VIRTUAL FIRE: Web GIS Platform for Forest Fire Management

Executive Summary

A Web GIS platform for forest fire management based on Microsoft® Bing Maps™ has been developed to easily, validly, and promptly share information and tools produced by the Geography of Natural Disasters Laboratory/ Department of Geography/ University of the Aegean/ Greece. The project has been funded by Microsoft Research.

End-users will have the ability to utilize the capabilities of GIS without the requirement of knowing how to handle commercial and complicated GIS applications; to query on the databases and to immediately receive answers; to locate points of interest in high resolution satellite images; to connect their portable computers or GPS with the platform; and to download information provided by the administrators of the system. Virtual Fire is based on ESRI ArcGIS commercial software: maps and functions are created within this software in close integration with MS SQL Server 2008; outcomes are published to the web via the ArcGIS Server; MS Visual Studio 2008 combines them all with MS Silverlight 3 by using components of ArcGIS API for MS Silverlight / WPF.

Remote automatic weather stations and a weather forecasting system based on the SKIRON weather model (Univ. of Athens/ Dept. of Physics/ Atmospheric Modeling and Weather Forecasting Group/ Greece) provide necessary data for fire prevention and early warning, channeled through the platform to authorized end-users. Geographical representation of the fire risk potential and identification of high-risk areas at different local regions is provided daily, based on a high performance computing (HPC) pilot application running on Microsoft Windows HPC server and developed in cooperation with Microsoft Hellas/ Microsoft Innovation Center. The servers where the system is running have been gracefully donated by Hewlett Packard (3 quad-core computing nodes, one head node and two computing nodes). By using the FARSITE and Flammap software, maps are produced (on demand by authorized users) that graphically represent the spread and intensity of a forest fire at different times and places. In addition, GeoRSS feeds and e-mails are key features to maintain a proper intercommunication among the end-users and the administrators of the system for reporting events.

By using these methods and a variety of provided fire management information and tools, the end-users (fire fighting personnel, emergency crews, authorities, etc.) are given the ability to design an operational plan to encompass the forest fire, choosing the best ways to put the fire out within the proper recourses and time. The whole system provides the ability to its end-users to locate online and in real-time, vehicles of the Fire Service and other resources (e.g. a fire patrol aircraft) by using GPS tracking and communications that transmit the coordinates of each item to the system, depicting them on an electronic map. In addition, detection cameras are able to send images of specific high risk areas into the Virtual Fire platform.