CRWR Online Report 95-3

A GIS Procedure for Merging NEXRAD Precipitation Data and Digital Elevation Models to Determine Rainfall-Runoff Modeling Parameters

by

Seann M. Reed
Research Assistant

and

David R. Maidment, Ph.D.

Principal Investigator

September, 1995

CENTER FOR RESEARCH IN WATER RESOURCES

Bureau of Engineering Research .The University of Texas at Austin

J.J.Pickle Research Campus . Austin, TX 78712-4497

This document is available online via World Wide Web at

http://civil.ce.utexas.edu/centers/crwr/reports/online.html

ACKNOWLEDGEMENT

This research was supported by the United States Army Corps of Engineers Hydrologic Engineering Center in Davis, CA. Information provided by Norm Bingham and Dale Lillie at the Arkansas-Red Basin River Forecast Center (ABRFC) and Dong-Jun Seo and Dennis A. Miller at the NWS Hydrologic Research Laboratory at Silver Springs, Maryland, is also appreciated.

ABSTRACT

The National Weather Service (NWS) Next Generation Weather Radar (NEXRAD) radar program generates a product called StageIII which offers gridded precipitation estimates spatially averaged over grid cells of approximately 16 km^2 and temporally averaged over 1 hour. Hydrologists need to consider how such distributed precipitation estimates may be translated into improved streamflow forecasts. Researchers at the U.S. Army Corps of Engineers Hydrologic Engineering Center (HEC) have proposed using a modified version of the Clark unit hydrograph method to incorporate NEXRAD rainfall data into their streamflow forecasts. The proposed method requires information about the area of each rainfall cell falling within each modeled subbasin and the average flow length from each rainfall cell to the corresponding subbasin outlet. A set of programs was written to obtain this information using Arc/Info GIS and USGS digital elevation models. Properly positioning NEXRAD rainfall cells relative to digital elevation model cells is an important issue. A fundamental problem is that NEXRAD estimates are referenced to a spherical earth datum while data sets describing the land surface (i.e. digital elevation models) are most commonly referenced to an ellipsoidal earth datum. A study of the equations required to transform NEXRAD cells and digital elevation model cells into a common ellipsoid-based map projection is presented.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES