

激光雷达专辑

合肥钠测温测风激光雷达与武汉流星雷达水平风场的对比研究

方欣¹, 谷升阳¹, 班超¹, 李陶¹, 熊建刚², 宁百齐², 窦贤康¹, 王宁宁¹

1 中国科学技术大学地球和空间科学学院, 安徽 合肥 230026;

2 中国科学院地质与地球物理研究所, 北京 100026

摘要:

中间层顶区域大气温度和风场是研究中高层大气动力学的重要参量。简要介绍中国科学技术大学钠测温测风激光雷达系统。其可用于高分辨率探测中间层顶区域(80~105 km)大气温度和风场。给出了该激光雷达测量大气温度和风场的基本原理, 对系统的发射部分、接收部分和光电探测采集及时序控制部分进行简要介绍, 给出了该系统探测的大气温度和风场的结果。温度和风场结果分别与TIMED/SABER卫星仪器和武汉地基流星雷达观测结果进行了对比。

关键词: 中高层大气 大气温度 风场 钠测温测风激光雷达

The horizontal wind comparison study between sodium temperature/wind lidar over Hefei and meteor radar over Wuhan

FANG Xin¹, GU Sheng-yang¹, BAN Chao¹, LI Tao¹, XIONG Jian-gang², NING Bai-qi², DOU Xian-kang¹, WANG Ning-ning¹

1 School of Earth and Space, University of Science and Techonology of China, Hefei 230026, China;

2 Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing 100026, China

Abstract:

The middle and upper atmosphere temperature and wind fields are important parameters to study atmospheric dynamics. A sodium temperature/wind lidar system of university of science and technology of china (USTC), can be used for the temperature and wind measurement with high resolution in the mesopause region (80~105 km), is presented briefly. Theory for measuring atmospheric temperature and wind of the lidar is discussed. The transmitter, receiver, photoelectric detecting subsystem, acquisition subsystem and timing control subsystem are described respectively. Finally, the temperature and wind results are given, while the sodium lidar observed temperature profile is compared with SABER observed and the sodium lidar observed wind is compared with ground-based meteor radar observed in Wuhan.

Keywords: middle and upper atmosphere atmospheric temperature wind fields sodium temperature/wind lidar

收稿日期 修回日期 网络版发布日期

DOI:

基金项目:

国家自然科学基金(41074108和40974084), 中科院“百人计划”和国家“985”工程项目

通讯作者: 方欣, 博士, 研究方向: 激光雷达系统及激光大气探测。

作者简介:

作者Email: fangxin1981@163.com

参考文献:

[1] She, C. Y., Li Tao, Collins R. L., Yuan Tao, Williams B. P.. Tidal perturbations and variability in the mesopause region over Fort Collins, CO (41N, 105W): Continuous multi-day temperature and wind lidar observations, Geophys. Res. Lett., 2004, 31: L24111.

[2] Li, T., She C. Y., Liu H. L., and Montgomery M. T.. Evidence of a gravity wave breaking event and the estimation of the wave characteristics from sodium lidar observation over Fort Collins, CO (41N, 105W)

扩展功能

本文信息

Supporting info

PDF(1188KB)

[HTML全文]

参考文献[PDF]

参考文献

服务与反馈

把本文推荐给朋友

加入我的书架

加入引用管理器

引用本文

Email Alert

文章反馈

浏览反馈信息

本文关键词相关文章

中高层大气

大气温度

风场

钠测温测风激光雷达

本文作者相关文章

PubMed

- [3] She, C.Y., Yu J. R. Simultaneous Three-Frequency Na Lidar Measurements of Radial Wind and Temperature in the Mesopause Region. Geophys. Res. Lett., 1994, 21: 1771-1774,
- [4] White, M. A., A Frequency-agile Na Lidar for the Measurement of Temperature and Velocity in the Mesopause Region: PhD Dissertation. Fort Collins: Colorado State University. 1999
- [5] Li Tao, Fang Xin, Liu Wei, Gu Sheng-Yang and Dou Xiankang. A narrowband sodium lidar for the measurements of mesopause region temperature and wind. Applied Optics, 2012, 51(21): .5401-5411.
- [6] Xiong, J. G., Wan W., Ning B., Liu L. First results of the tidal structure in the MLT revealed by Wuhan Meteor Radar (30° 40' N, 114° 30' E). Journal of Atmospheric and Solar-Terrestrial Physics, 2004, 66: 675-682.
- [7] Li Tao, Fang Xin, Gu Sheng-Yang, Liu Wei, Zhu Qiurui, Ban Chao and Dou Xiankang. The initial results of gravity wave momentum flux measured by a sodium temperature/wind lidar over Hefei, China. The 26th laser radar meeting, 2012.

本刊中的类似文章

1. 汪丽, 谭林秋, 李仕春, 狄慧鸽, 王玉峰, 华灯鑫 .基于Mach-Zehnder干涉仪条纹成像技术的多普勒测风激光雷达鉴频系统研究及仿真[J]. 量子电子学报, 2013,30(1): 98-102
2. 谷升阳, 李陶, Alan Liu, Gary Swenson, Chester Gardner, Dennis Riggan, David Fritts.Hawaii地区钠激光雷达与流星雷达和中频雷达同时观测的水平风场的对比分析[J]. 量子电子学报, 2013,30(1): 7-11