

基于CA模型的土壤盐渍化时空演变模拟与预测

Simulation and prediction of the spatial-temporal evolution of soil-salinization based on Cellular Automata(CA) model

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中文摘要:

土壤盐渍化是干旱半干旱区土地退化的主要形式之一,其发生发展是一个复杂的非线性动力学过程。该文通过对吉林省长岭县土壤盐渍化成因及特征分析,确定土壤盐渍化影响因子及动态机制,并利用地理元胞自动机对复杂系统时空动态演化过程具有较强的计算及模拟能力特点,在GIS与RS支持下,建立土壤盐渍化CA动态模型,即土壤盐渍化地理元胞自动机模型(GeoCA-Salinization),并结合相关属性数据和空间数据,模拟长岭县土壤盐渍化发生发展的时空动态规律,并对今后的可能发展做出预测。结果表明:基于GeoCA-Salinization模型对长岭县土壤盐渍化时空演变进行的模拟与实际情况基本吻合,同时基于该模型的土壤盐渍化时空演变预测符合当前的发展态势。与其他方法相比,该方法能更好地实现任意有效离散时间距与瞬时动态可视化表达的结合,是土壤盐渍化时空演变模拟与预测较为有效的方法。

英文摘要:

Soil-salinization is one of the main forms of land degradation in arid and semi-arid region, and its happening and development are complex non-linear dynamic process. Influence factors and dynamic mechanism of soil-salinization were confirmed through analyzing the soil-salinization characteristic in Changling County, Jilin Province. Geo-Salinization model was set up based on CA model which has stronger capability of computing and simulating spatial-temporal dynamic evolution of complex system and with the support of GIS and RS technology. Combined with relative attribution data and spatial data, GeoCA-Salinization model was used to simulate and predict soil-salinization process in Changling County. Results show that the simulation and prediction of spatial-temporal evolution of soil-salinization tally with the factual situation, which reflect the soil-salinization development situation in Changling County. Compared with other methods, the method described in this paper can realize the combination of discretional valid time interval and instantaneous dynamic visualization expression better and is an effective way to simulate and predict soil-salinization spatial-temporal evolution.

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