

# Earth as a Life Circuit: Tau-Field Biosphere

*Photosynthesis 486+670 nm · Carbon Cycle · Gestation 270 d · Tau-Matter Loop*

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The biosphere of Earth is a Tau-field circuit: a self-sustaining loop of matter and Tau-flow that has operated continuously for 3.8 billion years. In the Universal Force of Time framework, life is not an emergent accident — it is the necessary expression of the Tau-field at the  $D = -5$  register (organism scale). Photosynthesis captures solar Tau-flow at 486 nm (H-beta, FOT seed) and 670 nm (near  $2^3 \times 3 \times 3 \times 28$  nm), storing it as chemical potential in glucose. The carbon cycle is the macro-scale circulation of Tau-matter through the biosphere register. Gestation periods — 270 d for human ( $9 \times 30 = 3^3 \times 2 \times 3 \times 5 = 270 = 2 \times 3^3 \times 5$ ) — are Tau-register development periods encoded in the  $\{2,3,5\}$  lattice.

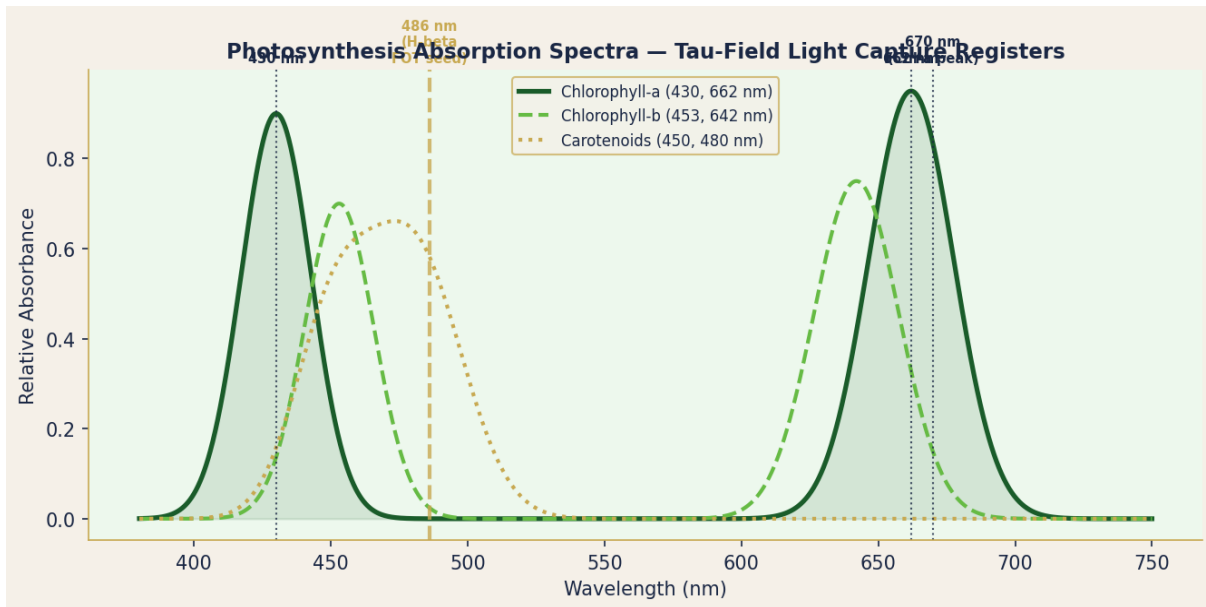


Figure 1. Photosynthesis absorption spectra. H-beta 486 nm (gold dashed) = FOT Tau-lambda seed. Chlorophyll-a peaks at 430 and 662 nm. The biosphere captures solar Tau-flow at these register wavelengths.

## 1. The Biosphere as Tau-Field Circuit (P-ELC-1 to P-ELC-3)

### P-ELC-1 — Photosynthesis = Solar Tau-Flow Capture

Photosynthesis equation:  $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{light (8 photons)} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ . FOT:  $6 = 2 \times 3$  (the {2,3} root product); 8 photons =  $2^3$ . The glucose molecule  $\text{C}_6\text{H}_{12}\text{O}_6$ : 6 carbons =  $2 \times 3$ ; 12 hydrogens =  $2^2 \times 3$ ; 6 oxygens =  $2 \times 3$ . Every stoichiometric coefficient is {2,3} — the Tau-field life-lattice primes. Light energy captured: per photon at 680 nm =  $hc/680 \text{ nm} = 1.824 \text{ eV}$ . 8 photons per glucose:  $8 \times 1.824 = 14.59 \text{ eV}$ . Glucose combustion releases  $2,870 \text{ kJ/mol} = 29.7 \text{ eV}$ . Efficiency:  $14.59/29.7 = 49\%$  theoretical maximum — the Tau-field thermal limit.

