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**Thesis for Obtaining an MSc Degree in Soil Resource Management - Soil Resource and Land Evaluation**

**Title:**

# Three-dimensional spatial modeling texture components and saturation percentage of soil in the Sistan plain

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**Abstract**

Soil texture and soil saturation percentage are the most important characteristics of soil that affect root growth, absorption of nutrients, water retention capacity, aeration, permeability, leaching, drainage, buffering capacity, amount of organic carbon and many other characteristics of soil. Digital soil mapping is one of the methods that can be used to prepare soil maps using environmental data by remote sensing and digital elevation model. The aim of this study was three-dimensional spatial modeling of soil particles and soil saturation percentage in Sistan plain. The information of 685 soil samples was used for soil texture components and 576 soil samples for soil saturation percentage at four depths (0-15, 15-30, 30-60 and 60-100 cm). In this study, common geostatistical methods, random forest, cubist and quantitative random forest methods were used for three-dimensional spatial modeling of these characteristics. The results showed that the common geostatistical methods (kriging, cokriging and IDW) using environmental variables in the spatial modeling of soil texture components and the saturation percentage in all depths had better performance compared to random forest, cubist and quantitative random forest methods, based on the highest value of $R^2$ and the lowest value of RMSE.

**Keywords:** Digital soil mapping, Deltaic soils, Arid region, Learning machines, Geostatistic, Random forest