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# Study on the prediction of soil heavy metal elements content based on visible near-infrared spectroscopy

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**Abstract:** The estimation of soils heavy metal content can reflect the impending surroundings of surface, which lays theoretical foundation for using covered vegetation to monitor environment and investigate resource. In this study, the contents of Cr, Mn, Ni, Cu, Zn, As, Cd, Hg and Pb in 44 soil samples were collected from Fufeng County, Yangling County and Wugong County, Shaanxi Province and were used as data sources. ASD FieldSpec HR (350 ~ 2500 nm), and then the NOR, MSC and SNV of the reflectance were pretreated, the first deviation, second deviation and reflectance reciprocal logarithmic transformation were carried out. The optimal spectroscopy estimation model of nine heavy metal elements of Cr, Mn, Ni, Cu, Zn, As, Cd, Hg and Pb was established by regression method. Comparing the diffuse reflectance characteristics of different heavy metal contents and the effect of different pretreatment methods on the establishment of soil heavy metal spectral inversion model. The results of chemical analysis show that there was a serious Hg pollution in the study area, and the Cd content was close to the critical value. The results show that: (1) NOR, MSC and SNV were adopted for the acquisition of visible near-infrared. Combining differential transformation can improve the information of heavy metal elements in the soil, and use the correlation band energy Significantly improve the stability and predictability of the model. (2) The modeling accuracy of the optimal model of nine heavy metal spectra of Cr, Mn, Ni, Cu, Zn, As, Cd, Hg and Pb by PLSR method were 0.70, 0.79, 0.69, 0.81, 0.86, 0.58, 0.55, 0.99, 0.62. (3) The optimal estimation model of

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