Preface

The processes that occur in one part of a hydrologic system inevitably influence processes in other parts of the system; thus, change at one site generally causes change at other sites. In hydrologic basins, however, dominant processes may vary dramatically with area, and there may be significant lag times between a change at one site and the effects that it imposes at distant sites. A principal means of documenting hydrologic change is by flux measurement. Fluxes of fluvial sediment, dissolved solids or chemicals, and energy are issues of increasing relevance as an expanding human population places an ever greater emphasis on the prudent yet nondestructive use of land, water, and biotic resources. In recent decades, both natural scientists and resource managers have become increasingly aware that these issues are in large part controlled by processes that vary according to the spatial and temporal scales considered. Only recently, however, has a concerted effort begun to identify the effects that process variation at different scales places on water as a transport medium, and how these effects can be treated to ensure judicious use of resources.

In response to the recent attention on scale factors, two commissions of IAHS, the Commission on Continental Erosion and the Commission on Water Quality, co-sponsored a symposium in the IUGG XXI General Assembly, Boulder, Colorado (July, 1995), on "Effects of Scale on Interpretation and Management of Sediment and Water Quality". The recognition of scale effects is, of course, a recognition of process variability. Although previous IAHS symposia have treated elements of variability and scale, this symposium explicitly considered variation in process due to scale, and as such extended topics discussed especially at the Symposium on Variability in Stream Erosion and Sediment Transport, held in Canberra, Australia, December 1994. Papers prepared for this symposium report a wide range of investigations on the manner by which physical and chemical characteristics of water vary with scale. Within a general symposium objective to evaluate relations of water characteristics for all parts of the hydrologic cycle with spatial and temporal scale, five specific goals were to: (1) identify scalar effects on fluxes of water and contaminant loads; (2) evaluate scalar effects of hydrologic and geomorphic processes relative to environmental concerns; (3) consider the application of models and other technologies to resolve questions of scale; (4) recognize, especially through statistical analyses, data requirements for developing relations between scale and contaminant flux; and (5) propose management and monitoring schemes by which knowledge of scale problems can be applied and extended.

The papers of this volume pertain to large ranges of climate, topography, hydrologic conditions, and land use, but all conform to a recognition that the evaluation of hydrologic data must be conducted relative to the areas and

periods within which those data were collected. It is hoped, indeed anticipated, that these papers will provide an impetus for continuing investigations into scale considerations of hydrologic and surface-process studies, a realm of investigation essential to an enlightened use of Earth resources.

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