

SEEING RED: a history of redness in Australian landscapes

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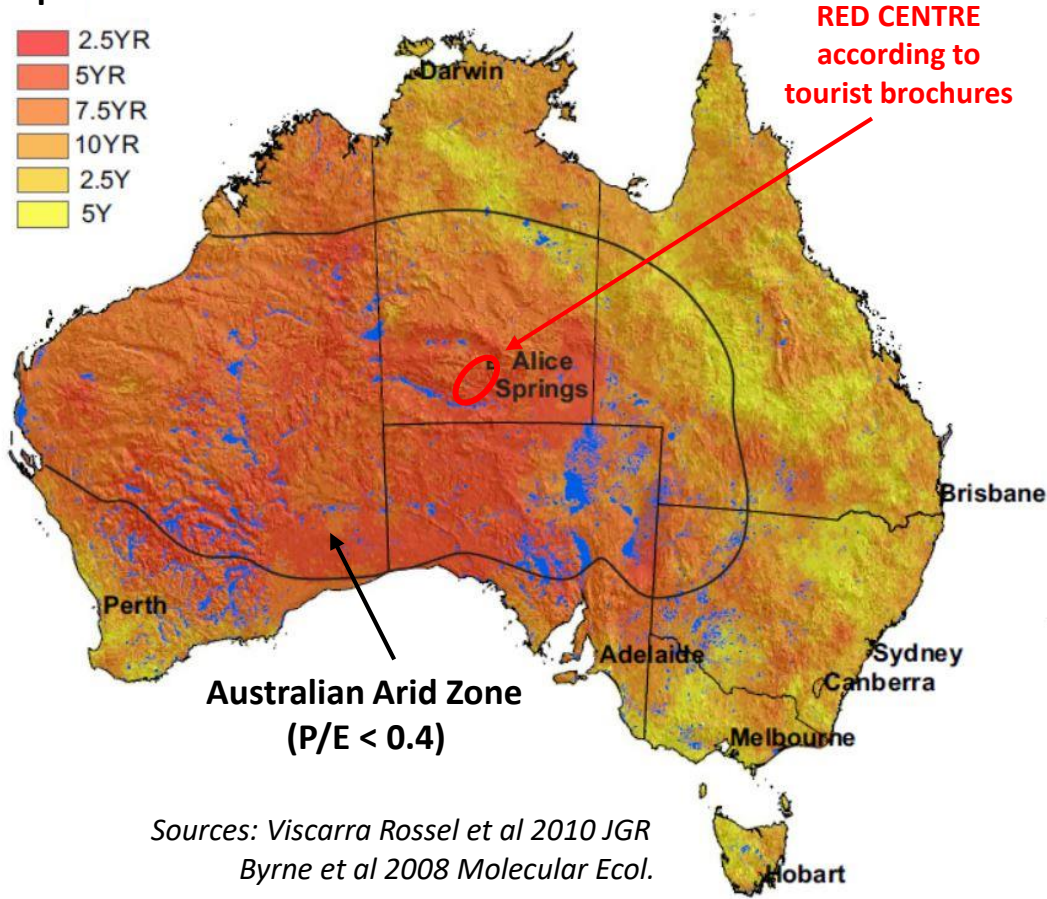
Research School of Earth Sciences, ANU



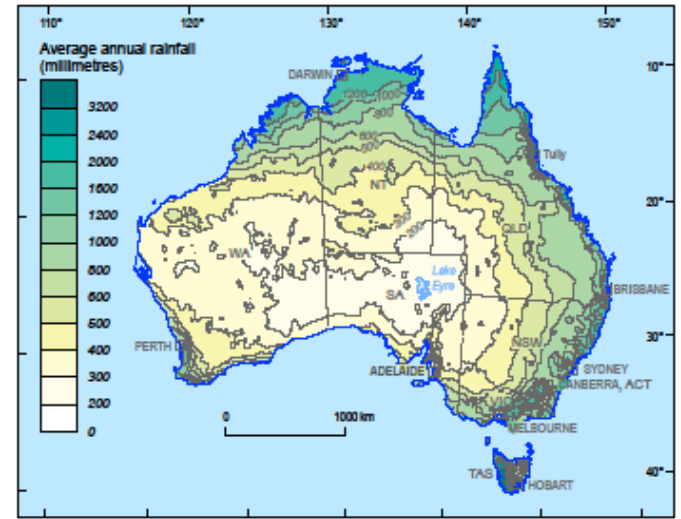
Redness = hematite and correlates with aridity?

