

Reply

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It is interesting to learn from Moyer's letter that the concept of an 'exclusion region for water and ice particles near the stratopause was discussed in the Russian literature by Khvostikov over a decade ago. On checking the paper of Ludlam to which I referred in my remarks [McDonald, 1964] on the exclusion region, I note that Khvostikov's 1952 paper is cited; conceivably Ludlam's brief comment on the exclusion phenomenon may have been based on Khvostikov's discussions.

Still another brief discussion of the exclusion effect has been called to my attention as a result of publication of the analyses by Schilling and myself. Arnold Court (private communication) points out that he had started a paper similar to Schilling's several years ago but put it aside when he found that the basic point was mentioned by Petterssen [1958] on p. 17 of his introductory text. Petterssen, speaking of the ozonospheric warm layer, states: 'As we ascend into the warm layer, the saturation vapor pres-

sure becomes higher than the total pressure. The air must be extremely dry, and no condensation can possibly take place.'

Evidently a number of persons have independently recognized the existence of the exclusion phenomenon. Apparently, as Moyer suggests, it was Khvostikov who first discussed the point in the literature. The principle certainly deserves to be better known, particularly now that strong interest is developing in the meteorology of other planetary atmospheres for which the basic principle may turn out to have fundamental importance.

REFERENCES

- McDonald, J. E., Atmospheric exclusion limits for clouds of water and other substances, *J. Geophys. Res.*, 69(17), 3669-3672, 1964.
Petterssen, S., *Introduction to Meteorology*, 2nd edition, McGraw-Hill Book Company, New York, 1958.

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Author's Reply

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I regret that I was unaware of Khvostikov's paper and thank Moyer for his kind comments in bringing Khvostikov's work to well-deserved attention. Let me add that, in this twentieth century, I do not consider the field of elementary thermodynamics still open for arguments as to originality or priority of anybody's exclusive

idea. Rather, I believe that McDonald's and my papers served to illustrate by quantitative examples the importance of simplifying seemingly complex problems in atmospheric physics through consideration of some very basic physics.

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