

BLENDING OBSERVATIONS, THEORY AND MODELS FOR UNDERSTANDING AND PREDICTION: LESSONS LEARNED AND CHALLENGES AHEAD

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The need to understand and predict hydrometeorological and geomorphological processes over a range of spatio-temporal scales from limited observations has spurred over the past decade interesting research directions in hydrologic sciences. One of the unifying themes of many efforts has been the desire to unravel underlying statistical or physical laws that parsimoniously describe the observed variability at a range of scales and to relate the statistics of this variability to the physics responsible for the formation of the processes. Among the concepts explored are those of self-similarity, nonlinear dynamics, self-organized criticality, dynamic scaling and time-scale-frequency analysis. In this talk we will review some of the lessons learned from application of these concepts to several problems and present a list of challenges that lie ahead. Examples will center on precipitation variability and predictability, nonlinear interactions in coupled modeling, landscape formation and dynamics and numerical weather model validation.