VARIATIONS OF THE ASHEN LIGHT OF MOON AND THE EARTH'S ALBEDO

(Letter to the Editor)

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(Received 13 June, 1985)

First we regret that we have to correct two errors in our recent paper (Hilbrecht and Küveler, 1985) published in this journal. The correlation coefficient between ΔS and R_i amounts to 0,54 (not -0.29). The correlation between the brightness of the Ashen Light and R_i indeed is negative as discussed in the paper, but a higher brightness is associated with a smaller ΔS so that the correlation coefficient becomes negative. Secondly, the errors given in Table III are too large by a factor of 2. The error bars in Figure 3 are correct.

In his letter regarding our paper (Hilbrecht and Küveler, 1985) Hunt (1985) claims that our methods are not sufficiently accurate to contribute to the question of climate variations in dependence on solar activity. Referring to his arguments we have the following comments:

1. One cannot compare our ΔS values with the historical estimates summarized by Hunt *et al.* (1985). Our data represent monthly means of up to 120 observations performed by different observers. Phase effects have much smaller influences.

2. The significance of our data is indicated by the good agreement with the satellite-based data of Baumgartner (1976) concerning the seasonal variation which clearly can be found from our Figure 3 in spite of the great differences in the numbers of monthly observations (Figure 1 of our paper). The standard deviations given in Figure 3 are not mainly due to observational errors but to some effects influencing the brightness estimation of the Ashen Light (see Introduction of our paper). This effects vanishes if one calculates monthly means but produces large error bars. The correlations (ΔS, R_i) would be much better if the seasonal variations from the ΔS values were removed. To do this in a correct way a larger observation period would be required. The correlation coefficient between ΔS and the current month number (0, . . . , 18) amounts to -0.68. r (R_i, current month number) amounts to -0.74. Hence, without doubt, the brightness increase of the Ashen Light within the reference period is as significant as the decrease of the sunspot number R_i.

Earth, Moon, and Planets **33** (1985), 229–230. 0167–9295/85.15

3. It is known that the solar activity (SA) has no remarkable influence on the solar constant (S) because the influx of high energy radiation is negligible for the total radiation. In contrast it is unclear whether the albedo A is a function of SA. The high radiation flux changes by several orders of magnitude. Lockwood and Thompson (1979) showed that $A = A(SA)$ is true for Neptune and Titan. We also remember the 'Comet Kohoutek disaster'. In the case of comets the dissociation of molecules by UV-radiation is responsible for $A = A(SA)$. In case of our planet we know that the solar activity influences the weather, which is indicated by annual circles in trees, coral reefs and rainfall. Williams (1981) demonstrated the influence of the solar cycle on 680 million years old sediments which were deposited by melting waters of a glacier. We do not know much about the mechanisms being responsible for these relations. Some famous strong correlations with the solar activity persisted for only one or two cycles (e.g., the water level of Lake Victoria) and later on dissappeared completely.

We adhere to the main result presented in our paper: 'within the referenced period the brightness of the ashen light tends to increase, whereas the solar magnetic activity decreases'. More extended observations are required to prove whether this relation lasts for one or more solar cycles and, if it does, which physical meaning it has.

References

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