Spectral hue of Australian soils

- 2.5YR
- 5YR
- 7.5YR
- 10YR
- 2.5Y
- 5Y



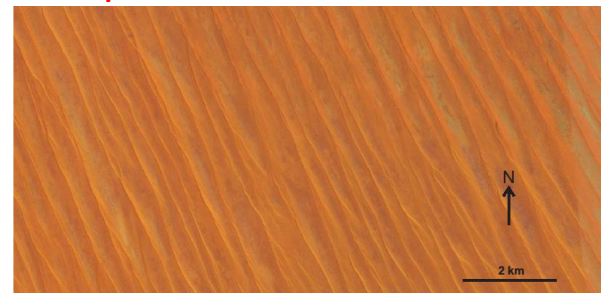
Sources: Viscarra Rossel et al 2010 JGR
Byrne et al 2008 Molecular Ecol.



Source: Blewett 2012 Shaping a Nation



Simpson Desert dunes

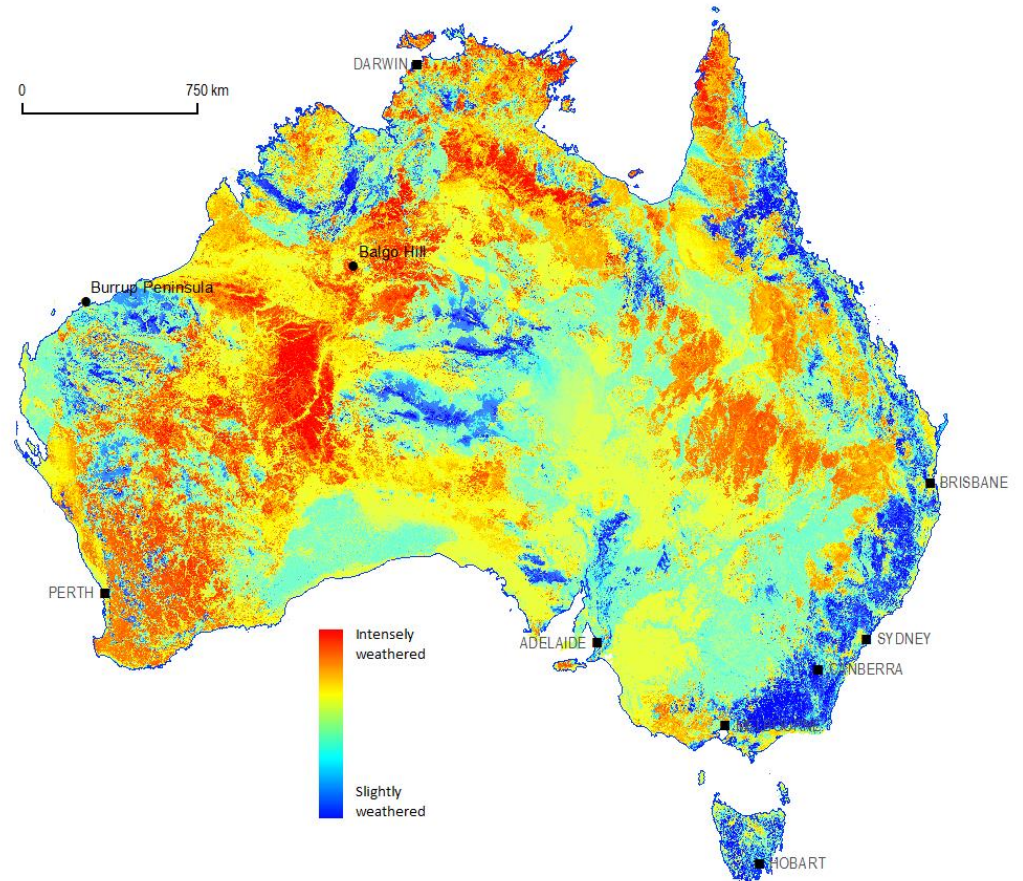




BURRUP PENINSULA - World's largest rock art gallery

Slightly weathered Gidley Granophyre (2.7 Ga)

