



## **Mapping of soil salinity: a comparative study between deterministic and geostatistical methods, case of the Tadla plain (Morocco)**

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Soil salinization hazard in semi-arid regions such as Central Morocco is increasingly affecting arable lands and this is due to combined effects of anthropogenic activities (development of irrigation) and climate change (Multiplying drought episodes). In a rational strategy of fight against this hazard, salinity mapping is a key step to ensure effective spatiotemporal monitoring. The objective of this study is to test the effectiveness of geostatistical approach in mapping soil salinity compared to more forward deterministic interpolation methods. Three soil salinity sampling campaigns (27 September, 24 October and 19 November 2011) were conducted over the irrigated area of the Tadla plain, situated between the High and Middle Atlas in Central Morocco. Each campaign was made of 38 surface soil samples (upper 5 cm). From each sample the electrical conductivity (EC) was determined in saturated paste extract and used subsequently as proxy of soil salinity. The potential of deterministic interpolation methods (IDW) and geostatistical techniques (Ordinary Kriging) in mapping surface soil salinity was evaluated in a GIS environment through cross-validation technique.

Field measurements showed that the soil salinity was generally low except during the second campaign where a significant increase in EC values was recorded. Interpolation results showed a better performance with geostatistical approach compared to deterministic one. Indeed, for all the campaigns, cross-validation yielded lower RMSE and bias for Kriging than IDW. However, the performance of the two methods was dependent on the range and the structure of the spatial variability of salinity. Indeed, Kriging showed better accuracy for the second campaign in comparison with the two others. This could be explained by the wider range of values of soil salinity during this campaign, which has resulted in a greater range of spatial dependence and has a better modeling of the spatial variability of salinity, which was not the case in the other two campaigns.