Abstract

NASA DEVELOP, a student-led project headquartered at NASA Langley, allows students to demonstrate remote-sensing techniques that are used to create visualizations, which aid communities in solving problems. Students use Autometric EDGE Viewer and ESRI ArcView software to layer remote sensing data such as NASA and USGS topography maps using Landsat 5 & 7, NASA SeaWIFS and MODIS Imagery, and one-meter resolution DOQQs, resulting in a greater understanding of complicated issues through 3-dimensional visualizations. DEVELOP students gain an in-depth knowledge of GIS, GPS, and remote sensing techniques used in community planning.

What is DEVELOP?

DEVELOP creates projects based on the growing concern of the public. Students use this concern to begin projects, focused on community problems, which have the ability to be demonstrated visually to the community when completed. These three-dimensional visualizations help manage satellite imagery, aerial photography (DOQQ's), digital elevation models (DEM's), and other complicated data that an untrained member of the community would be unable to interpret. DEVELOP combines

remote sensing information along with geographical information system (GIS) data to produce pilot projects that aid in community planning. Essential data that is so vital in the completion of these projects can be found at our fingertips, however, if someone cannot manipulate the basic information used, the continuous advance in technology is virtually useless.

DEVELOP produces many application projects that focus on national application themes that include: Homeland Security, Disaster Preparedness, Coastal Management, Invasive Species, Water Management, Energy Management, Agricultural Competitiveness, Public Health, Community Growth, Aviation Safety, Carbon Management, and Air Quality Management.

Homeland Security

Homeland Security has became a real issue in the everyday lives of ordinary Americans.   The recent events that all citizens have witnessed, has forced the nation to heighten awareness and increase security. DEVELOP is currently working on a Homeland Security project that focuses on key components of the critical infrastructure of Virginia.   DEVELOP's homeland security project focuses on the transportation critical infrastructure in the Hampton Roads area on the east coast of Virginia. In this area, there are only three crossings of the James River; these include the Hampton Roads Bridge Tunnel, Monitor Merrimack Bridge Tunnel, and the James River Bridge. However, the Hampton Roads Bridge Tunnel became the heart of the Homeland Security project due to the high traffic density on the bridge tunnel during the evening rush hour.

A local newspaper article regarding the possibilities of an incident on the Chesapeake Bay Bridge Tunnel and other tunnels in the Hampton Roads area stimulated public concern, which led to the development of this project. In order to create this project, the students combined digital elevation models (DEM's), and DOQQ's to create a visually pleasing elevation model. Using traffic volume data in addition to GIS data such as roads, hydrology, and emergency responders, the students are able to create a three-dimensional visualization that simulates the traffic backup along Interstate 64, due to impedance in traffic flow on the Hampton Roads Bridge Tunnel.   The emergency responder data will play a key role in determining the severity of the consequences that the community could be faced with if a crisis were to occur on the HRBT.

At the completion of the homeland security pilot project, DEVELOP students will format the final visual to be displayed in the portable Cave Automated Virtual Environment (CAVE) that is also being created and built by DEVELOP.   The portable CAVE is a three wall, virtual environment, that with the aid of liquid crystal shutter glasses, an individual is surrounded by a three-dimensional automated view of student projects. DEVELOP's CAVE is the only portable virtual environment in the nation, with a cost of less than $25,000.

Decision Support

DEVELOP students collect data from many internal and external sources. For example, students obtained free DEM's and DOQQ's from the United States Geological Survey (USGS), traffic data from Virginia Department of Transportation (VDOT), GIS

data from local city planners, and Landsat satellite imagery from NASA to create the homeland security pilot project.

Decision Support is incorporated into DEVELOP by using the data that students collect from various organizations and planting them into science models and data assimilations. Using simulation software, visuals can be produced and predictions can also be made in terms of community planning. Policy makers can then use the DEVELOP pilot product as an input into their existing decision support systems, which in turn will allow them to make more informed decisions.

Community Projects

DEVELOP students are constantly working on new projects throughout the year. Currently, DEVELOP is working on the completion of eight projects, one being homeland security. Examples of other ongoing projects at NASA DEVELOP include: CAVE, Convective Initiation, Urban Heat Islands, Decision Support, South Central Initiative, Pearl River, and Computers for Schools. The Convective Initiation team aims to create a framework that allows various types of information such as atmospheric data, water vapor, temperature profiles, and precipitation data to be used by meteorologists to better predict severe weather. The urban heat island team is looking at tropospheric ozone and its relation to financial and health impacts on Jefferson and Mobile Counties in Alabama. The Decision Support team is researching, organizing, and categorizing policy oriented decision support systems and determining the ways in which NASA technology can help them. The South Central Initiative team is working on

two projects. One project being the creation of workforce development training for local students who are creating a comprehensive South Central Virginia website, while the other project studies water elevation patterns and the effects of the Dan River on the South Central Virginia region. The Pearl River team is studying contaminates and their concentrations in the Pearl River and how these pollutants will ultimately affect the surrounding region. The Computers for Schools project utilizes the Federal Computers in Learning Program to collect and rebuild computers for Title 1 and/or empowerment zone schools. DEVELOP is a workforce development, community outreach and applications program. The pilot projects that DEVELOP creates are customer driven and created entirely by students from across the nation.

Amanda K. Harris
NASA DEVELOP
Homeland Security Co-Manager
M.S. 207 Bldg 1312
Hampton VA 23681
Office: (757) 864 – 9531
Fax: (757) 864 – 3699
http://develop.larc.nasa.gov