Infrared radiative cooling / heating of the terrestrial mesosphere / lower thermosphere: Non-LTE analysis of the CRISTA limb radiance data

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The new model of radiative cooling/heating of the mesosphere and lower thermosphere (MLT) in the ro-vibrational bands of atmospheric gases (CO_2, O_3, H_2O, CO, NO, N_2O and others) accounts for vibrational and rotational non-LTE, line-overlapping, and absorption and transformation of the near-infrared solar radiation. The model utilizes ALI technique for the solution of the system of kinetic equations and the DFE radiative transfer algorithm. The contributions of various band to the total cooling/heating are analyzed. The model is applied to the calculation of the MLT cooling/heating for atmospheric data retrieved from the CRISTA limb radiance measurements. Implications for modeling of the MLT region are discussed.