基于氢氧同位素宁夏罗山植被水分来源不同方法比较研究

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摘 要：【目的】本研究选取了宁夏罗山国家级自然保护区的典型植物，对其中的模型进行了比较，并对其中的水分来源进行了解析。【方法】采用直接对比法,多元线性混合（IsoSource）模型以及贝叶斯混合（MixSIAR）模型这三种方法确定植物水分来源,并对两种模型的可信度进行评价。【结果】①乔木主要利用的是 0-10 cm 土层深度的土壤水；灌木不同土层深度土壤水利用比例最大的是 0-20 cm,柠条主要利用的土壤水为 80-100 cm 土层的水分；草本主要利用的水分来源于 0-10 cm 土层的土壤水。②基于直接对比法的分析结果,MixSIAR 模型较 IsoSource 的可以更好的区分植物水分来源,且模型性能评价指标 RMSE 值 MixSIAR 模型小于 IsoSource 模型。【结论】通过不同方法分析确定了植物水分来源,且 MixSIAR 模型分析植物水分来源的可靠性更高,误差更小。该研究成果可为在干旱和半干旱地区选用植物水源分析方法提供一些依据。

关键词：宁夏罗山 稳定同位素 IsoSource 模型 MixSIAR 模型

A comparative study on the water sources of vegetation in La Son, Ningxia by different methods

Abstract: 【Objective】 This study selected typical plants from the La Son national nature reserve in Ningxia to compare the model and determine the source of plant water. 【Method】The plant water sources were analyzed by using three methods: the direct comparison method, IsoSource model, and the Bayes MixSIAR model, and the reliability of the model was evaluated. 【Result】(1)The arbor mainly used 0-10 cm depth of soil water; the highest proportion of soil water use was 0-20 cm in different soil layers of shrub; Caragana korshinskii mainly uses 80-100cm of soil moisture; and the main water use of herbaceous plants comes from soil water in 0-10 cm soil layer. (2) Based on the direct comparison method, the MixSIAR model can better distinguish plant water sources than IsoSource, and the RMSE value of MixSIAR model is lower than that of IsoSource model. 【Conclusion】The source of plant water was determined by different methods,and that the MixSIAR model is more reliable and makes fewer errors in analyzing plant water sources. The research results can supply some basis for the selection of plant water source analysis methods in arid and semi-arid areas.

Key words: La Son, Ningxia；stable isotope；IsoSource model；MixSIAR model