

## ***Interactive comment on “Spectral solar irradiance and its entropic effect on Earth’s climate” by W. Wu et al.***

**Anonymous Referee #1**

Received and published: 1 February 2011

General comment: Wu et al.’s paper addresses an interesting question related to the incoming radiation entropy flux. New data extracted from satellite data for both energy and entropy radiative variables are shown and a discussion on the dependence of spectral radiation entropy flux on the distance travelled is included. This is a topic of interest among many scientists since several authors have investigated the implications of the radiation entropy on the global climate system both theoretically and experimentally. The structure of the paper is clear and concise. Results are clearly shown and discussed. So I recommend it for publication. However, I have some specific comments that I should be glad if the authors could response it.

Specific comments: As far as I know, equation (10) is an original contribution of the authors and its validity should be checked. My point of view is that the spectral en-

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tropy radiance  $L_{\nu}$  comes from the spectral energy radiance  $I_{\nu}$  by integrating the equation  $dL_{\nu} = dI_{\nu} / T^*_{\nu}$  where  $T^*_{\nu}$  is the brightness temperature. Does Eq. (10) predict a brightness temperature dependent on the distance travelled by radiation? Does Eq. (10) have implications with the classical radiative entropy transfer equation of Wildt (Radiative Transfer and Thermodynamics, Astrophysical Journal, 123, 107-106, 1956; and subsequent works of Wildt published in the same journal (140, p. 1343, 1964), (143, p. 363, 1966), (146, p. 418, 1966), (174, p. 69, 1972). On the other hand, what is the value of applying Eq. (4) to Eq. (10) at 1AU? Is it similar to that derived from satellite data?

Technical corrections and typing errors: 1.The value of  $1.09 \text{ W m}^{-2} \text{ K}^{-1}$  for scenario I in page 58 differs from that found in page 53 ( $= 1.08 \text{ W m}^{-2} \text{ K}^{-1}$ ). 2.I suggest to include a short sentence at the end of line 5 in page 54 stating how the global averaged Earth’s incident value has been obtained (i.e., divided by 4) 3.For a better reading, I suggest to substitute the superscript 1-AU by 1AU 4.In page 56, it would be interesting to explain the reason of taking such a dimensionless 5.Typo in page 48: “Cahalan” instead of Cahanlan

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Interactive comment on Earth Syst. Dynam. Discuss., 2, 45, 2011.

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