

Research on hyperspectral remote sensing estimation model of heavy metal pollution in vegetation

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Hyperspectral remote sensing, which can provide higher spectrum resolution and super multi-band image spectrum data, and can well reflect the inherent spectral characteristics and differences of various vegetation in nature, has a wide range of applications in the vegetation monitoring. After the heavy metals getting into the interior of vegetation, they will cause changes in various physical and chemical parameters of vegetation, so that they will lead to the changes of spectral characteristics. This paper will take the corn in heavy metal copper pollution as an example, through analyzing the main spectrum features under hyperspectral remote sensing, and extracting the feature parameters of the red edge from the spectral, analyze the movement rules of the red edge of the corn in different pollution degrees and the relationships between the physiological index of the corn under the heavy metal pollution and them. According to multiple statistical analysis technique, regarded the red edge feature parameters as independent variable, establish the multiple regression estimation model of physiological index, and invert various physical and chemical parameters of vegetation polluted by heavy metals, which is helpful for the pollution degrees of vegetation to diagnose and evaluate. By analyzing the test data, based on the regression model of the red edge feature parameters with the character of simple and practical and high accuracy, it will be able to well reflect the pollution degrees of vegetation polluted by heavy metals, so it is worth doing and applying in practice.

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Photochemistry and the observed enrichment of O, C, N, and H isotopes in meteorite IOM

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Recently measured large isotope excursions in IOM

The remarkable O MIF signatures seen in acid-insoluble organic matter (IOM) from a CR2 meteorite [1] show some correlation with enhanced $\delta^{13}\text{C}$ values, suggesting that both enrichments may be a result of CO photochemistry. ^2H and ^{15}N enrichments in the same IOM do not correlate with ^{17}O and/or ^{13}C enrichments, but do show some correlation with each other [1]. Both N and H isotopes have been shown to be strongly fractionated by ion-molecule reactions in molecular clouds [2, 3]. The question I address here is are these results, particularly those for meteorite IOM [1], consistent with expected photochemical and ion-molecule processes.

Photochemical models of clouds and the solar nebula

It is well established that CO self-shielding produces large enrichment in product ^{17}O and ^{18}O , which are then stored in H_2O . Product C is similarly enriched in ^{13}C , although by a factor of ~ 2 less than the enrichment in ^{17}O and ^{18}O [4]. Self-shielding enrichment of ^{13}C is predicted by photochemical models of disks [5], but CO exchange with C^+ and CO condensation [6, 7], are also important. Disk model calculations, including ^{13}C at temperatures well above CO condensation, are in progress. As with CO, N_2 also undergoes self-shielding, producing enriched N and N (^2D), with the N stored in HCN. The N (^2D) rapidly forms NH, leading to reformation of N_2 by reaction of N and NH. Large ^{15}N enrichments are possible by N_2 self-shielding, but the total amount of enriched material produced is small [8]. Finally, H_2 also has a line-type absorption spectrum, and so also undergoes self-shielding at the edges of clouds and high surface of disks. At greater depths into these objects, where CO and N_2 self-shielding become important, H_2 lines are very broadened and will shield HD lines, thus reducing D enrichment. These results are consistent with a photochemical origin for O and (possibly) C isotopes signatures in IOM, and ion-molecule origin for H and N isotopes signatures in IOM.

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