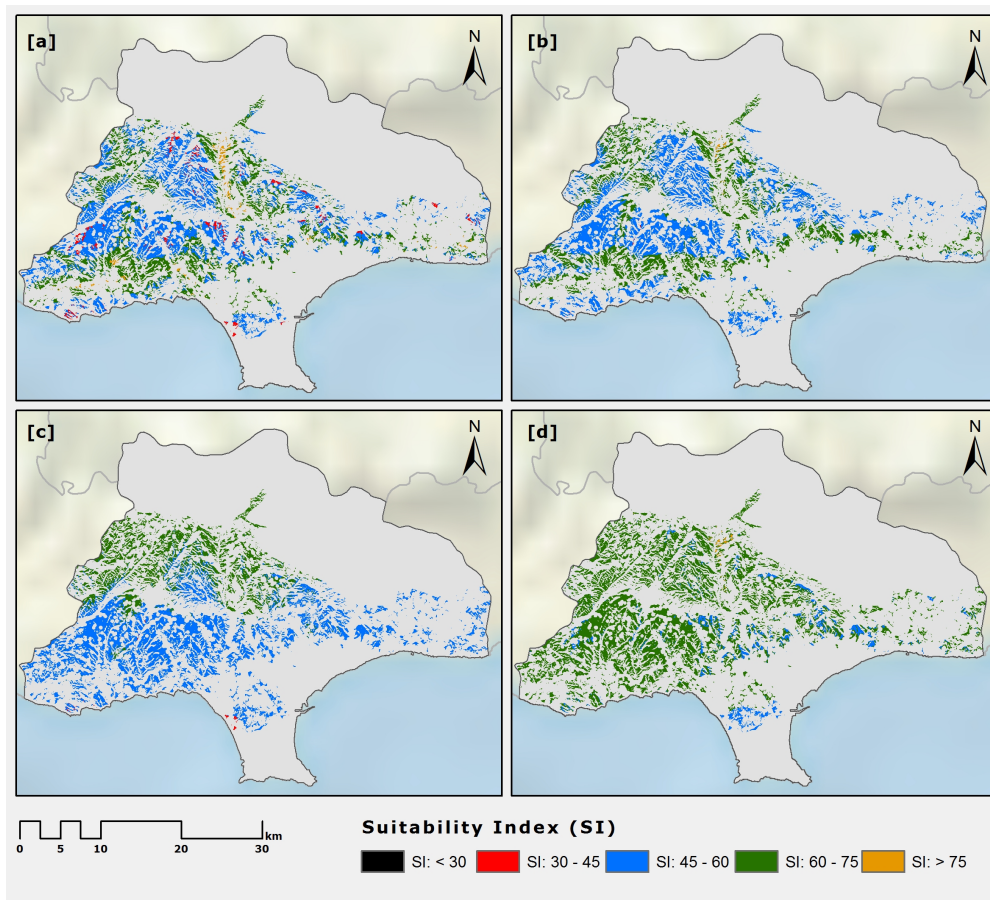
Fig. 3. Classified results of sensitivity analysis and comparison among different scenarios (a) Case 1; (b) Case 2; (c) Case 3; (d) Case 4

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