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研究报告

鼎湖山针阔叶混交林水文学过程中总有机碳动态

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摘要

2002年7月～2003年7月对鼎湖山针阔叶混交林生态系统水文学过程中总有机碳（TOC）总量和浓度进行了初步研究.结果表明,观测期间，林外大气降水输入的TOC总量为41.80 kg·hm^{-2}·yr^{-1},地表径流和地下水(50 cm土壤渗透水)输出分别为17.54和1.80 kg·hm^{-2}·yr^{-1},输入输出之差为 22.46 kg·hm^{-2}·yr^{-1}，系统TOC为正平衡.各类型水中TOC总量月动态基本上与大气降水月动态变化趋势一致.大气降水的TOC平均浓度为3.64 mg·L^{-1}.经过森林林冠淋洗和树干淋溶后，穿透雨和树干流中TOC的平均浓度分别比大气降水中TOC浓度增加了6.10倍和7.39倍.地表径流、25 cm和50 cm土壤渗透水中TOC平均浓度分别为12.72、7.905和3.06 mg·L^{-1}.穿透雨和树干流中TOC浓度的月变化相似，生长季初(3月)，TOC浓度开始增加， 9月后逐渐下降，12月又有所回升.降水量较大的月份地表径流中TOC浓度较高.25 cm和50 cm土壤渗透水中TOC浓度无明显的月变化规律.不同树种树干流中TOC浓度差异很大.大气降水、穿透雨、25 cm和50 cm土壤水中TOC浓度随降水量的增加而规律性递减，树干流和地表径流中TOC浓度与大气降水量之间无明显相关关系；除树干流和土壤水外，水文过程各分量水中TOC浓度随着大气降水强度的变化呈现规律性波动.

关键词 针阔叶混交林,水文学,总有机碳(TOC)

分类号

Dynamics of total organic carbon (TOC) in hydrological processes in coniferous and broad-leaved mixed forest of Dinghushan

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Abstract

The total flux and concentration of total organic carbon (TOC) in hydrological processes in coniferous and broad-leaved mixed forest of Dinghushan were measured from July 2002 to July 2003. The results showed that the TOC input by precipitation was 41.80 kg·hm^{-2}·yr^{-1},while its output by surface runoff and groundwater (soil solution at 50 cm depth) was 17.54 and 1.80 kg·hm^{-2}·yr^{-1},respectively.The difference between input and output was 22.46 kg·hm^{-2}·yr^{-1},indicating that the ecosystem TOC was in positive balance.The monthly variation of TOC flux in hydrological processes was very similar to that in precipitation.The mean TOC concentration in precipitation was 3.64 mg·L^{-1},while that in throughfall and stemflow increased 6.10 and 7.39 times after rain passed through the tree canopies and barks.The mean TOC concentration in surface runoff and in soil solution at 25 and 50 cm depths was 12.72,7.905 and 3.06 mg·L^{-1},respectively.The monthly TOC concentration in throughfall and

stemflow had a similar changing tendency, showing an increase at the beginning of growth season (March),a decrease after September,and a little increase in December.The TOC concentration in runoff was much higher during high precipitation months.No obvious monthly variation was observed in soil solution TOC concentration (25 and 50 cm below the surface).Stemflow TOC concentration differed greatly between different tree species.The TOC concentration in precipitation,throughfall,and soil solution (25 and 50 cm depths) decreased with increasing precipitation, and no significant relationship existed between the TOC concentrations in stemflow,surface runoff and precipitation.The TOC concentrations in the hydrological processes fluctuated with precipitation intensity,except for that in stemflow and soil solutions.

Key words

Coniferous and broad-leaved mixed forest Hydrology Total organic carbon (TOC)

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