Geophysical Research Abstracts
Vol. 20, EGU2018-16975, 2018
EGU General Assembly 2018

A Biological Approach to Gaia theory

Sergio Rubin
Université Catholique de Louvain, ELI, ELIC, Louvain-la-Neuve, Belgium (sergio.rubin7@gmail.com)

The main tenet of Gaia theory states that life is a planetary phenomenon. While Gaia has been approached in terms of homeostasis, thermodynamic optimization, self-organization and co-evolution, here we develop a biological approach in terms of (M,R)-systems and Autopoiesis equivalence. By applying a minimum set of key categories to ongoing fluxes and cycles of the Earth system that are metabolized from internal and external resources by a planetary microbial network, we obtain a congruent mapping between Gaia and a single biological (M,R)-Autopoietic unity. Furthermore, from our biological approach we explore the open dynamics of Gaia's genotype in terms of internal forcing of PMN's by-products and Gaia's phenotype in terms of autonomy and anticipation. Whether Gaia's behaviours (phenotype) can be locally and temporally approximated in terms of minimization of free energy by active inference is not clear. Nevertheless, our results suggest that biological activity fabricates and constitute (become itself) more than co-evolve (soft hypothesis), regulate, optimize or self-organize (strong hypothesis) the Gaia phenomenon. Strong implications on environmental theory and climate prediction are of interest.