

P2.26 The DEOS Interactive Visualization and Analysis System (DIVAS) Prototype

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The Delaware Environmental Observing System (DEOS) is a real-time system dedicated to monitoring environmental conditions across the State of Delaware. DEOS consists of three main components: (1) the DEOS Environmental Monitoring and Observing Network (DEMON), a network of approximately thirty meteorological observation sites coupled with existing weather observation stations in and around Delaware, (2) the DEOS Integrated Visualization and Analysis System (DIVAS), which integrates surface weather observations with National Weather Service WSR-88D radar estimates of precipitation, thereby providing estimates of meteorological and environmental variables over a high spatial resolution grid, and (3) DEOS Analysis Systems (DAS), designed to provide decision support in a variety of environmentally-sensitive areas. (see <http://www.deos.udel.edu>) Ultimately, however, DEOS will be extended to cover the Delmarva Peninsula as well as the larger Middle Atlantic States region.

For DEOS, a real-time, GIS-based data display system is being developed to display and analyze data collected and archived as part of DEOS. This GIS mapping and analysis interface will be the central component of the DEOS Interactive Visualization and Analysis System (DIVAS), which will display the surface weather observations from DEOS and National Weather Service radar estimates of precipitation (Figure 1). In addition, through the use of the Spatial Meteorological Analysis in Real-Time System (SMARTS), DIVAS will present in both digital and graphical form the results of spatial interpolation of the station data to a high spatial resolution grid and calibration ('ground-truthing') of the radar rainfall estimates. Additional derived environmental variables (*e.g.*, evapotranspiration rate, apparent temperature, equivalent potential temperature) also will be displayed by the DIVAS system.

DIVAS will be based on a client-server application using the Environmental Systems Research Institute (ESRI)'s new ArcGIS 9 Server to display station data, interpolated fields, and bias-adjusted radar estimates of precipitation. ArcGIS Server is a modular, scalable system consisting of several components that are

distributed across multiple machines. The components consist of a GIS server, a web server, and desktop applications for end users to connect to ArcGIS web services over the Internet.

This GIS server application allows us to implement a centrally managed mapping and analysis system for decision makers who are able to access the weather information through any common web browser without any need for specialized software. The application is being built and deployed through Java web controls and data objects because of its cross platform functionality. Once this initial prototype system is fully functional, it will be ported to high-end Unix workstations for the GIS Server to connect and interface with an Oracle database via the ArcGIS Spatial Data Engine (ArcSDE).

DIVAS provides basic map navigation capabilities enabling the decision maker to pan and zoom around the Delmarva Peninsula (Figure 2). The system affords the user to ability to dynamically display real-time weather information overlaid with political boundaries, roads, and streams for spatial reference. Additional GIS functions available include the capability of identifying features on a map by pointing to them such as shown in Figure 2, select features within a specified distance of other features or within an area of interest, find and select features using structured query language (SQL) expression. Capabilities are also being developed to extract information based on spatial area and/or time period of interest to the end user. DIVAS will allow a user, for example, to highlight the nearest weather observation sites to a location of interest or contained within a county, or highlight all geographic areas that receive greater than a user-specified amount of rainfall during the last three hours to track potential areas of flooding.

Presently, DEOS is under construction and development of the DIVAS is underway. It is expected that the ArcGIS server will be available sometime in early 2005. See our website, <http://www.deos.udel.edu> for further information and developments of the DIVAS ArcGIS-based system.

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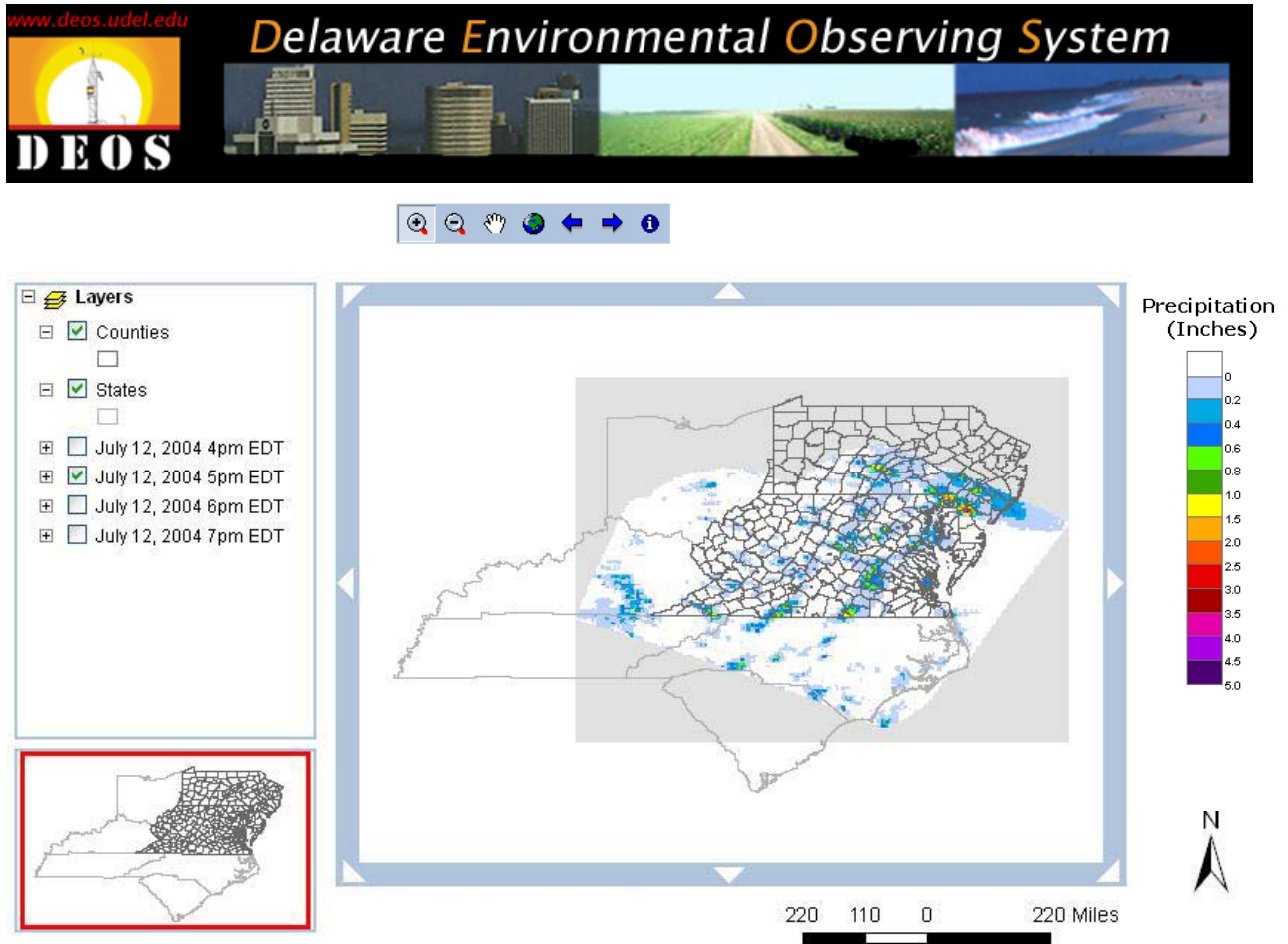


