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Modelling ash thickness spatial distribution after a grassland fire. The effect of sampling distance.

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After fire ash is distributed heterogeneously in the soil surface, providing different levels of soil protection and nutrient inputs. In the immediate period post-fire ash is the most valuable soil protection against erosion and understand ash distribution patterns is of major importance, because, because allow us to identify the most vulnerable areas to soil erosion. Modelling accuracy depends on the data density and the best method for data interpolation. In this communication we aim to study the effects of ash thickness samples, separated by 20, 40, 60, 80 and 100 cm on the modelling performance in a west faced slope with 15 % of inclination in an area of 80 m2.
We tested the experimental variogram for each data density and some well known interpolation methods as Inverse Distance to a Weight (IDW) (with the power of 1,2,3,4 and 5), Local Polynomial with the first and second polynomial order, Polynomial Regression (PR), Radial Basis Functions (RBF) as Multilog (MTG), Natural Cubic Spline (NCS), Multiquadratic (MTQ), Inverse Multiquadratic (IMTQ) and Thin plate Spline (TPS) and Ordinary Kriging. Overall we tested 16 methods of interpolation. Interpolation accuracy was observed with the cross-validation method that is achieved by taking each observation in turn out of the sample and estimating from the remaining ones. The errors produced in each interpolation allowed us to calculate the Root Mean Square Error (RMSE). The method with smaller RMSE is the most accurate to interpolation of ash thickness in each considered distance.
The results showed that ash sampling distance has important implications on variogram properties. Spherical model fits better with the sampling distance of 20 cm, Gaussian model with the distance of 40 and 100 cm, Linear model with the distance of 60 cm and Wave Hole Effect model with the distance of 80 cm. This means that sample designing had implications on the spatial structure and evolution of ash thickness properties across the studied area. From all the interpolation methods the most accurate for 20 cm, 40 cm and 60 cm of distance was IDW 1, for 80 cm and 100 cm IMTQ. This reveals that the small scale variability of ash distribution is detected until 60 cm of distance and data heterogeneity is very high. At the sampling distances of 80 cm and 100 cm IMPQ identified some patterns of ash thickness distribution. Among all sampling distances, on average, 60 cm presented less error and 20 the high error in sample prediction.

Keywords: Ash thickness, modelling, sampling distance, interpolation methods