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Talk title	Primary-hosted uranium resources, geology, and mineralisation of the Damara Orogen, Namibia
By	Dr. Guy Freemantle
Date	Monday 24th February 2025
Time	17h30
VENUE	Auditorium of the MME

Abstract:

**Primary-hosted uranium resources, geology, and mineralisation of the
Damara Orogen, Namibia**

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Geological Society of Namibia Talk 24.02.2025

The bulk of Namibian uranium deposits occur in the Erongo Region, where two categories of deposits host the nation's >380 kt indicated U resources: 77 % in primary-hosted deposits of the Rössing type; and 23 % in carnotite-dominant surficial deposits of the Langer Heinrich type. The primary-hosted deposits are those in which U occurs in the sheeted leucogranites (SLG) that are commonly referred to as alaskite. Presently ~130 kt U indicated resources are hosted in at least four unexploited alaskite deposits within a 50 km radius of Rössing and Husab. The major primary deposits are products of the Pan African Damara Orogeny, in which the high-T°/low-P southern Central Zone (sCZ) hosts the highest-grade metamorphism, and consequently the greatest density of granitic intrusions occur. All of the sCZ primary deposits are similar, having formed in structurally prepared sites in granulite facies Neoproterozoic metasediments of the lower Damara Supergroup; spatially proximal to basement-cored domes and inliers, and temporally-proximal to the regional peak metamorphism. Economic deposits occur on the southwest edge of the Khan Inlier at Etango, on the south eastern margins of the Ida Dome at Omahola, and on the eastern edge of a basement inlier at Valencia. Contemporary interpretations for the formation of these large, low-grade deposits favour models of low-percentage partial melt of weakly-uraniferous source material that interact with reactive metasediments that encourage the precipitation of U(IV) oxides and silicates. The uranium repositories in the source rocks include common accessory minerals, such as zircon, monazite, biotite, and apatite, that retain or release U, Th, lanthanides, and other incompatible elements into the silicate melt and magmatic fluids. The bulk of U occurs in uraninite [(U₄+,U₆+)O₂], coffinite [U(SiO₄)_{1-x}(OH)_{4x}], and secondary hydrate minerals, predominantly uranophane

$[\text{Ca}(\text{UO}_2)_2\text{SiO}_3(\text{OH})_2 \cdot 5(\text{H}_2\text{O})]$. A relatively low proportion of U is hosted in the refractory minerals betafite $[(\text{Ca},\text{U})_2(\text{Ti},\text{Nb},\text{Ta})_2\text{O}_6(\text{OH})]$ and/or brannerite $[\text{UTi}_2\text{O}_6]$.

