Ferricretes, or indurated iron oxides, are a common regolith material found in mineral prospective areas around the word, including Australia. On Kangaroo Island, they are the dominant regolith material and they are being studied to determine their usefulness as a sample media for geochemical exploration. Before they can be effectively used as an exploration tool their formation must be understood. There are a number of different scales that can be looked at, here we are looking at the microscopic level. From work conducted on the Microprobe SXFive at Adelaide Microscopy, element maps were obtained that enable us to see microscopic processes at work in the ferricretes, and better understand the larger scale processes that form them. We have been able to see the transition from weathered saprolite, with fabric still evident, to the pisoliths with multiple growth stages and the intricacies of the matrix which show several stages of formation. The conclusions of this being that ferricrete formation is not one single event, but a constantly evolving process and needs to be placed in a broader landscape context when used as a sample media.

**Different Ferricrete Morphologies**

Ferricrete samples have been divided into two broad categories, *in situ* and transported ferricretes. The *in situ* ferricretes are primarily ferruginised bedrock or saprolite (Figure 1). The transported ferricretes are dominated by pisolitic (Figure 2), nodular and veriform (Figure 3) ferricretes.

**Different Ferricrete Morphologies and Mineral Exploration**

We have found that formation of *in situ* ferricretes involves a greater component of vertical elemental and mineralogical reworking and will thus have a greater chance of carrying a signature of proximal buried mineralisation. Whereas transported ferricretes, the formation of which is dominated by distributive lateral processes, are likely to give a broader and more diffuse geochemical signature.