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Interactive comment on "Two decades of distributed global radiation time series across a mountainous semiarid area (Sierra Nevada, Spain)" *by* Cristina Aguilar et al.

Anonymous Referee #2

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General comments: The manuscript describes a high spatial resolution global radiation dataset over the Sierra Nevada region in Spain, based on a solar radiation model. Such high-resolution datasets are rare; this is the novelty of the data. My concerns are:

- The applicability of a monthly and annual resolution, though because of missing data in the station data series it is understandable.

- There are many solar radiation models out there. It is not clearly stated why this model is chosen, whether there are better, up-to-date models. I would suggest at least a comparison to other models' skill.

- Why is the daily missing data need to be generated? Since the global radiation has

high variability in mountainous regions, especially in low valleys with fog occurrence, incorporating data based on another station can distort calculations.

- An English language revision is required.

Other specific comments/questions:

- General remark: please refrain from using sentences that are 4-5 lines long, break them up into separate ones.

- L12-16: Too long for one sentence.

- L18, L259,L269: dispersion => use instead scatter or spread, to not cause confusion

- L20: "at the wet season," => in the wet season

- L29-30: Rephrase the second part of the sentence, it is not understandable.

- L30-34: too long sentence

- L73: actor => members

- L80-82 (and L330): Monthly solar radiation data is only suitable for eyeballing surface energy budget components, and most definitely won't help with runoff in a mountainous area.

- L93: end of sentence dot is missing

- L94-94: please, rephrase the sentence with a different word structure.

- L95-97: I don't understand the sentence.

- Figure 1.: Please, note in the caption that numbers on the figure at the station IDs.

- L109-110: Which specific DEM model is used?

- L113-114: change the sentence, from:" the longest available point information of in situ daily global radiation (Rgo) measured in 16 weather stations over the area", to "the

longest in-situ daily global radiation (Rgo) of 16 weather stations over the area"

- L114-115: There are only 4 low altitude stations in the first 5 years of the data set. How reliable the global radiation estimation is in this case?

- L141: What is the exact "expectancy envelope" in this case?

- L162: How is the cell defined? The 30x30 m grid point, or is it a larger one?

- L180-181: Please, check the definition of the RMSE.

- L189-190: The original model differentiates the diffuse radiation estimates at CI<0.1, 0.1 <=CI <0.71, and CI>0.71. Is using these intervals affect or change the interpretation of the results?

- L189: "atmospheric states" => an atmospheric state is stable, unstable or neutral, => "based on the cloudiness three types of weather conditions were analysed: . . ."

- L193-194: What periods the satellite measurements cover? It would be informative to give the horizontal resolution of the satellite images.

- L202-203: A high correlation coefficient is expected since the global radiation has a clear intra-annual course. Instead of a simple linear correlation for the whole dataset, the annual course should be removed and then calculate the correlation.

- Figure 3, Figure 4: Beside the station IDs, the altitude of the stations could also be shown, so one doesn't have to scroll back-and-forth to analyse the figure on their own. Or the figures/columns could be ordered by altitude, so it would be more informative as there is no seemingly order in the current figures/columns.

- L225-228: Station 853 has lower RMSE than 802 or 860, though it is situated far away from the other stations, so the "leave one out method" for validation would affect it the most. (comparing 858 and 860, which are both high altitude station, the verification scores are still worse for 860 which is surrounded by 3 other stations) How is the statement in these lines are then supported?

- L231, L233,L292,L299 (I'm sure I left some out): "appreciated" is not the correct word to be used here, perhaps use "shown" instead.

- L230-235: too long sentence

- L231-232: a stable minimum value is attributed to the occasional cloudy days, it is expected to have low variations.

- L245: I get what you mean by curved evolution, but it should be rephrased as it means something different

- L245: Why is there a difference between the curves from January to July, and from August to December? (it only looks linear because of the temporal resolution, but the second semester's global radiation are lower than the first. Is it because of precipitation?)

- L258: "allow to draw the same conclusions as those" Was it assumed to be otherwise?

- L262: Which months constitute the "wet season"?

- Figure 6: The color scale is not fortunate in terms of values. Using the same scale for winter and summer months is not a good idea as low radiation values disappear from the map. Perhaps use two scales, one for the winter semester and one for the summer semester.

- Figure 8: What is the grey area mean? What do the different grayscale colours mean? The timeseries is too long for a good figure. Variations in the data can barely be observed. It would be better to split the figure into two periods.

- Figure 11: Do the grayscale colours correspond to the percentiles? If so, please note it in the caption.

- L319-327: The paragraph refers in general long term solar radiation data, but one should be careful with it, and highlight the ones that are representative to this particular dataset.

- L320-321: To analyse the Sun's activity on a barely 17 year-long dataset is a far reach.

- L326: The region covered by the dataset is roughly 50 km by 100 km, it is definitely not a large scale when it comes to atmospheric processes. It might affect large-scale processes such as extratropical cyclones (change in direction or intensity) but only due to its orographic properties and due to radiation properties.

- L576,L577: distributed => interpolated?

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