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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A daytime climatological distribution of high opaque ice cloud classes over the Indian summer monsoon region observed from 25-year AVHRR data" *by* A. Devasthale and H. Grassl

Anonymous Referee #2

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This paper is a useful and detailed documentation of exactly when and where deep convective clouds appear associated with the Asian monsoon. There are interesting indications of the strongest convection being anchored to small-scale topographic features. The authors have been quite careful in attending to the various problems with AVHRR, which I don't think significant affect any of their results.

Overshooting is seen to roughly follow the same pattern as the colder cloud category, but with more localisation. One caution in interpreting these results is that the tropopause temperature varies with location and height, whereas a constant T thresh-

old (200 K) is used to identify "overshoots" so more of these will be detected when the tropopause is colder.

If there is a chance to revise this paper, it is full of grammatical and spelling errors which should be fixed.

I have one quibble about the monsoon hypotheses offered: they are not very insightful. Clearly the monsoon is driven by solar heating, the question is how. A "sea breeze" analogy is not very useful since the monsoon is an approximately geostrophically balanced and deep phenomenon while sea breezes are high-period, shallow, mesoscale oscillations. What sea breezes and monsoons have in common is only that they are both thermally direct, solar-driven flows, so this "hypothesis" doesn't say anything we don't already know. The "moving ITCZ" hypothesis is not a physical hypotheses at all but a mere relabelling of the phenomenon by another name. I do not actually think that the cloud fields here can tell us anything about what causes monsoons. However, they are a treasure of information for theories of deep convection, which (given the monsoon characteristics) should be able to explain when and where the clouds occur.

I do not understand why Fig. 14 is included. It is nearly identical to the one that is corrected for orbital drift (Fig. 15), except for modest differences in EOFs2-3 of Class I. Why is the contaminated one of interest?

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 23, 2009.