

## A Systematic Review and Meta-Analysis of the Partitioning of Precipitation over Land

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Long-term mean Precipitation (P) over land is partitioned into runoff (R) and evapotranspiration (ET). The aridity index, defined as the ratio between potential ET and P, constitutes the first order control of this partitioning (i.e. ET/P) within Budyko's framework. However, second order controls of ET/P can be significant, and their understanding remains a fundamental challenge. This study therefore introduces a new global observation-based dataset for the long-term mean partitioning of P into ET and R in approximately 2000 catchments, which is obtained from a systematic examination of 170 peer-reviewed studies. The new dataset serves as a basis to improve our understanding of these second order controls around the world. A list of 22 indicators of second order controls of ET/P are identified from the literature, and tested for significance using the new dataset. Results reveal that (i) climate type is a dominant control of ET/P, and additional controls vary with climatic region; (ii) climate characteristics and catchment slope dominate over other catchment controls—the phase shift between the seasonal cycle of P and potential ET appears as an important index across all climate types; (iii) despite the high attention that vegetation-related indices receive as controls of ET/P, they were found to be less important and not always significant; and (iv) the fraction of precipitation falling as snow is the most important second order control in regions with snow climate. The process-related insights from this study about the partitioning of P are a valuable asset for model development, watershed management, and the understanding of future water availability around the globe.