Workshop Without Walls: Upstairs Downstairs

Breakout Group 2 Note-taking

Context in order to distinguish between abiotic and biotic signatures?

O2 context (easier?):
Sources:
Stellar properties are very important due to abiotic H2O splitting, CO2 “splitting,”
“non-condensing gas idea”
How is CO drawn down after CO2 splitting to produce O2?
What about sulfur species photochemistry?? volcanism + many redox states available for S...
Unknown process(?) generating O2 detected -> Rosetta Comet (clues about outer solar system redox state?)
How can an oxidized mantle affect O2 production? Do we need to understand what determines mantle redox state to understand O2 sources? (e.g. H going into core, volcanoes belching out highly oxidized species? Even O2?)

CH4 context (harder?): Difficult even on Earth!
Sources: fluxes?

Sinks: fluxes?

What is a reducing planet’s biosignature? (in reducing planet focus on oxidants in atmo?)
vs.
What is an oxidizing planet’s biosignature? (in oxidizing planet focus on reductants in atmo?)

On Everett’s comment:
Single photosystem photosynthetic apparati have evolved separately multiple times. Oxygenic photosynthesis (2 photosystems) has evolved once and diversified from there, and is much more complicated structurally.

Prioritize important contexts?
heatflow
mantle redox state (can we even set constraints for exoplanets?)

observations (direct and indirect) needed:
planetary elemental abundances, mass:radius