Title: Utilizing Data Sets from the CReSIS Data Archives to Visualize Greenland Echograms Information in Google Earth

Team Members:
Shaquia Johnson, Mississippi Valley State University
Maya Smith, Winston-Salem State University

Mentor: Jeffrey Wood, Elizabeth City State University

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Since 1993, the Center for Remote Sensing of Ice Sheets (CReSIS) has been gathering ice thickness data in Greenland. This information was in various formats such as: Postscript Document Format (PDF), Joint Photographer Expert Group (JPEG), Keyhole Markup Language (KML), and Comma Separated Values (CSV). These formats display data in individual visualizations while another format; Matrix Laboratory (MATLAB) will display multiple sources of data, but in the proprietary software application only.

The goal of this project was to combine the non-MATLAB visualizations into one window utilizing the PHP Hypertext Preprocessor scripting language and Google Earth. These product files would be simple in their construction, easily adaptable to new data formats, and provide continued display of newly acquired data.

The first step of the actual modification process was to import the URLs to the echogram images on the CReSIS web site. These URLs were packaged into a CSV file due to their storage directory also containing other files. These URLs were then placed into an array to be called later in the file. The next step in the modification file was to import the contents of the current KML file from the CReSIS site. Once the data from the CReSIS KML file is downloaded and the CReSIS KML file is closed, the data from the CReSIS KML file is then loaded into the temporary file and the file is closed.

Once the reading section of the code is complete, the modification section begins. First a new DOM document is created to hold the structure of the temporary XML document previously created. The temporary file is loaded into a variable and the first node is located. This node is the root node and all other elements within the file are contained within this node. The next step is to locate and count each of the "Placemark" elements, as these are the elements, which separate each of the strings of coordinates, which are linked to a particular echogram image. Now that the data has been loaded and the "Placemarks" located, a loop is begun to perform the actions of building the value for the new "description" element for each "Placemark" element. This value includes PHP variables and HTML code for displaying a reduced version of the echogram image and a link to the actual image. Once this value is assembled, a new node titled "description" is created. This is repeated for each "Placemark" within the temporary KML file. Once the loop is completed, the tempKMLflight.kml file is saved. A call is then made to the function "output_file" with the parameters "name", "path", and "mime-type" which downloads the tempKMLflight.kml file and attempts to open the application Google Earth. This function will

not override mime a setting on a local computer set by a user and behaves in different manners with different browsers. Some browsers will simply download the file (Chrome) while others (Safari, Firefox, Explorer) will download and prompt you as to whether you would like to save or open the file.

The PHP Hypertext Preprocessor language was used to modify the Keyhole Markup Language files to add description tags in order to display data from other formats. The combined files were displayed in the geographical program Google Earth available as a free download to users. The team was able to combine two files KML and JPEG into one KML using 52 lines of script were two variables need to be change to create a new flight one is the URL to the KML at CReSIS and the other is the URL to the CSV at CReSIS. The team also used XML DOM to write and modify KML file.

In conclusion, PHP XML DOM scripting is a valid tool to be used in modifying and visualizing KML data files from CReSIS. Better organization, scripting reviews and rewriting, and the provision of more presentation software applications will enable developers to quickly present information to users as needed. Developers should continue to focus on Google Earth as the main presentation software, but move to Google Maps or other mapping software when able. The use of the PHP XML DOM configuration of development enabled quick development of the commands needed and produced a small file to complete the task.