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Regional scale soil salinity assessment using remote sensing based environmental factors and vegetation indicators

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Land degradation, specifically soil salinization has rendered large areas of China west sterile and unproductive while diminishing the productivity of adjacent lands and other areas where salting is less severe. Up to now despite decades of research in soil mapping, few accurate and up-to-date information on the spatial extent and variability of soil salinity are available for large geographic regions. This study explores the po-tentials of assessing soil salinity via linear and random forest modeling of remote sensing based environmental factors and indirect indicators. A case study is presented for the arid oases of Tarim and Junggar Basin, Xinjiang, China using time series land surface temperature (LST), evapotranspiration (ET), TRMM precipitation (TRM), DEM product and vegetation indexes as well as their second order products. In par-ticular, the location of the oasis, the best feature sets, different salinity degrees and modeling approaches were fully examined. All constructed models were evaluated for their fit to the whole data set and their performance in a leave-one-field-out spatial cross-validation. In addition, the Kruskal–Wallis rank test was adopted for the statis-tical comparison of different models. Overall, the random forest model outperformed the linear model for the two basins, all salinity degrees and datasets. As for feature set, LST and ET were consistently identified to be the most important factors for two ba-sins while the contribution of vegetation indexes vary with location. What's more, models performances are promising for the salinity ranges that are most relevant to agricultural productivity.