

An improved wetland process model based on AVIM and its sensitivity analysis

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In order to describe the dynamic process of substance and energy exchange among atmosphere, vegetation and soil at the wetland surface of Poyang lake, a remote sensing-based process model was improved based on AVIM, which couples physical process with plant physiological growth process. Some hypotheses are set here as: (1) The basic cell in analysis is vegetation colony of population instead of a single plant; (2) There is not restriction in nutrient supply, but the effect of light, temperature, moisture and CO₂ concentration is considered; (3) The plant is random distributed in the grassland; (4) Only the emerging and hygrophyte herbs are considered in the model. The photosynthesis of hygrophyte will stop and the hygrophyte retained aboveground will wilt when grassland is flooded; (5) The effect of herding is not considered.

Considering that the wetland dynamics and relevant ecological processes are affected by the water level of Poyang Lake, in the physical process model (LPM), a water level sub-module was added to estimate the water level and the status of submersion or emersion of wetland grassland. And the saturation excess runoff-yield equation was modified. In the plant growth module (PLT), a controlling factor was added to the photosynthesis. Moreover, an inter-specific competition model was introduced to describe the interaction between emerging plants and hygrophyte plants. Some parameters applied in the improved model are derived from remote sensing inversion.

Finally, the model was used to simulate the wetland process in 2006 day by day, which shows good results according to comparison with the observations. Meanwhile, the sensitivity of NPP to environmental factors is analyzed, which shows that the NPP is sensitive to temperature and water level in the certain range. There is no significant correlation with precipitation.

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