

Evaluation of factors affecting the soil moisture in arid and semi-arid regions in Mongolia

モンゴル乾燥・半乾燥地域における土壌水分に影響する要因の評価

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Land cover with insufficient and unstable soil moisture is generally predominant in north-eastern Eurasia. This is true especially in the arid and semi-arid region which covers Mongolia, where there is an annual precipitation ranging from a few mm/y to 300 mm/y. Therefore, the development of an integrated approach to evaluate the soil moisture is a key for better understanding of the natural potential during climate change.

The objective of this master's thesis is to predict the temporal and spatial distribution of the soil moisture content through a correlation analysis using the observed data and to make clear the important factors affecting on the future soil moisture conditions.

Firstly, a correlation analysis of the observed soil moisture data in the selected stations is performed to make clear the relationship between the soil moisture and certain parameters such as: precipitation, temperature, humidity in the atmosphere, and then to predict the soil moisture in the future. A preliminary regression analyses for four different natural zone's stations were performed. First, a forest steppe area (Bulgan, Tsetserleg) showed a good correlation between the soil moisture and the precipitation, and the precipitation can predict the soil moisture. In Steppe regions, forecasted air and surface temperature with daily wind factors were correlated (Darkhan, Undurkhaan, Ugtaal, Baruun-Urt). In the Gobi Desert, the soil moisture can be predicted by previous precipitation and evapotranspiration (Dalanzadgad, Saikhan). Second, a spatial distribution map of the moisture index was produced for every variety of natural zone. The results of the present study would contribute much to the construction of a prediction system to improve the agriculture and nomadic activities in Mongolia. This study determined two seasonal and different natural zones (1986 to 2002). In the steppe region, the moisture index was estimated to be 5.5 in April, 9.6 in May, 36 in July and 28.6 in August, and that of the forest steppe region showed 4.3 in April, 11.3 in May, 32.5 in July and 27.9 in August, whereas in Gobi desert that was estimated to be 2.6 in April, 5.1 in May, 12.9 in July and 13.3 in August.