

# Redox Revolutions on Earth and Beyond

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**Abstract:** The molecule O<sub>2</sub> looms large in the search for life on extrasolar planets, because Earth's O<sub>2</sub>-rich atmosphere is a consequence of biology. However, it is likely that O<sub>2</sub> was being produced on Earth long before it accumulated in the atmosphere. Its rise was likely delayed by interactions between the atmosphere and the solid planet. If so, the secular evolution of the solid Earth played a key role in modulating the oxygenation of Earth's surface environment. This emerging understanding of Earth's redox revolution raises important questions about the likelihood of similar revolutions on other worlds, and highlights the need for far better understanding of solid Earth processes - and how these processes might operate on other nominally "Earth-like" worlds - as a key part of the evolving exoplanetary research enterprise.