

Interactive comment on “27-day variation in cloud amount and relationship to the solar cycle” by Y. Takahashi et al.

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Dear Dr. Tinsley,

Authors are very grateful to your encouraging words and suggestions making the revision much better one.

The analysis in this paper is important in that it identifies the phenomenon of a 24-30 day periodicity in outgoing longwave radiation (OLR) that was stronger in years that were mostly solar maximum years, and weaker in mostly solar minimum years. This suggests that the 27-day periodicity in solar UV, which is stronger in solar maximum years, is involved. The UV is mostly absorbed in the upper stratosphere, but there is a possibility that effects could be dynamically or chemically or radiatively coupled to

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affect cloud cover at lower altitudes. However, there are other interpretations of the periodicity. The peak near 27 days could be a statistical fluke, although that seems unlikely. Alternatively, the peak near 27 days could be significant, but the relationship to the solar cycle a statistical fluke. This leaves open the possibility that the effect is related to the Madden-Julian oscillation (MJO). As suggested by Deneke, an analysis of the phase variation of the OLR oscillations to F10.7 variations, and to the MJO variations, would clarify this. At the same time, analysis of the OLR phase relation to that of lunar ocean tides (which in shallow oceans produce a 29-day cycle in vertical mixing and in sea-surface temperature) should also be made. Also, effects of sampling due to satellite orbital changes, as mentioned by Deneke, should be evaluated. The Takahashi et al. paper has opened for discussion some interesting results, which, with further analysis, may lead to important new insights in meteorology.

Answer: Of course we cannot rule out the possibility of statistical fluke. But it seems too much to be a coincidence and “this rule” still stands up for very recent years, meaning no peak around 27-day in the latest solar minimum years. As we answered in the letter to Dr. Deneke, the phase relationship between OLR and F10.7 is somewhat tricky and needs more careful analysis not only on them but also on other meteorological parameters near or in the warm pool region. In regards to lunar tide, we have not found any clear phase relationship so far. But we have to keep in mind this possibility in future analysis. Also we have to be careful about aliasing effect caused by sampling interval. Thanks again for your considerate reviewing.

Yukihiro Takahashi

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