Red weathering only 'skin deep'



Weathering Intensity Index based on gamma ray spectrometry & digital terrain analysis

Source: Wilford 2012 *Geoderma*

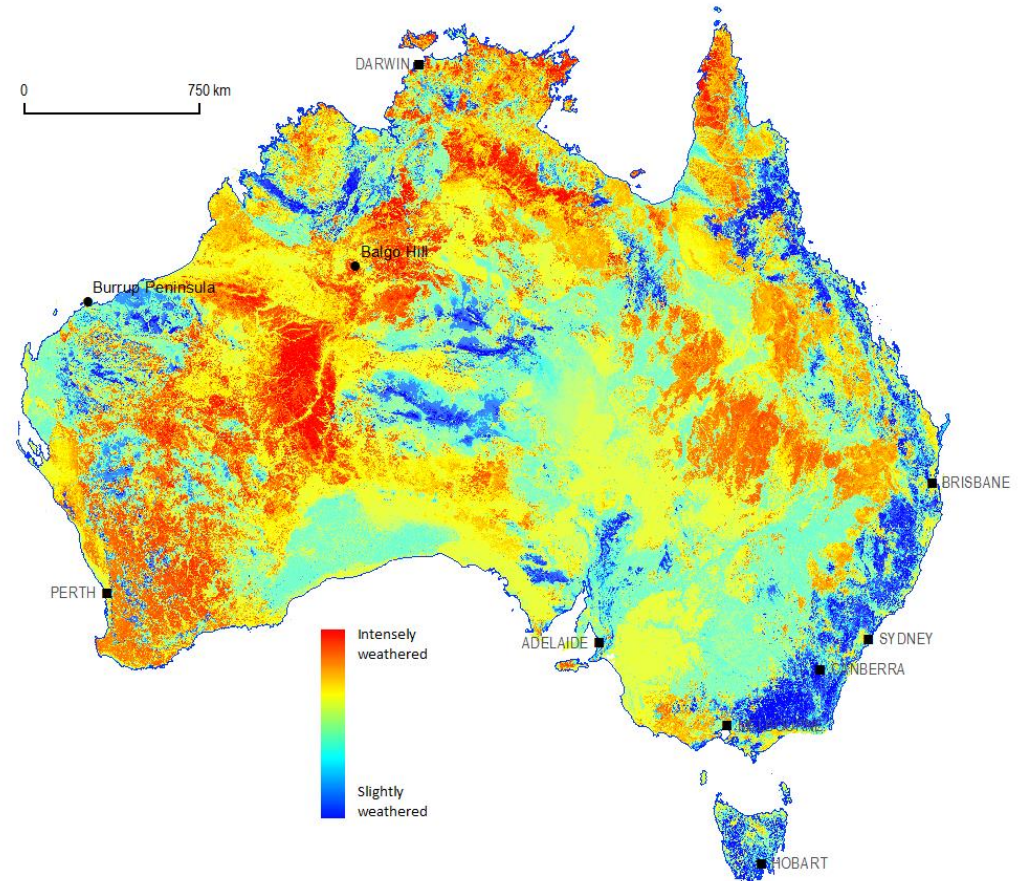


Intensely weathered Permian sediments at Balgo Hill (above)

Red weathering to more than 50 m depth in Proterozoic rocks (below)

