

论文

香河地区光合有效辐射的测量和计算

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摘要 2004年9月12日—2006年10月31日, 在河北省香河县对太阳辐射(包括光合有效辐射PAR、可见光辐射VIS和总辐射Q等)、气象参数等进行了综合测量, 初步得到了PAR、VIS等的变化特征。观测表明, 小时累计之比PAR/Q、VIS/Q、PAR/VIS相对稳定, 2004—2006年的平均值分别为2.164、0.434 mol \cdot MJ⁻¹和4.967 mol \cdot MJ⁻¹, 同时它们表现出明显的日、逐日和季节变化特征, 并受到水汽、气溶胶、云等因素的影响。建立了实际天气条件计算PAR、VIS小时累计值的经验公式以及PAR与VIS转换关系式, 计算值与观测值符合得较好。在考虑水汽和散射因子时, PAR、VIS计算值与观测值的相对偏差分别为9.9%和10.8%。限于实际情况, 也可以只考虑水汽因子的作用来计算PAR和VIS小时累计值, 它们的相对偏差分别为11.1%和11.8%。对于PAR、VIS的传输和计算来说, 水汽因子的作用至关重要。散射因子的作用虽然弱于水汽因子, 但它的作用不容忽视。

关键词 [太阳辐射](#) [光合有效辐射](#) [可见光辐射](#) [水汽](#) [散射因子](#)

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Measurement and calculation of photosynthetically active radiation in Xianghe, Hebei province

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Abstract Solar radiation (photosynthetically active radiation (PAR), visible radiation (VIS), global radiation (Q), etc.) and meteorological parameters were determined from September 12, 2004 to October 31, 2006 in Xianghe, Hebei province. The variations of PAR and VIS were analyzed. The results show that the ratios of hourly sums of PAR/Q, VIS/Q, PAR/VIS are relatively stable, and their averages are 2.164, 0.434 and 4.967 mol \cdot MJ⁻¹ from 2004 to 2006. These ratios are of obvious diurnal, daily and seasonal variations, and are influenced by water vapor, aerosol, clouds, etc. The empirical formulas calculating hourly sums of PAR and VIS under weather conditions and conversion formulas between PAR and VIS are established. The calculated PAR and VIS were in good agreement with the measured, and their relative biases are 9.9% and 10.8%, respectively, if water vapor and scattering factor are considered. According to the actual conditions, if water vapor factor is considered simply, the relative biases between the calculated and the observed are 11.1% and 11.8%, respectively. Water vapor factor is important for the transmission and the calculation of PAR and VIS. At the same time, the scattering factors are also important.

Key words [Solar radiation](#) [Photosynthetically active radiation](#) [Visible radiation](#) [Water vapor](#) [Scattering factor](#)

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