

论文

纳帕海湿地不同退化状态下土壤有机碳素的分异特征

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摘要:

纳帕海湿地地区4类土壤退化程度由高到低依次为:弃耕地—中生草甸土(AFMMs)、中生草甸土(MMS)、湿草甸土(WMS)和沼泽土(MS),对4类土壤0~10cm(上层)、10~20cm(中层)、20~30cm(下层)进行采样,分析土壤有机碳(SOC)、活性有机碳(LOC)和溶解有机碳(DOC)含量。结果表明:4类土壤间,除AFMMs中下层LOC含量略高于MMS对应层LOC含量外,其它各层SOC、LOC、DOC含量都为AFMMs<MMS<WMS<MS;剖面垂向上,MS的SOC和LOC含量由上向下先增后减,其它土壤SOC、LOC、DOC含量以及MS的DOC含量均由上向下减少;LOC/SOC(%)变化于8.6~16.8%,而DOC/SOC(%)、DOC/LOC(%)更低;除AFMMs外,其它3类土壤SOC和LOC含量呈显著正相关,且LOC和LOC/SOC(%)分异与土壤类型分异有明显的对应关系,而DOC含量与SOC和LOC含量的相关性无明显规律。本研究表明,微地貌制约下的水文情势—植被生态分异对湿地SOC及活性组分的分异有显著影响,而强人为干扰会带来湿地土壤有机碳活性组分的明显损失,缺乏水文生态调控的撂荒式恢复难以有效恢复退化高寒湿地土壤有机碳库;LOC是表征湿地土壤有机碳库及其活性组分变化更为敏感和合适的指标。

关键词: 湿地土壤 有机碳 活性有机碳 溶解有机碳 纳帕海

Variations of soil organic C components under different degradation conditions in Napahai wetland reserve

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Abstract:

There are four major types of soils in Napahai wetland reserve,northwest Yunnan,i.e.,Abandoned Farmland Mesophytic Meadow Soil(AFMMs),Mesophytic Meadow Soil(MMS),Wet Meadow Soil(WMS),and Marsh Soil (MS),correspondingly their degradation degrees from high to low.Soil organic carbon(SOC),labile organic carbon(LOC) and dissolved organic carbon(DOC) contents and their correlation at three layers(1st layer 0~10 cm,2nd layer 10~20 cm,and 3rd layer 20~30 cm) for the 4 types were investigated.Results showed that except that LOC contents at the 2nd and 3rd layers of AFMMs were slightly higher than those at corresponding layers of MMS,the orders of the contents of SOC,LOC and DOC at the other layers of the 4 soils were AFMMs < MMS < WMS < MS,which clearly reflected the degradation conditions of the 4 soils within the wetland region.From up to down in the soil profiles,soil SOC,LOC and DOC contents of AFMMs,MMS and WMS,as well as the DOC contents of MS,declined from top to down layer;the decrease between the 1st and 2nd layers was significantly larger than that between the 2nd and 3rd layers;while the contents of SOC and LOC of MS increased from the 1st to 2nd layer and then declined to the 3rd layer.LOC/SOC(%) of the 4 soils varied from 8.6 % to 16.8 % and LOC/SOC at 3 layers of the 4 soils was AFMMs > MMS > WMS > MS,which indicated dryer soil had a higher turnover rate of the biological activity of SOC.Except extremely human-disturbed AFMMs,LOC contents are significantly positive to SOC contents for the other 3 types of soils;furthermore,the variations of LOC contents and LOC/SOC(%) have correlations with soil types.Compared with SOC and DOC,LOC is more suitable to detect the changes of wetland SOC pool.The study indicated the variation of wetland hydrology and vegetation controlled by topography has significant influence on the variation of wetland SOC and its labile components;high disturbance(e.g.wetland reclamation and drainage) usually causes obvious loss of wetland SOC and its labile components.For the degraded sub-alpine wetlands like Napahai where significant hydrological changes were observed,hydro-ecological regulation measures should be taken to prevent their further degradation.

Keywords: wetland soil SOC LOC DOC Napahai

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