Figure 1. Radar calibrated rainfall derived from the SMARTS displayed in DIVAS.

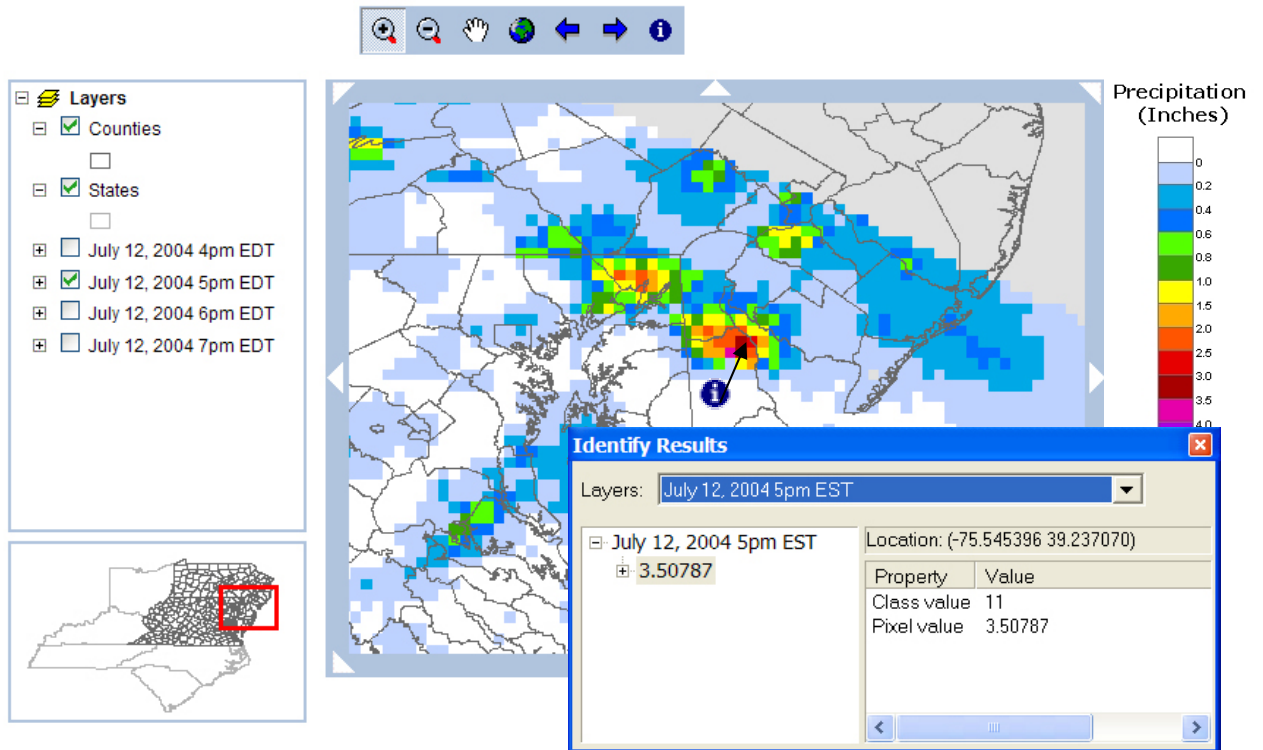


Figure 2. Zoomed view of the Delmarva Peninsula showing hourly-accumulated radar calibrated rainfall at 5pm on July 12, 2004. An area in northeastern Kent County, Delaware received upwards of 4 inches of rainfall between 4 and 5pm EST.