Predicting Floods by Visualizing and Analyzing Latest Weather Data

Vincent Thomas and Felix Friedmann (Canada)

Key words: Cartography; e-Governance; Geoinformation/GI; Risk management; HTML5, flood, time-aware data, disaster prediction/recovery

SUMMARY

In June 2013 heavy rainfall in the Canadian Rockies and foothills triggered the worst floods in the history of Alberta. Many communities were displaced and downtown Calgary was completely shut down for days. Sadly, five persons perished and the property damage summed up to approximately five billions dollars. The government agency responsible for monitoring the province's rivers water level and set reservoir operation procedures to mitigate possible flooding is the River Forecast Centre (RFC) which is part of the Alberta Environment and Parks ministry. In case of an emergency RFC will plan the response in collaboration with several groups such as dam operators, municipal emergency managers, industry, first nations and the general public.

In the past, RFC was limited because downloading and processing weather data was done manually. Better tools to automate and enhance the visualization and analysis processes were needed to provide better flood forecasts.

To address their needs, we were given the mandate to develop a new GIS web application named the Weather Model Assessment Tool (WMAT). This tool enabled RFC employees to visualize many weather data model animations easily and select at-risk water basins for detailed analysis.

The base data of the application is downloaded several times each day from the Environment Canada website. The downloaded data is then processed and incorporated in the WMAT website seamlessly. RFC employees can choose a weather model and see the time-aware precipitation data and animate it with a play button to view the forecasted rain by the intervals available in the selected model. ESRI geoprocessing services are used to analyse data within a selected basin and then an Open Source JavaScript tool is used to generate analysis charts of the amount of precipitation over time. Additionally, WMAT prepares basin average precipitation input files for

input into the RFC's flow forecast model tool.

The project to build the tool was under severe time and budget constraints so a very agile development process had to be use to get the most functionality out of the available technology in a maintainable and efficient manner.

WMAT is a key application supported by the spatial data infrastructure which transcends levels of government (federal, provincial and municipal) and conveys critical information to predict and recover from floods. The ability to animate and analyse any of 18 daily models enables RFC to produce defensible flow forecasts and take any actions that will protect Albertan lives and properties.