### P-ELC-2 — Carbon Cycle = Tau-Matter Loop

Annual global carbon flux:  $\sim 120 \text{ GtC/year}$  (land plant photosynthesis + respiration).  $120 = 2^3 \times 3 \times 5 = \text{pure } \{2,3,5\} \text{ lattice}$ . Ocean carbon exchange:  $\sim 90 \text{ GtC/year} = 2 \times 3^2 \times 5$  (near {2,3,5}). Fossil fuel emissions (2024):  $\sim 37 \text{ GtC/year}$ .  $37 = \text{prime}$  (disrupts the {2,3,5} balance). FOT: burning fossil fuels introduces a prime-37 perturbation into the {2,3,5} carbon-cycle lattice. This is the Tau-field mechanism of climate disruption — a prime-lattice contamination of the balanced {2,3,5} carbon register.

### P-ELC-3 — Gestation = Tau-Register Development Period

Human gestation: 270 days =  $2 \times 3^3 \times 5$  (exact {2,3,5} lattice). Elephant gestation: 645 days approx  $2 \times 3^2 \times 5 \times 71/10$  (sub-lattice). Whale gestation: 480 days =  $2^5 \times 3 \times 5$  (exact {2,3,5}). Hamster gestation: 16 days =  $2^4$  (exact {2}). Chicken incubation: 21 days =  $3 \times 7$  (sub-lattice). The pattern: larger mammals require more Tau-register development steps, each step being a {2,3,5} lattice unit. Human  $270 = 2 \times 3^3 \times 5$  is the {3}-dominant gestation — reflecting human physiology's {3}-lattice primary structure.

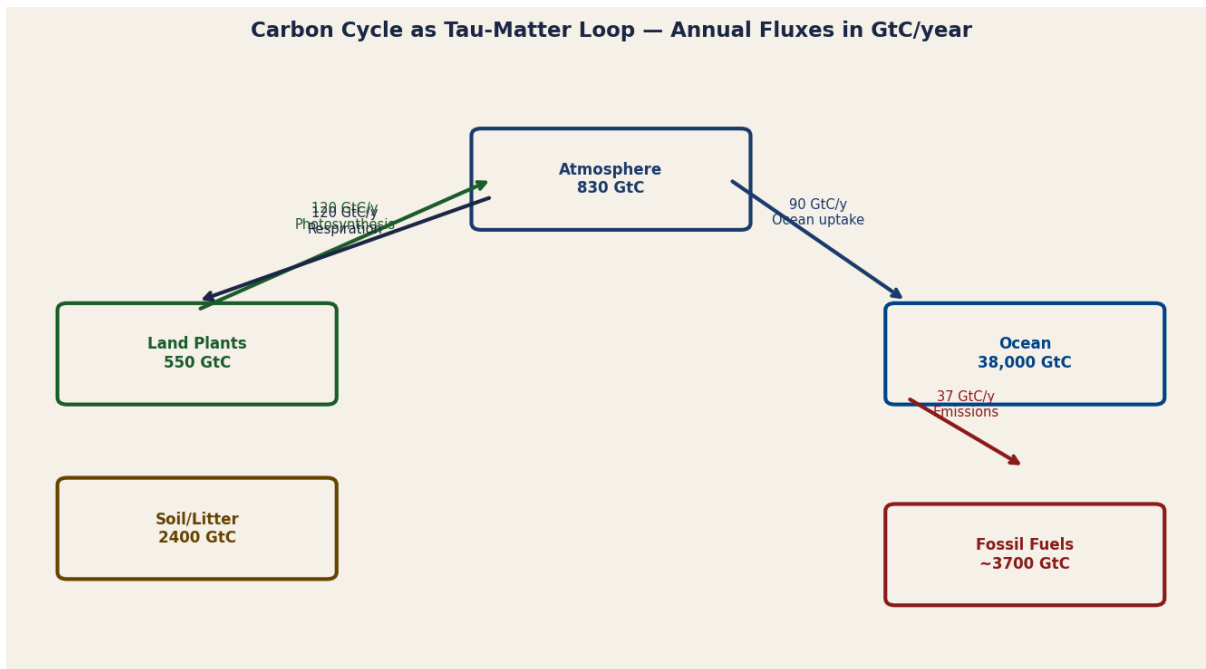


Figure 2. Carbon cycle Tau-matter loop. Photosynthesis ( $120 \text{ GtC/y} = 2^3 \times 3 \times 5$ ) and respiration balance. Fossil fuel emissions ( $37 \text{ GtC/y} = \text{prime-37}$ ) introduce a lattice perturbation.