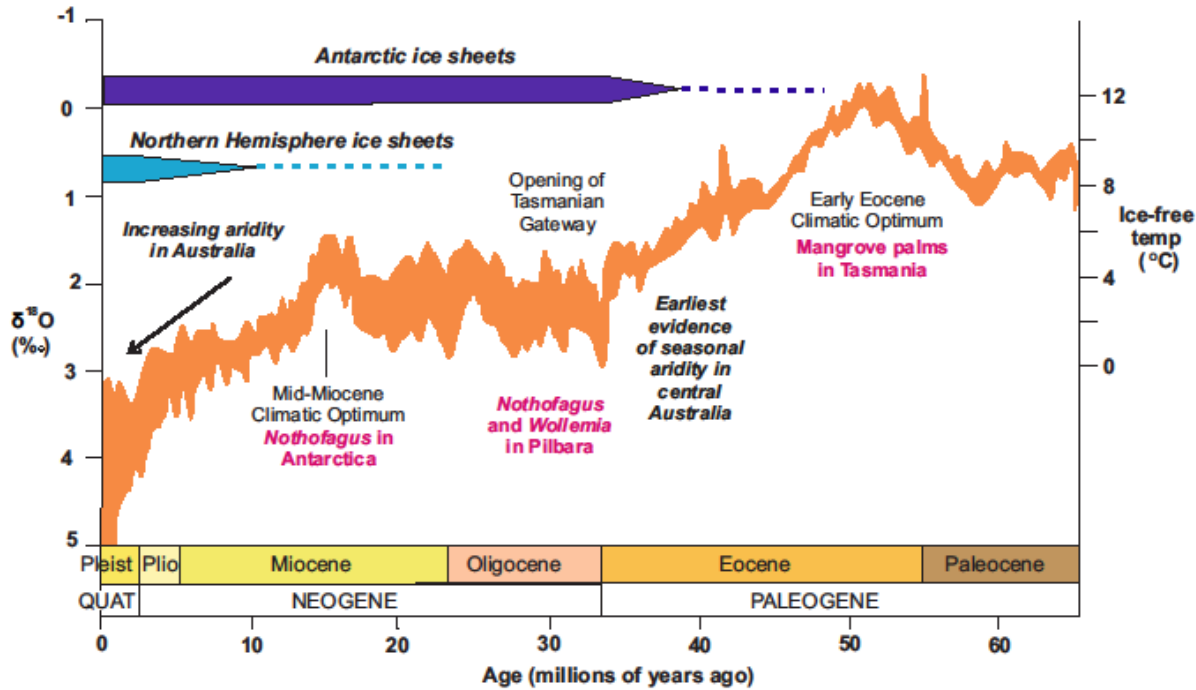


WESTERN TANAMI DESERT

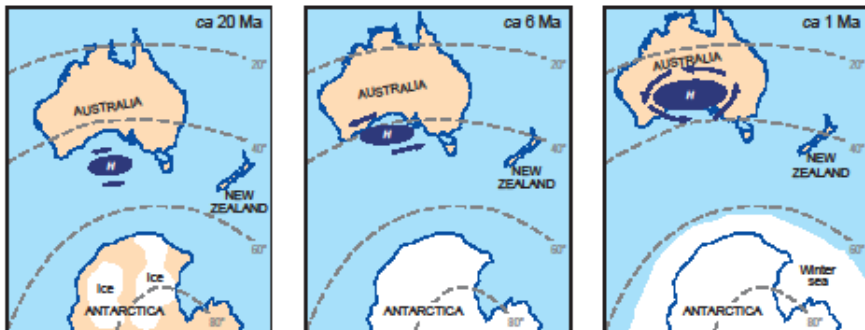


Weathering Intensity Index based on gamma ray spectrometry & digital terrain analysis

CENOZOIC GLOBAL PALEOCLIMATE DRIVES AUSSIE ARIDITY?



