

卫星遥感东经120°子午圈MLT典型温度结构：中间层顶统计分析

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摘要 利用2002~2006年期间SABER/TIMED温度数据综合考察了中心位于120° E, 宽度为30°子午圈(东经120°子午圈)内中间层和低热层(MLT)大气的平均热力状态. 季节平均温度的分析结果说明该子午圈中平均温度与用相同数据集建立的纬圈平均温度之间表现出相当好的一致性, 但是与国际参考大气CIRA-86温度之间则表现出显著的差异, 而对MLT典型温度结构描述不同是导致70 km高度以上出现这种显著差异(20 K以上)的主要原因. 进一步利用逐日数据开展温度梯度诊断确定了中间层顶的位置和温度, 在此基础上开展考察的结果显示, 在夏季, 与极区中间层顶高度一致(83 km)的中间层顶稳定地伸展到中纬度(48° N), 而热带和赤道地区中间层顶稳定地维持在97 km高度, 形成了“两台阶”中间层顶结构. 逐日分析结果还揭示了中纬度地区夏季中间层顶异常复杂的表现, 结果表明在这里可以看到两种位于不同高度的中间层顶, 第一种位于83 km并且伴随异常低温, 而另一种位于约100 km高度. 虽然基于当前分析结果并利用过去用于解释极区中间层顶“两模态”的理论对有关问题进行了探讨, 但是全面理解夏季中纬度中间层顶的复杂表现还有待更深入的研究.

关键词 [东经120°子午圈](#) [MLT](#) [平均温度](#) [中间层顶](#) [CIRA-86模式](#)

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Satellite remote sensing of the characteristics of MLT mean temperatures in the 120° E meridian: The mesopause

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Abstract The L2A SABER/TIMED temperatures taken during 2002~2006 were used to estimate the mean temperatures in the MLT region in the meridian at 120° E. Good agreements were seen in the comparison between the seasonal mean temperatures in the meridian and that across the entire zonal cycle. In contrast, very large discrepancies were observed when comparing the temperatures with that derived from the CIRA-86 temperatures; and the discrepancies were attributed to the differences in the critical structures in the two temperatures. Daily temperatures were used to investigate the altitude and temperature of the mesopause in the meridian by applying a scheme that extracts the mesopause information through diagnosing the lapse rate in each temperature profile. Estimation results show that in summer season, the mesopause with the same height (83 km) as that of the polar mesopause is observed through the latitudes from 48° N to the polar area. In the meantime the equatorial and tropical mesopause are maintained at 97 km, which is critical in shaping the characteristic global “two-level mesopause”. Moreover, daily analysis disclosed the extreme complexity in the appearance of the mid-latitude mesopause. It was observed that there are two kinds of mesopause, one locates at 83 km height with extremely low temperatures, the other locates at about 100 km. Although the theory proposed for interpreting the “two mode” mesopause in polar area was successfully used to explain the current estimation results, further detailed investigation is necessary to understand the complex situation.

Key words [The meridian at 120° E](#); [MLT](#); [Mean temperatures](#); [Mesopause](#); [CIRA-86](#)

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