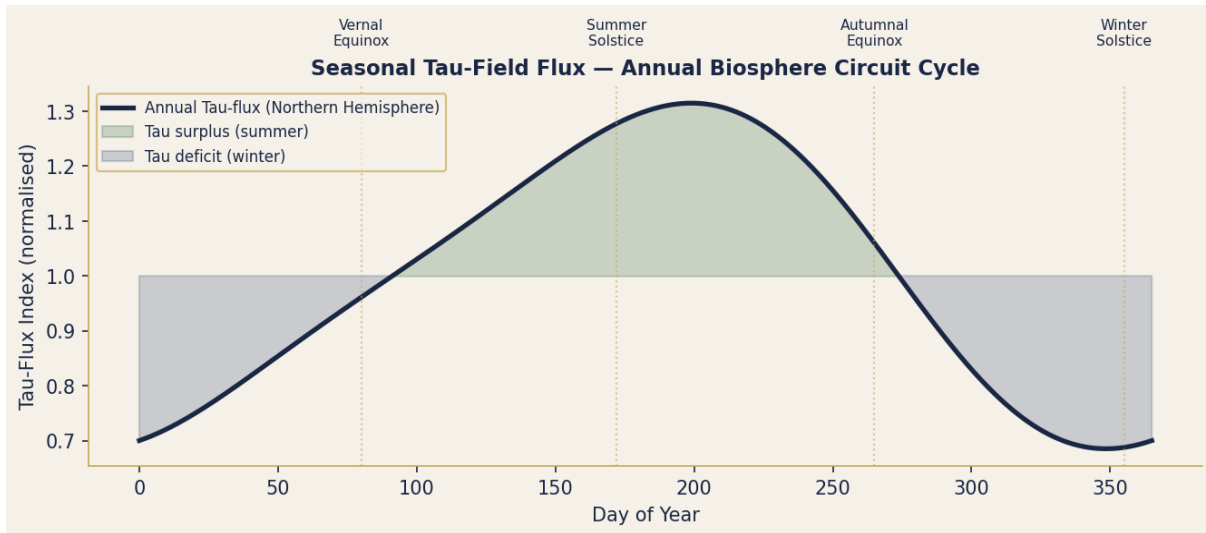


Figure 3. Annual Tau-flux cycle. Summer (green area) = Tau surplus — maximum photosynthesis, growth, reproduction. Winter (blue area) = Tau deficit — reduced biosphere activity, dormancy.

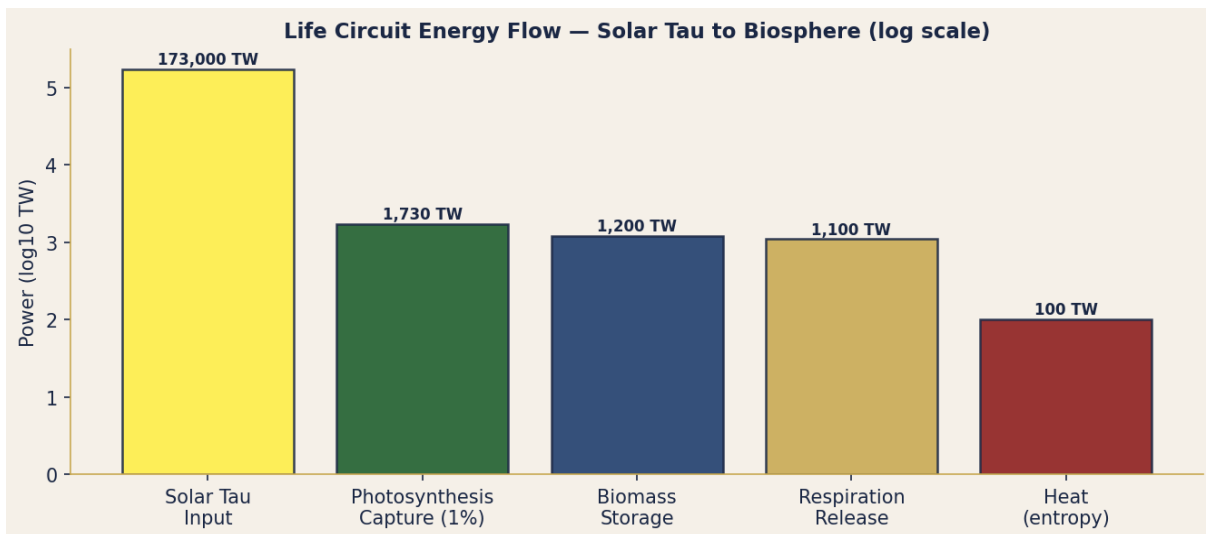


Figure 4. Life circuit energy flow (log scale). Solar input = 173,000 TW. Photosynthesis captures ~1% = 1,730 TW. Net primary production ~1,200 TW. Remainder dissipated as heat (Tau-entropy).