Abstract

An Investigation on Linear Regression and Ordinary Kriging Methods for Estimating Spatial Distribution of Snow Depth at Samsami Basin

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Knowledge on spatial distribution of snow storage in catchments is important in snow hydrology because of its effect on yielding run-off. Therefore, intensive scale is necessary to measure snow depth for collecting observed data. But, difficulties are involved in measuring snow depth at fields. Therefore, methods based on observed data have been developed to predict snow depths for unobserved area. To apply these methods, care is needed because of their abilities to predict snow depth accurately. Therefore, these methods should be evaluated for studied sites to select more accurate method. In the current research, an area of 5.2 Km^2 as part of a small basin (named Samsami) as one of the headwaters of Northern Karoun, is studied for unobserved snow depth points. To do this, Multiple Linear Regression and Ordinary Kriging methods were applied and evaluated to the studied site. To compare and evaluate these two methods snow depths from 258 points were measured then; 208 points of them were used as working points and the others (50 points) as reference points to develop these two models. Finally, predicted results from these two methods for the 50 reference points were compared with their observed data, respectively. Statistical analyses of data showed that 67% of variations in snow depth which were affected by Elevation, North-South aspect and Wind shelter index can be modeled by Linear Regression method at %95 meaningful levels. However, Slope parameter did not show significant result at above confidence limit. Results from application of Ordinary Kriging method for the same data as were used above, showed that 62% of variations in snow depth can be modeled. Comparison of ability of these two models (predicting 67% of variations in snow depth with 62%) shows a little advantage for the Linear Regression which is an advantage for this method over the Ordinary Kriging method. However, the Ordinary Kriging method has another advantage over the Linear Regression which is its ability to show variations in spatial distribution of predicted snow depth smoothly on a map.

Keywords: Spatial Distribution of Snow Depth, Linear Regression, Kriging, Terrain Parameters, Samsami Basin, Northern Karoun.

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