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CIVILIZATIONS THROUGH THE EYE OF KARDASHEV: AN EXTENDED SCALING

Abstract

The Kardashev scale is a procedure by which we can detect the advancement in technology and the amount of energy our civilization is consuming presently from planetary scale. It is possible to distinguish civilizations based on their capability to harness energy from different stages: Type I- from planetary bodies, Type II- from star, Type III- from host galaxy. At present, our human civilization consumes $17e+12$ J/sec energy which places us at 0.72 as per year 2015. In order for us to step up to Type I, total energy harnessed by us should be $1e+16$ J/sec. Thus, to increase the energy consumption by 1 million, literature suggests a gradual hyperexponential curve. The civilization will also undergo physical and thermodynamical transformations. There are various biochemical processes that will occur at different ecological trophic levels due to the abundance of complex polymer molecules. When two or more reactions are coupled such that thermodynamically favorable and unfavorable reactions combine, it overall results in a favorable reaction. For each phase transitions occurring, we can thermodynamically calculate temperature, pressure dependencies and other changes that are taking place in the environment at equilibrium. Civilization upscaling directly correlates with biological activities. Oxidation level of biomass, greenhouse effect and photosynthetic activity at considerable ecological trophic levels are few of the phenomena contributing towards them. The energy utilization efficiency (EUE) with organism level differential biological clock at eco-evo-devo related to circumbinary dual or quadruple star system should also be taken into consideration setting the proposed upscaling of the the conventional Kardashev scale at per. We have aimed to elaborate the energy consumption by a graphical approach. We also observed the physical, thermodynamical and biological modifications. We have incorporated differential parameters into the conventional kardashev scaling system to enhance the detection of different kinds of civilization.