Senior Design Project in Electrical & Computer Engineering

LORAN and DGPS Signal Coverage Software

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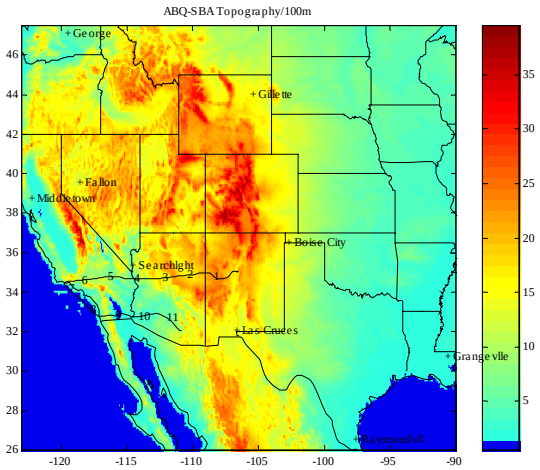
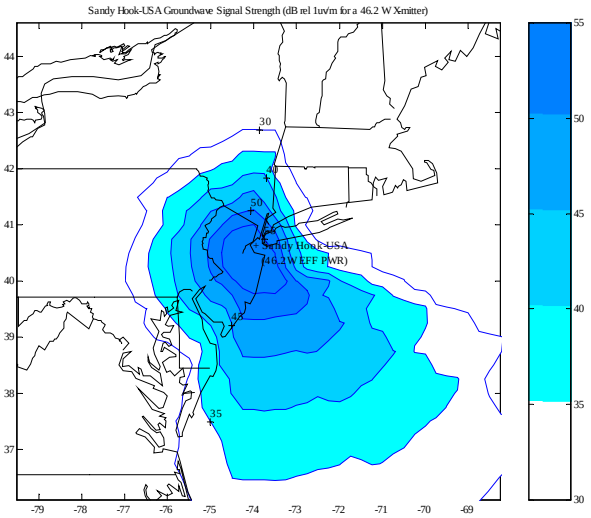
Improving Software Performance

Groundwave signal strength is traditionally modeled as a function of spherical spreading and surface conductivity. The existing software utilizes Millington's Method to predict propagation patterns.

The first objective is to provide the Coast Guard's Navigation Center with an alternative NDGPS propagation model. The current software, referred to as DGPS_Coverage Software, is capable of performing basic propagation modeling with Millington's Method and is also able to be updated as more accurate modeling methods are discovered.

As general functionality of the software is improved, the project's emphasis has shifted to verifying the model's accuracy. By comparing DGPS_Coverage Software with real data and the Coast Guard's Navigation Center software, specific examples can be verified against the previous software and actual data. Propagation performs differently over water and different types of land. The model's accuracy is being tested with sites that propagate from water onto land. The end result will be a software package for the Navigation Center that will be an alternative solution to the current prediction models.





Project Goals

The project is part of an on-going effort to improve the management of U.S. Coast Guard Radionavigation assets. Prior research has developed a preliminary software package that enables the Coast Guard to better design placement, power, and frequency allocation of groundwave radionavigation systems such as LORAN and Differential GPS.

The next milestone is to provide the Coast Guard with possible solutions to the inaccuracies found with propagation modeling. Current models rely largely on Millington's Method and disregard other outside errors. Comparison's between real data and predicted data reveal propagation patterns often differ several miles apart. The exact reasons for these differences are currently unknown but emphasis is being placed on discovering a remedy for propagation models. The goal is to find a solution for these errors while preserving the validity of DGPS_Coverage Software's propagation model. This will be done by carefully evaluating real data versus predicted patterns along with the possible factors interfering with the model.