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Temperature-Profile/Lapse-Rate Feedback: A Misunderstood Feedback of the Climate System

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ABSTRACT

This study shows that the heretofore assumed condition for no temperature-profile (TP)/lapse-rate feedback, for all altitudes z , or , in fact yields a negative feedback. The correct condition for no TP feedback is for all z , where T_s is the surface temperature. This condition translates into a uniform increase (decrease) in lapse rate with altitude for an increase (decrease) in T_s . The temperature changes caused by a change in solar irradiance and/or planetary albedo satisfy the condition for no TP feedback. The temperature changes caused by a change in greenhouse gas concentration do not satisfy the condition for no TP feedback and, instead, yield a positive feedback.

KEYWORDS

Climate Feedback; Feedback Analysis; Lapse-Rate Feedback

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References

- [1] R. D. Cess, " Global Climate Change: An Investigation of Atmospheric Feedback Mechanisms," *Tellus*, Vol. 27, No. 3, 1975, pp. 193-198. doi:10.1111/j.2153-3490.1975.tb01672.x
- [2] A. Arking, " The Radiative Effects of Clouds and Their Impact on Climate," *Bulletin of the American Meteorological Society*, Vol. 72, No. 6, 1991, pp. 795-813. doi:10.1175/1520-0477(1991)072<0795:TREOCA>2.0.CO;2
- [3] C. B. Entwistle, " Analysis of the Nature of Zero Feedback in the Climate System Using a Multilayer Radiative-Convective Model," M.S. Thesis, University of Illinois at Urbana-Champaign, Urbana and Champaign, 1992, p. 201.
- [4] M. E. Schlesinger, " Feedback Analysis of Results from Energy Balance and Radiative-Convective Models," In: M. C. MacCracken and F. M. Luther, Eds., *The Potential Climatic Effects of Increasing Carbon Dioxide*, U. S. Department of Energy, 1985, pp. 280-319.
- [5] M. E. Schlesinger, " Quantitative Analysis of Feedbacks in Climate Model Simulations of CO₂-Induced Warming," In: M. E. Schlesinger, Ed., *Greenhouse-Gas-Induced Climatic Change: A Critical Appraisal of Simulations and Observations*, Elsevier, Amsterdam, 1988, pp. 653-737.
- [6] M. E. Schlesinger, " Quantitative Analysis of Feedbacks in Climate Model Simulations," In A. Berger, R. E. Dickinson and J. W. Kidson, Eds., *Understanding Climate Change*, American Geophysical Union.

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