Simpson Desert dunes from 1 Ma

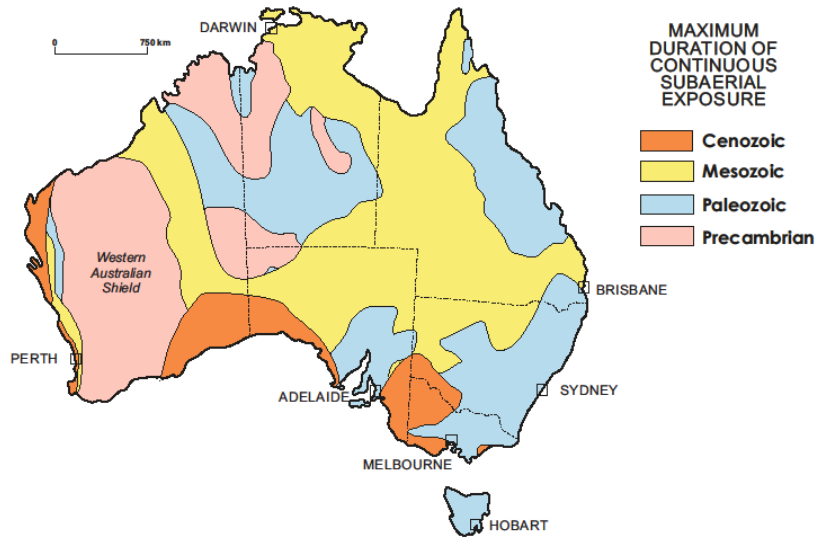


Opening of Tasmanian Gateway, growth of Antarctica ice sheet and position of STHP's

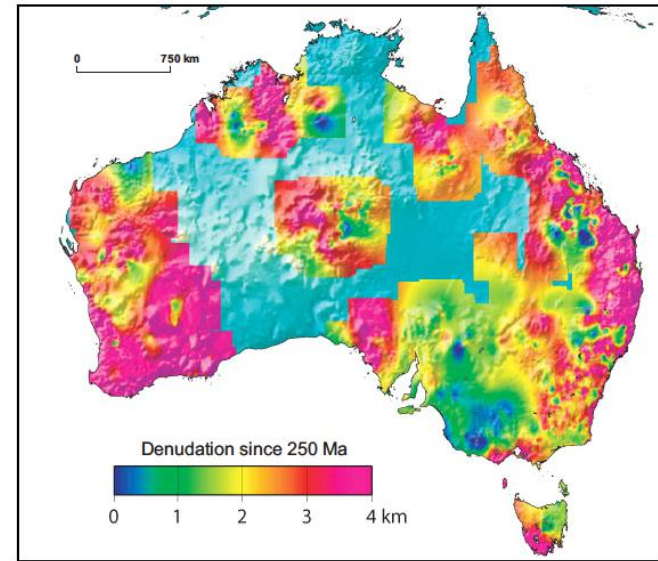


Simpson Desert gibbers from 4 Ma

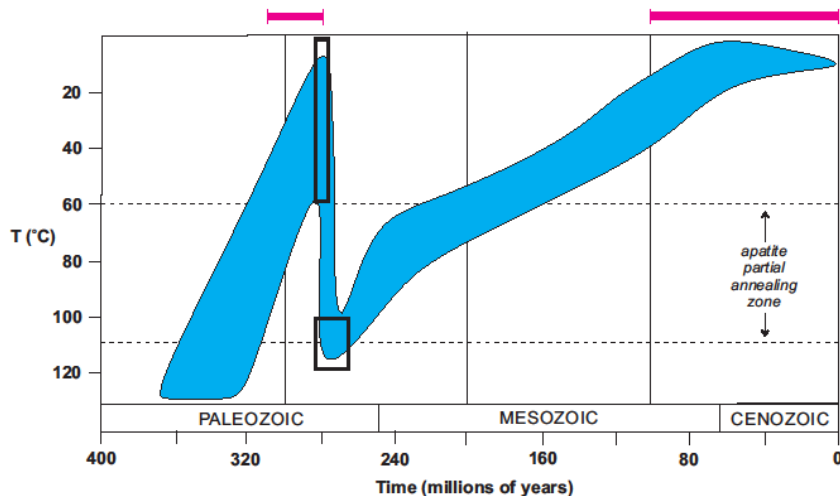
Paleogeographic reconstructions - ancient subaerial exposure



