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利用不同资料研究我国大陆上空柱水汽含量

Total Column Water Vapor over Chinese Mainland Based on Different Datasets

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基金项目: 资助项目: 国家重点基础研究计划项目(2010CB428605, 2011CB403406), 国家自然科学基金项目(40865002)

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摘要:

利用1971—2001年探空资料以及ERA 40和NCEP/NCAR再分析资料分别得到地面到300 hPa我国大陆上空大气柱水汽含量, 对3种不同资料所得的柱水汽含量的空间分布特征以及线性趋势进行对比分析。结果表明: 3种资料得到的柱水汽含量年平均和季节平均的空间分布特征一致; 3种资料年平均的线性变化趋势在东北地区、内蒙古东部地区, 西南地区北部、华南沿海和新疆北部地区均呈增加趋势; 在华北和华东的部分地区, ERA 40和NCEP/NCAR再分析资料为降低趋势, 而探空资料得到的柱水汽含量变化相对较小, 但未通过信度检验; 探空资料得到的柱水汽含量的相对变化显示我国东北地区、内蒙古东部地区、新疆地区的增加更显著。

关键词: [柱水汽含量](#) [探空资料](#) [再分析资料](#) [线性趋势](#)

Abstract:

The spatial distribution characteristics and linear trends of total column water vapor (TCWV) are compared between radiosonde data, NCEP/NCAR reanalysis data and ERA 40 reanalysis data over Chinese Mainland from 1971 to 2001. The TCWV is also used to investigate how water vapor changes under the context of climate change. The radiosonde data are used to calculate TCWV, which is integrated vertically from surface to 300 hPa, TCWV of NCEP/NCAR and ERA 40 reanalysis data also restricts from surface to 300 hPa. Considering the missing rate and integrity, 78 stations are selected and the analyzed. The result shows that the climatological annual mean and seasonal mean spatial distribution features of TCWV between those data are consistent. TCWV decreases gradually from southeast to northwest, but the decreasing rate derived from the two reanalysis data are smaller than that of radiosonde data. Seasonal variations of TCWV is distinct, the largest TCWV occurs in summer and the smallest in winter. For linear trend of annual mean, TCWV is increasing in northeast of China, the coastal regions of Southern China, northern regions of Southwest China and northern Xinjiang region in all three data. The most evident differences in three data are in southern Xinjiang region and parts of north and east China. In southern Xinjiang region, TCWV of NCEP/NCAR reanalysis data shows decreasing trend, it is increasing according to the other two datasets. In parts of north and east China, TCWV of the two reanalysis datasets both show decreasing trend, but according to the radiosonde data, TCWV may increase slightly rather than decrease. The linear trend of TCWV by all three datasets is not significant at 95% confidence level in this region. Radiosonde data also shows that the largest relative trends are in higher latitudes. Six stations are selected to compare time series of anomaly TCWV between the three datasets, indicating that anomaly TCWV of three datasets have similar variation tendency at the same station, though not equal. The variation tendency of TCWV is different from station to station, which illustrates water vapor responds differently to climate change in different regions.

Keywords: [total column water vapor](#) [radiosonde data](#) [reanalysis data](#) [linear trend](#)

彭艳秋,王卫国,刘煜,李维亮.利用不同资料研究我国大陆上空柱水汽含量[J].应用气象学报,2012,23(1):59-68.Peng Yanqiu,Wang Weiguo,Liu Yu and Li Weiliang.Total Column Water Vapor over Chinese Mainland Based on Different Datasets[J].Journal of Applied Meteorological Science,2012,23(1):59-68

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