

常鸣,樊少芬,王雪梅:珠三角土地覆被资料优选及在WRF模式中的初步应用[J].环境科学学报,2014,34(8):1922-1933

珠三角土地覆被资料优选及在WRF模式中的初步应用

Impact of refined land-cover data on WRF performance over the Pearl River Delta region, China

关键词: [土地覆被资料](#) [WRF模式](#) [珠三角](#)

基金项目: [国家自然科学基金面上项目 \(No.41275018\)](#); [国家高技术研究发展计划项目 \(No.2013AA122002\)](#); [广东省自然科学基金重点项目 \(No.S2012020011044\)](#); [公益性行业\(气象\)科研专项 \(No.GYHY201406031\)](#)

作者 单位

常 鸣 中山大学环境科学与工程学院, 广州 510275

樊少芬 中山大学环境科学与工程学院, 广州 510275

王雪梅 中山大学环境科学与工程学院, 广州 510275

摘要: 针对WRF模式中珠三角地区土地覆被资料不准确的现状, 从国内外主要的土地覆被产品中筛选与统计年鉴资料相符的产品, 与模式内置的静态资料进行对比试验以评估土地覆被资料对模拟结果的影响. 试验模拟的时段设为2010—2011年1、4、7、10月. 结果表明: 1 WRF模式内置的MODIS资料在珠三角地区对于建成区高估超过3倍, 而主要土地覆被遥感产品中GLC2009资料最为接近统计年鉴和调查结果值; 2 GLC2009土地覆被数据相比模式内置的MODIS资料, 对珠三角区域地表温度、风速、相对湿度的模拟有一定改善, 2 m地表气温与观测的平均偏差从0.32 °C降至0.08 °C; 2 m水汽压平均偏差从0.31 hPa降至0.28 hPa; 10 m风速平均偏差从0.59 m·s⁻¹降至0.38 m·s⁻¹, 其中10 m风速对于土地覆被变化最为敏感; 3从空间分布上看, GLC2009资料相对内置的MODIS资料, 其对整个模拟区域内的温度、湿度模拟结果有所改善, 并且对珠三角城市外围区域风速模拟结果的改善明显; 4模拟结果的变化是由于土地覆被类型及其比例的变化直接改变了模式中地表反照率、粗糙度、植被覆盖率、植被气孔阻抗等参数的取值引起的.

Abstract. Our study indicated that current land use type datasets of the Weather Research and Forecasting (WRF) model, derived based on the United States Geological Survey and Moderate Resolution Imaging Spectroradiometer (MODIS) data, were unable to accurately describe land surface features in the Pearl River Delta (PRD) region. To improve land surface process simulations and to accurately measure their impact on climate for the PRD region, we examined different land use and land cover products specifically developed for this region and found that the GLC2009 (Global Land Cover) data derived from the statistical survey annual report of the Guangdong Forestry Administration most reasonably categorized the land surface features of the PRD region. GLC2009 dataset was then interpolated to the grids of WRF through its pre-processing system. For this study, we performed the WRF simulations driven with both MODIS and GLC2009 land use type datasets for the periods of January, April, July and October, 2010—2011 and investigated the impact of the difference between these two datasets on local climate. In these simulations, the Noah land surface scheme was selected. Our results showed that WRF with GLC2009 improved air temperature, relative humidity, and wind speed simulations at a near surface level for the PRD region when compared with that driven by the MODIS data. The 2 m temperature bias simulated by WRF decreased from 0.32 °C with MODIS to 0.08 °C with GLC2009, the 2 m water vapor pressure bias decreased from 0.31 hPa to 0.28 hPa, and the 10 m wind speed bias reduced from 0.59 m·s⁻¹ to 0.38 m·s⁻¹. In addition, WRF with GLC2009 produced a better geographical distribution of these variables than that with MODIS over the central area of the great PRD metropolitan area and the surrounding hilly areas. The differences in the modeling results were closely associated with the changes in surface albedo, surface roughness length, vegetation coverage, vegetation stomatal resistance, and surface radiation budget that were calculated in the Noah land surface scheme in WRF based on the input land use type s and their fractions in the model domain.

Key words: [Land cover](#) [WRF model](#) [Pearl River Delta region](#)

摘要点击次数: 110 全文下载次数: 109

关闭

下载PDF阅读器

您是第6184824位访问者

主办单位：中国科学院生态环境研究中心

单位地址：北京市海淀区双清路18号 邮编：100085

服务热线：010-62941073 传真：010-62941073 Email: hjkxxb@rcees.ac.cn

本系统由北京勤云科技发展有限公司设计