Natural hydrogen resource potential of Australia

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The inferred resource potential of molecular hydrogen (H₂) in Australia has been assessed as world class (Moretti et al., 2021). However, such an assessment is based on indirect, untested methodologies and the presence of only a handful of H₂-rich natural gases (H₂ > 10 mol%) (Boreham et al., 2021). The identification of abiogenic H₂-rich gases associated with gold mineralisation in the Neoarchean Yilgarn Craton, Western Australia has extended prospective areas to structures not traditional targeted by petroleum exploration drilling (ibid).

Models of H₂ production rates based on water radiolysis mediated by the radioactive decay of U, Th and K-bearing minerals, coupled with helium production rates (α-particles from U and Th decay), can apportion water radiolysis and mineral hydration redox reactions (e.g. ferrous-ferric iron in serpentinization). However, data limitations and extrapolations at local–global scales can result in a wide range in calculated minimum and maximum H₂ production rates (ibid).

Using the data in Wilford and Kroll (2019), radiogenic U, Th and K contents and rock densities are assigned at a 100m x 100m grid spacing across onshore Australia. The modelled H₂ production rate is a minimum of ~1.6 MMm⁻³ yr⁻¹ to a depth of 1 km. This compares with a maximum rate of ~58 MMm⁻³ yr⁻¹ for Australia’s share from global Precambrian cratons. Although the reasons for such a wide range in H₂ production rate estimates are not fully understood, the current analysis provides the foundation for continued re-assessment with new knowledge and datasets of Australia’s natural H₂ resource potential.

References:

