Effect of Volcanoes on the Vertical Temperature Profile in Radiosonde Data

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Comparison of the responses of temperatures above the surface to the Agung, El Chichon and Pinatubo volcanic eruptions after removal of ENSO and QBO effects shows the expected stratospheric warming, with a maximum at 50 mb in the tropics, and a predominantly cooling effect in the troposphere with a maximum in the middle or upper troposphere. The tropospheric cooling is greater after the Pinatubo eruption, with a significant effect on the temperature difference between the upper and lower tropical troposphere. The tropospheric coolings after El Chichon and Agung are more vertically uniform. The size of the responses, and of the difference between the Pinatubo and El Chichon responses, are somewhat sensitive to the choice of data subset and the index used to account for the effects of ENSO. Such differential effects of volcanic eruptions on the upper and lower tropical troposphere may have affected temperature trends at those levels.