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Mobility of rare earth elements in soil-plant-groundwater systems in Oman

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A study of the relationship between the chemical composition of groundwaters, plants and soils was carried in the Oman area. Groundwaters were collected from 13 wells in the Muscat area. Different species of plants were also sampled from different geological materials in the same area where the underlying rocks are primarily ophiolite and limestone. The different plant and groundwater samples were analysed for major and trace elements, including rare earth elements. The objective of this study is to determine the ability of plants to accumulate and to transfer some elements such as rare earth elements (REE) to the groundwaters in Oman and to provide a model for soil-plant- groundwater interaction in Oman

The preliminary results of this study showed that the total REE contents in different plants are about 2 to 7 μg per g of dried plants. The total REE contents in groundwaters are about 7 to 23 ppb. The distribution patterns of the REE in plants collected either from limestone or from ophiolite showed an enrichment in middle and heavy REE, realtively to the REE composition of the post archean shale composite (PAAS), with a significant negative anomaly in Ce and a positive anomaly in Eu.

The groundwaters and the plants had nearly similar REE distribution patterns. These patterns suggest that the transfer of REE from plants to the groundwaters occurs without any significant fractionation. By comparison to the Oman ophiolite (Durair et al., 2005), the REE in different species of plants, are depleted in Ce and in heavy REE and by comparison to a limestone geological standard (Kengo et al., 2003), either REE of

plants or REE of groundwaters are enriched in middle and heavy REE.

References:

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