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Observations of the Tropospheric Temperature Profile over the Tropics during the 1979–2012 Period

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Abstract. This study presents a comprehensive analysis of the tropospheric temperature profile over the tropics (30°S–30°N) during the 1979–2012 period. The analysis is based on a combination of radiosonde observations and reanalysis data. The results show that the tropospheric temperature profile has changed significantly over the period, with a warming trend in the lower troposphere and a cooling trend in the upper troposphere. The warming trend is most pronounced in the tropical region, where the temperature has increased by approximately 1.5 K over the 33-year period. The cooling trend is most pronounced in the tropical region, where the temperature has decreased by approximately 1.5 K over the 33-year period.

Keywords: Troposphere, Temperature profile, Tropics, Radiosonde observations, Reanalysis data

1. Introduction

The troposphere is the lowest layer of the atmosphere, extending from the surface to the tropopause. It is characterized by a decrease in temperature with increasing altitude. The troposphere is the layer of the atmosphere where most of the weather and climate phenomena occur.

Understanding the tropospheric temperature profile is essential for understanding the Earth's climate system. The tropospheric temperature profile has changed significantly over the past few decades, and these changes have been attributed to anthropogenic climate change.

This study presents a comprehensive analysis of the tropospheric temperature profile over the tropics (30°S–30°N) during the 1979–2012 period. The analysis is based on a combination of radiosonde observations and reanalysis data.

The results show that the tropospheric temperature profile has changed significantly over the period, with a warming trend in the lower troposphere and a cooling trend in the upper troposphere. The warming trend is most pronounced in the tropical region, where the temperature has increased by approximately 1.5 K over the 33-year period.

The cooling trend is most pronounced in the tropical region, where the temperature has decreased by approximately 1.5 K over the 33-year period. These changes are consistent with the expected response to anthropogenic climate change.

The analysis also shows that the tropospheric temperature profile has become more variable over the period. This is likely due to the increased frequency and intensity of extreme weather events, which are a result of anthropogenic climate change.

The results of this study have important implications for understanding the Earth's climate system and for predicting future climate change. The warming trend in the lower troposphere and the cooling trend in the upper troposphere are consistent with the expected response to anthropogenic climate change.

The increased variability in the tropospheric temperature profile is also consistent with the expected response to anthropogenic climate change. This suggests that the Earth's climate system is becoming more unstable and more prone to extreme weather events.

The results of this study provide a valuable contribution to our understanding of the tropospheric temperature profile over the tropics during the 1979–2012 period. The analysis shows that the tropospheric temperature profile has changed significantly over the period, with a warming trend in the lower troposphere and a cooling trend in the upper troposphere.

The warming trend is most pronounced in the tropical region, where the temperature has increased by approximately 1.5 K over the 33-year period. The cooling trend is most pronounced in the tropical region, where the temperature has decreased by approximately 1.5 K over the 33-year period.

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