MESOPAUSE REGION TEMPERATURE STRUCTURE AT SÃO JOSÉ DOS CAMPOS

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We have been using a sodium resonance lidar to measure mesopause region temperatures between 80 and 100 km at São José dos Campos (23 S, 46 W) since March 2007. We find a mean mesopause temperature of 182 K at 102 km. Although there exist large day-to-day variations, the seasonal means show little change in mesopause temperature and height between autumn, winter and spring. Weather conditions prevent us from making measurements in summer. Temperature profiles show strong oscillations, in many cases apparently associated with tides and gravity waves. Very large vertical temperature gradients are encountered, maximum values reaching almost 100 K/km. Despite the fact that the mean temperature gradient between 80 and 100 km is negative (about -1.5 K/km), positive gradients are generally much stronger than negative ones and the adiabatic lapse rate is seldom reached. Strong positive temperature gradients are frequently associated with strong gradients in sodium mixing ratio – positive on the bottom of the layer and negative on the topside. We believe that this behaviour results from the inhibition of vertical mixing by positive temperature gradients. If this is the case the vertical transport of minor atmospheric constituents in the mesopause region must be strongly influenced by atmospheric stability conditions.

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