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基于遥感技术的绿地耗水估算与蒸散发反演

Water consumption estimation and evapotranspiration inversion based on remote sensing technology

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中文关键词：遥感,灌溉,蒸散发,绿地,耗水,地表能量平衡模型

英文关键词:remote sensing irrigation evapotranspiration green land water consumption surface energy balance model

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中文摘要:

为研究北京市五环范围内的绿地耗水总量和空间分布情况，该文应用高分辨率遥感影像、长时间序列气象数据、植被耗水规律研究成果等资料，进行绿地提取、耗水估算和蒸散发反演。主要步骤包括：预处理遥感影像，分析典型地物的光谱特征，层次分类提取绿地分布，估算不同气象条件、植被覆盖条件下的耗水量，以遥感技术为基础反演日蒸散发量。遥感技术提取的北京市五环内绿地面积为197.3 km2，估算年耗水量为1.61亿m3。特枯年、枯水年、平水年和丰水年的净灌溉水量分别为1.09、0.75、0.59和0.35亿m3。应用地表能量平衡模型反演典型日蒸散发结果表明，城市水体、高植被覆盖率区和低植被覆盖率区的ET均值分别为11.1、5.7和4.0 mm/d。五环内城区夏季典型日蒸散总量为126.6万m3，二环内、二三环间、三四环间、四五环间的绿地日ET总量分别为：10.3、14.2、20.4和81.7万m3，该研究可为城市绿地灌溉系统设计提供耗水总量和空间分布的信息。

英文摘要:

The water consumption quantity and spatial characteristics of green land within the 5th Ring Road of Beijing city was studied based on high resolution remote sensing imagine, long time series meteorology data, and water consumption research results for different green land vegetation types. These procedures included pre-processing remote sensing imagines, distinguishing green land with stratified classification method, estimating irrigation water quantity for green land in different dry scenes accounting for different meteorological conditions and vegetation types, and inversing daily evapotranspiration. The green land area within the 5th Ring Road was 197.3 km2, accounting for 29.7% of total urban area. The annual green land water consumption was 161 Mm3, and the net irrigation water values in different dry scenarios were 109, 75, 59, 35Mm3 for the hydrological years of 95%, 75%, 50% and 25% respectively. Regional daily ET was inversed through Landsat Data and SEBAL model，and daily ET values of different land covers in summer were 11.1mm for urban lakes, 5.7mm for dense vegetation area, 4.0 mm for sparse vegetation area. Total daily water consumption was 1.266 Mm3, and the daily ET values were 0.103, 0.142, 0.204 and 0.817 Mm3 for these regions within 2nd Ring Road, between 2nd and 3rd Ring Road, between 3rd and 4th Ring Road, between 4th and 5th Ring Road, respectively. These results provide total water consumption and spatial distribution information for designing irrigation system of urban green land.