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Conditional Derivation of the Maximum Entropy Production Principle and its Application to Planetary Climate Systems

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Recently, a conditional, local derivation of the Maximum Entropy Production (MaxEP) principle has been presented based on Jaynes' maximum entropy (MaxEnt) method, using an entropy defined on the fluxes through an infinitesimal element of a flow system. The analysis is analogous to Gibbs' formulation of equilibrium thermodynamics, which expresses the balance between changes in entropy inside and outside a system, but is formulated for a non-equilibrium flow system. The MaxEP principle emerges as the extremum condition in some circumstances. In this seminar, a generic form of the derivation is first provided, encompassing seemingly disparate formulations of equilibrium thermodynamics, local steady-state flow and global steady-state flow (and other systems). The implications of the analysis for the modelling of solar and extrasolar planetary climate systems are then explored.