STUDY ON OASIS SOIL SALINIZATION IN XINJIANG BASED ON QUANTITATIVE REMOTE SENSING

Soil salinization is getting more and more attentions over the world for its adverse impact on the social economy, the environment, and the agricultural eco-system. The total area of salinized soil in Xinjiang reaches 674.8 × 601 hm², accounting for 31.1% of the total cultivated land. It is, therefore, necessary and important to study soil salinization in arid region for solution to this problem. Remote sensing (RS) technology demonstrates a number of advantages in this field. But how to extract salinization information accurately from RS images is the basis of the study. In this paper a case study of Yutian County monitoring soil salinization by means of remote sensing, is carried out. Yutian County was selected for this study because of its importance as a significant site for agricultural development. Located in the south-of the Keriya oasis, it has recently been exposed to severe soil salinization. Seven spectrum-band Enhanced Thematic Mapper-plus(ETM+) images dated October 7, 2002 were used against the data of soil features obtained from field investigation and analysis of typical soil information, to extract Salinization Index (SI) and land surface albedo, which are very important biophysical parameters of land surface. In this paper the relationship between salinization index (SI) and albedo was analyzed quantitatively. Through experimental and theoretical reasoning, the authors proposed a conception of SI-Albedo space and discussed its biophysical characteristic s. Analysis revealed that location could be used to improve the current strategies for salinization in the SI-Albedo space, and hence the strategies for salinization mapping, by defining measurements in this feature space.
Therefore, the authors present a methodology to monitor severity of salinization. Field data, available data in the literature, and ancillary data were linked with land cover characteristics (salinization index, land surface albedo) derived from Landsat-ETM+ multispectral images. An information extraction model, using the decision tree classification method, was established and applied to classification of RS images. Results indicate that the classification based on SI-Albedo space has a higher classification accuracy than the one based on maximum likelihood. Its highest overall-accuracy is about $91.42\%$ higher than the maximum likelihood. Although both techniques show some mix-class phenomena in the classification result, but the classification based on SI-Albedo space has less than the maximum likelihood, and thus a higher separability. Salinity soil distribution maps show that the soil salinization of this study area is relatively severe and varying in degree and type. The area is dominated with light salinization and moderate salinization. The former is distributed mainly in farmland, while the latter around the Bostan swamp. And based on the salinized soil map, the salinity soil early-warning line was derived for anticipating further soil degradation. Such contrasting and complementary behavior suggests a potential synergism between salinization index and land surface albedo for mapping and monitoring of a complex soil salinization environment such as Keriya oasis.

کلمات کلیدی:
Oasis; Soil salinization; Salinization index; Albedo; Quantitative remote sensing

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