Apatite FT thermochronology - km-scale denudation



Periods of deep oxidative weathering (hematite)
dated by paleomagnetism

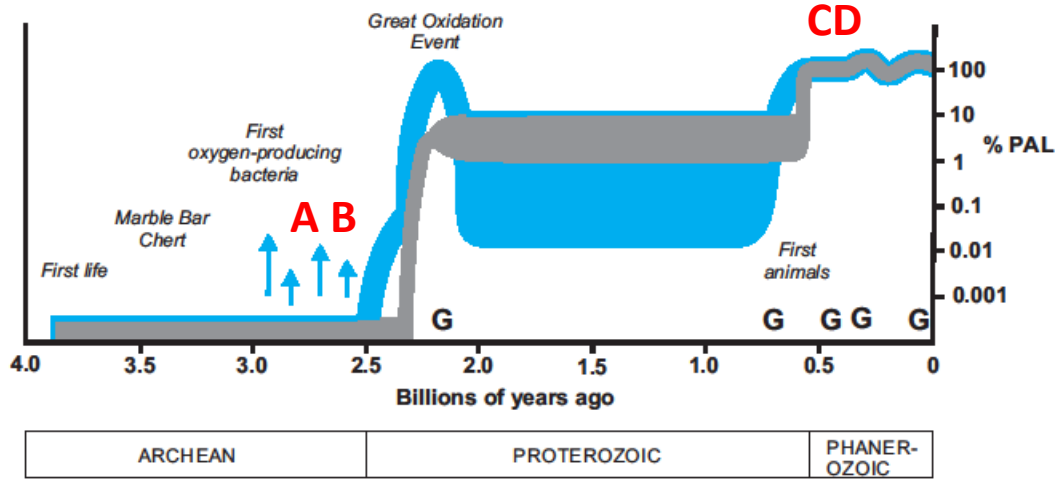


Thermal history of northern Yilgarn

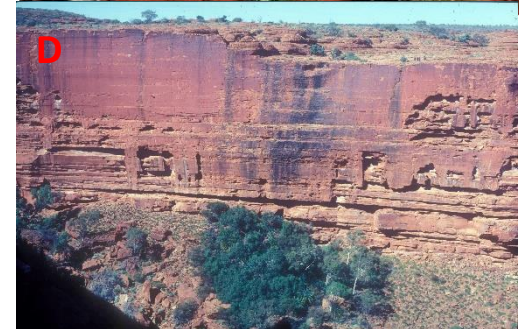
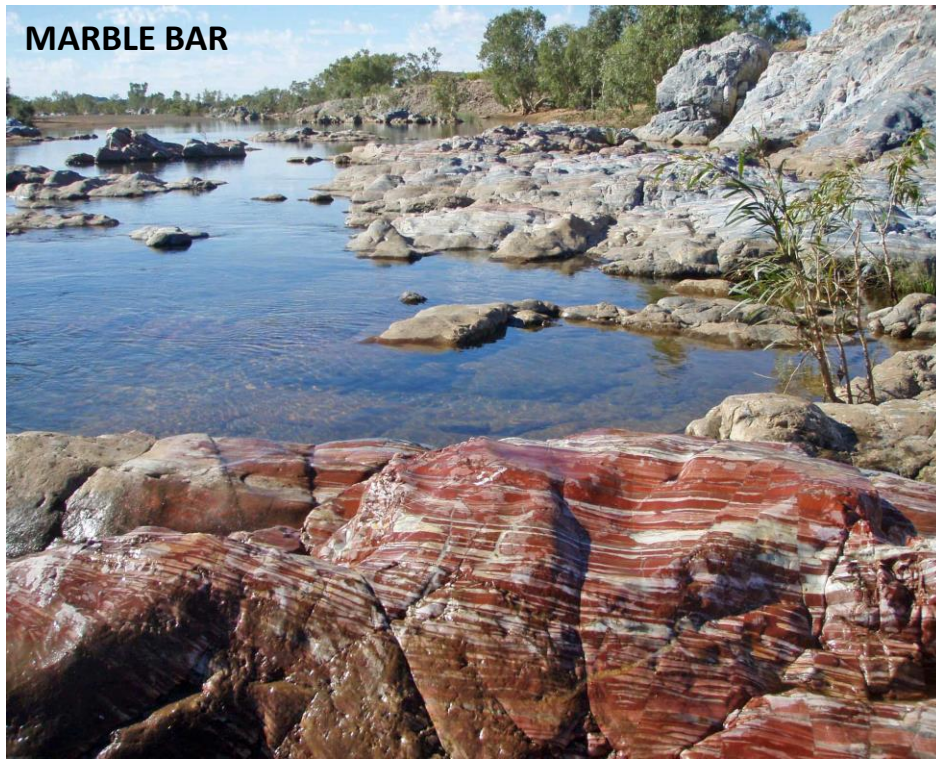
- km-scale burial & exhumation
- ancient red weathering survives

