



UNIVERSITÀ
DI TRENTO

Dipartimento di
Biologia Cellulare, Computazionale e Integrata - CIBIO

4 JUNE

11:00 A.M.

ROOM A207 - POVO 2

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● ● **SIMULATED GEOCHEMISTRY OF THE EARLY**
● ● **EARTH AND EXOPLANETS FUELS A HYDROGEN-**
● ● **DEPENDENT PRIMORDIAL METABOLISM**

This study investigates how **abiotic hydrogen (H₂)** production can support early and extraterrestrial life. Experiments simulating early Earth conditions show that iron-sulfide minerals (mackinawite and greigite) can generate enough **H₂ to sustain the growth and metabolism of hydrogen-dependent methanogenic archaea**, promoting **CO₂ fixation** via the **acetyl-CoA** pathway. Extending this approach to Saturn's moon Enceladus, the study demonstrates that simulated alkaline ocean conditions - rich in H₂ and dissolved inorganic carbon - can support **the growth of methanogens** even at extremely high pH. Despite low CO₂ availability, these organisms adapt by upregulating the acetyl-CoA pathway, enabling efficient carbon fixation. Overall, the results suggest that **abiotic H₂** from geochemical processes **can fuel primitive metabolism** on early Earth and potentially sustain life in extraterrestrial environments like Enceladus.