

## **THE TIMING OF SECONDARY URANIUM MINERALISATION AND THE RECONSTRUCTION OF ANCIENT ENVIRONMENTS**

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The occurrence of naturally formed secondary uranium minerals in weathering profiles suggests that these phases are suitable for weathering geochronology using either the U-Pb or U-series dating techniques. Uranium is one of the most soluble and mobile trace elements in the surficial environment. Despite this mobility, secondary uranium minerals may preserve relatively old ages. Such minerals are formed in the surficial environment by oxidation of primary uranium ore minerals and provide valuable information on the timing and rate of uranium mobility through the geologic past. A thorough understanding of uranium geochemistry at low temperatures, over lengthy timescales and the impact of different climatic conditions is required to predict areas of extreme uranium mobility. The geochronology of secondary uranium minerals can be used to study the pathways for meteoric solution migration in U-bearing weathering profiles. Understanding these fluid migration paths and the history of dissolution-reprecipitation of supergene uranium minerals in the surficial environment can provide information useful in the consideration of safe mechanisms for disposing nuclear waste. Certain environmental conditions are able to cause intense uranium mobilisation and precipitation, for example, humid temperate climates in the early stages of erosion, or under arid conditions in mature landscapes. The high solubility of some secondary uranium minerals makes them ideally suited to dating subtle climatic transitions. Understanding the conditions, timing and rates of formation of secondary uranium minerals during weathering is necessary to constrain past climates, develop models of landscape evolution and trace element mobility in the surficial environment.