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Applying a new understanding of supergene REE deposit formation to global exploration initiatives for environmentally sustainable resources

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Two new models have recently been proposed for the formation of REE ion-adsorption deposits and it is likely that they are both active in their related study profiles described in the Ambohimirahavavy Complex in Madagascar (Marquis et al, 2016) and the Serra de Monchique (SDM) complex in Portugal (Hardy et al, 2016). These are two separate environments presenting two different soil systems in terms of flora, protolith and structure.

In the latosol profiles of SDM the natural sweating cycle of eucalyptus trees is proposed as the main geochemical cycling control for some 40% of Fe and 30% of Y, which have been observed migrating up and down profile seasonally between upper horizons and the rooting depths of these intensively farmed trees.

If, through their natural cycle, eucalyptus trees in SDM are capable of concentrating depleted protolithic Y contents of 4-10ppm to some 140-160ppm in their enriched 150-200cm deep E horizons in only the 40 years since they were introduced to the region (Jenkins, 1979), then what potential deposits and concentrations may lay underneath older plantations across Brazil, Chile, China and most importantly, Australia, where these trees naturally cover some 16% of the entire continent.

Eucalyptus is mostly farmed as pulp for paper mills and has lost its market value with the demand for paper decreasing, as the demand for REEs increases, ironically driven by the demand for the accessible technology to replace paper (EPA, 2012).

Not only might there be great resources below these forests, but the removal of the aggressive intrusive species would be welcomed across Southern Europe and South America where they have limited market value and have destroyed local ecosystems and water supplies (Brito, 1999), where local people are actively seeking an alternative use of their lands.

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