



## **Estimation of Surface Soil Moisture Using Fractal**

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This study establishes the relationship between surface soil moisture and fractal dimension. The surface soil moisture is one of important factors in the hydrological cycle of surface evaporation. It could be used in many fields, such as reservoir management, early drought warning systems, irrigation scheduling and management, and crop yield estimations. Soil surface cracks due to dryness can be used to describe drought conditions. Soil cracking phenomenon and moisture have a certain relationship, thus this study makes used the fractal theory to interpret the soil moisture represented by soil cracks. The fractal dimension of surface soil cracking is a measure of the surface soil moisture. Therefore fractal dimensions can also be used to indicate how dry of the surface soil is. This study used the sediment in the Shimen Reservoir to establish the fractal dimension and soil moisture relation. The soil cracking is created under the control of temperature and thickness of surface soil layers. The results show the increase in fractal dimensions is accompanied by a decreases in surface soil moisture. However the fractal dimensions will approach a constant even the soil moisture continually decreases. The sigmoid function is used to fit the relation of fractal dimensions and surface soil moistures. The proposed method can be successfully applied to estimate surface soil moisture. Only a photo taken from the field is needed and is sufficient to provide the fractal dimension. Consequently, the surface soil moisture can be estimated quickly and accurately.