

Continuation of  $^7\text{Be}$  Experiments in the Biosphere 2 Varnish Garden

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Funding for Phase #1.

**Project Summary**

Rock varnish accumulates very slowly (microns per millennia) on stable rock surfaces in desert settings. As the chemical composition of varnish appears to be very sensitive to climatic conditions, it has potential as a paleoprecipitation proxy. One of us (Tanzhuo Liu) has made thin sections of thousands of varnishes from deserts throughout the world. He has also done hundreds of electron microprobe line-scans and maps on varnish thin sections. These studies confirm that within a region the chemical stratigraphy of varnish is spatially uniform (high  $\text{MnO}_2$  during wet periods; lower during dry periods). Unfortunately, little is known of the mechanisms governing the delivery of ingredients for varnish or governing the deposition of these ingredients on the varnish surface. We propose to use the 54-day half-life cosmogenic isotope  $^7\text{Be}$  to study these processes. Because of its short half-life, we can conduct interactive experiments designed to elucidate the roles of rain, dew, dust, and aerosols in delivery of beryllium and of bacteria in the deposition of beryllium. We propose here, as phase #1 of our research program, a series of interactive experiments to be carried out in a fenced-in site on the Biosphere 2 property. Based on the results of these experiments, we will at a later date propose a set of phase #2 experiments involving laboratory rains spiked with a number of short-lived radioisotopes. These experiments will be designed to trace the relative uptake by natural varnish surfaces of a range of chemical substances.