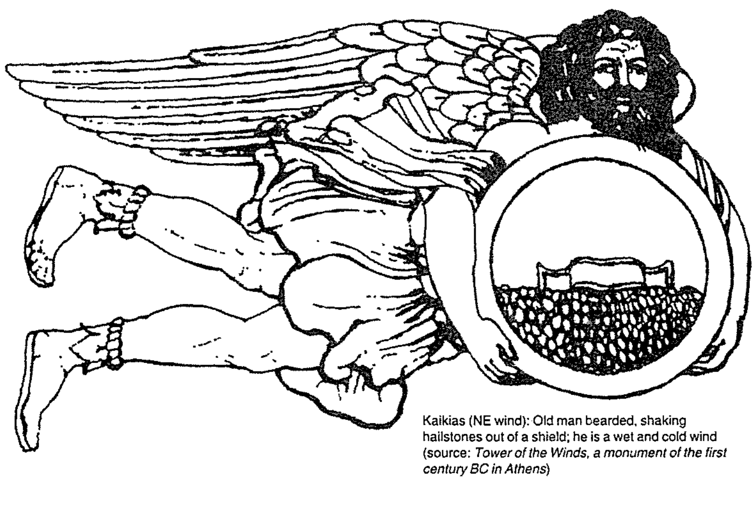
ABSTRACTS

FIFTH INTERNATIONAL CONFERENCE ON PRECIPITATION

SPACE-TIME VARIABILITY AND DYNAMICS OF RAINFALL

June 14-16, 1995
Elounda, Crete
Greece

ΚΑΙΚΙΑΣ



Kaikias (NE wind): Old man bearded, shaking hailstones out of a shield; he is a wet and cold wind (source: *Tower of the Winds, a monument of the first century BC in Athens*)

FINAL PROGRAM

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ASSESSMENT OF DAILY CATCHMENT PRECIPITATION IN MOUNTAINOUS REGIONS FOR CLIMATE CHANGE INTERPRETATION

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The reliable assessment and prediction of mean areal precipitation in a mountainous region for catchment scale and day-time interval has been one of the most difficult problems of surface hydrology. The problem becomes more acute for reasons of climate change interpretation and adjustment, which require the areal precipitation modelling to be as physical and accurate as possible.

The acceptance of long-term climate change predictions which resulted from general circulation models (GCMs) is limited only to long-term climatic averages over large areas. The various strategies which are focused on one-way nested modelling from the macroscale to the mesoscale and on the parameterization of land-atmosphere interaction in GCMs, present critical shortcomings for the space-time variability of precipitation. They cannot possibly represent the dynamic feedback between the fine and coarse scales, while the parameterization of subgrid-scale processes without reference to spatial location, precludes the preservation of consistency across scales. Even the use of multigrid methods, including the technique of the telescope numerical analog, does not offer any global solution to the interaction between land-surface singularities (e.g. mountain ranges) and climate. On the other hand, statistical approaches, such as fractal and self-similar representations, may be useful for short-term, localized, dynamical state-space modelling, but the lack of their physical determinism renders medium and long-term diagnosis or prognosis beyond their scope.

Thus, some attempts are directed towards a coupling of atmospheric circulation simulations with surface hydrology, while some others are focused on point or areal rainfall estimation and prediction models with a sound physical interpretation. These latter are more or less weather models and in a reliminary sense, they are appropriate for calibrating the rates of climate change. In this case, we assessed the daily catchment precipitation over a mountainous region from incomplete point records by developing a simple, practical and dynamic integration method aimed at preserving the physical structure of the areal series data. According to the proposed method, the daily catchment precipitation was estimated from the existing data by using a combinatorial scheme of the Thiessen method and precipitation gauge station availability. The estimated catchment precipitation was also corrected for elevation variations. The other orographical and climatological parameters (e.g. orientation, slope, exposure, zonal index, etc.)were not considered in the spatial distribution of the daily precipitation of this study. On the other hand, several of the aforesaid meteorological parameters can be taken into account in the snow accumulation and ablation (pseudo-precipitation) models, which accept as input the spatially distributed daily precipitation.

The developed method regarding the areal and elevation integration of daily point precipitation data has been implemented successfully over a mountainous catchment for conceptual watershed simulation by using nine precipitation stations inside and around the catchment, as well as for climate change interpretation studying eleven precipitation stations. The proposed method is not only appropriate for climate change studies, but also dynamic for handling successfully any change in the gauge network, which was the greatest limitation of the inflexible Thiessen method.'