Thermodynamic Basis of Budyko Curve for Annual Water Balance: Proportionality Hypothesis and Maximum Entropy Production

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Recently, Wang and Tang [2014] demonstrated that the validity of the Proportionality Hypothesis extends to the partitioning of precipitation into runoff and evaporation at the annual time scale as well, and that the Budyko Curve could then be seen as the straightforward outcome of the application of the Proportionality Hypothesis to estimate mean annual water balance. In this talk, we go further and demonstrate that the Proportionality Hypothesis itself can be seen as a result of the application of the thermodynamic principle of Maximum Entropy Production (MEP), provided that the conductance coefficients assumed for evaporation and runoff are linearly proportional to their corresponding potential values. In this way, on the basis of this common hydrological assumption, we demonstrate a possible physical (thermodynamic) basis for the Proportionality Hypothesis, and consequently for the Budyko Curve.