

## General comments

The paper presents the modelling system for a short-wave solar radiation component that can be used seamlessly with modelling solutions available in JGrass-NewAGE for the estimation of various environmental parameters. It includes a description of the mathematical background of the solar radiation component under clear-sky and real-sky conditions. The applicability is demonstrated in 3 study areas, watersheds, with different climatological and topographical conditions. The paper is well structured, however, it contains several formulations that need to be clarified or corrected.

## Specific comments

**p. 4356** – Abstract: “The first component, NewAGE-SwRB, accounts for slope, aspect, shadow and the topographical information of the sites, and use suitable parametrisation for obtaining the cloudless irradiance.”

- it not clear what kind of topographical information in addition to slope, aspect and shadow has been used in this study

**p. 4358** “and seamlessly integrates ion the Spatial Toolbox of the uDig GIS,”

- probably typo

**p. 4359** “Therefore in the following is assumed that the solar constant,  $I_{sc}$  has been spatially corrected to account for the geometry and the position of the landscape underneath, to give a “corrected” solar constant,  $I_{sc}$ .”

- please explain what you mean by “corrected” solar constant based on geometry and position of the landscape underneath. Include any reference if available.

**p. 4360** “–  $s$  is the shadows index that accounts for the sun or shadow of the point under 20 analysis, and is modelled according to Corripio (2003):“

- please be specific how shadows are calculated without information on the surrounding terrain geometry. Isn't this a reason for poorer results in the Piave river basin study area?

**p. 4364** “eq. (22) and (23) equation which also define  $k_d$ , the ratio between the diffuse shortwave irradiance and the shortwave total irradiance.”

- please correct the sentence and be specific how this equation defines the  $k_d$  coefficient

**p. 4365** “ To be extended to any spatial point, they need to be extrapolated to all the points of interest (where 15 incoming shortwave solar radiation is not measured). “

- please replace all occurrences of “extrapolation” with “interpolation”. The method and context says it is interpolation (as you have also mentioned on p. 4374)

**p. 4374**

“The outputs provided by the model composition shown are independent of both the 10 simulation time step and of the spatial resolution the user want to use. This mean that they can be integrated in both semi-distributed hydrological model and for fully distributed hydrological model (once these models follow the conditions required by OMS3).“

- please explain how your system can be integrated with a fully distributed hydrological model when it calculates values for specific points (as demonstrated in case studies). Do you use any grid-based calculations?

**p. 4382, Table 2-4**  
Aspect ()

- please explain why you have included in the tables Aspect values of the meteo stations. Solar radiation is usually measured for horizontal surfaces. If your sites have aspects then they have also slope values (if you need them to calculate solar radiation for tilted surfaces).