Sources: Pillans 2007 *J Quat Sci*; Kohn et al 2002 *AJES*
Weber et al 2005 *Tectonophysics*

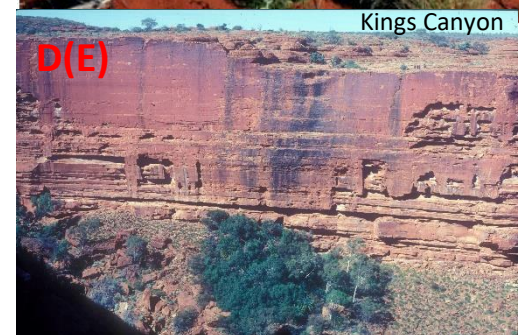
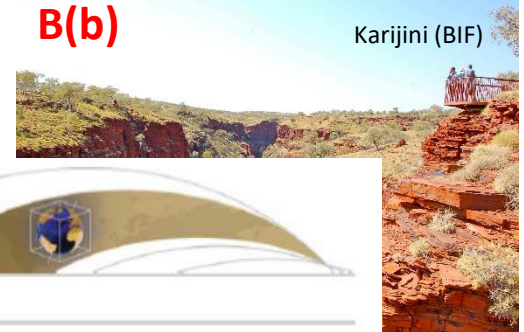
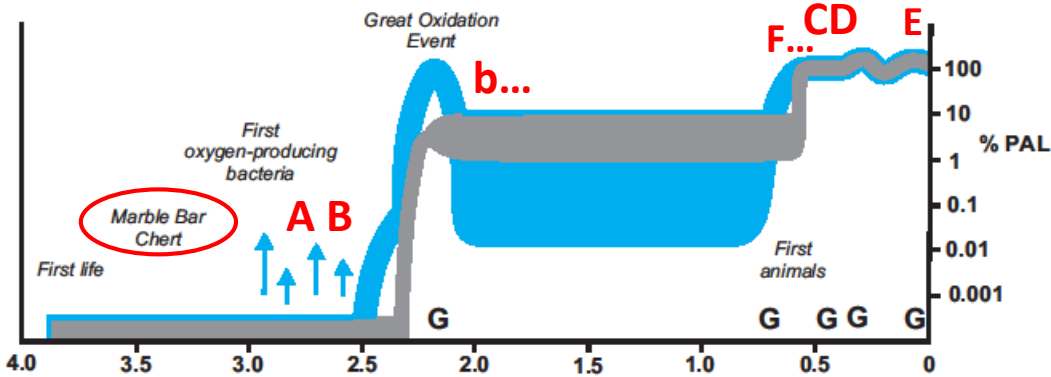
History of atmospheric oxygen



Source: Lyons et al 2014 Nature



History of atmospheric oxygen and redness



AGU PUBLICATIONS

Geochemistry, Geophysics, Geosystems

RESEARCH ARTICLE

10.1002/2017GC007091

Special Section:

Magnetism From Atomic to Planetary Scales: Physical Principles and Interdisciplinary Applications in Geo- and Planetary Sciences

Magnetic Properties and Paleomagnetism of Zebra Rock, Western Australia: Chemical Remanence Acquisition in Hematite Pigment and Ediacaran Geomagnetic Field Behavior

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MARBLE BAR

