Images from space reveal ground-level flood threat

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(PhysOrg.com) -- Satellite imagery captured hundreds of miles from the Earth's surface is being used to analyse the flood risks of some of the world's largest regions, using data that researchers hope could become freely available in efforts to provide a more immediate response to natural disasters.

Using river flow and rain forecasts from global monitoring stations and space imagery that takes in vast areas of 400 by 400 km, geographical scientists from the University of Bristol are developing sophisticated flood forecasting models that map past and present global water levels and could predict future flow patterns to a new degree of accuracy.

The effective management of natural resources and natural disasters requires the use of near-real time data. However, existing technologies used to track changing water levels are spatially limited owing to the declining number of global monitoring stations and the heavy cost implications of collecting more frequent, timely satellite data.

A much cheaper alternative, as is now being applied by Bristol experts, is to use low spatial resolution data, which captures water level data more frequently and across larger expanses. The algorithm in development, a computerised problem-solving program, will allow for the automated retrieval of information relating to fluctuating water levels. When combined with a global flood forecasting model, this should provide improved estimates of future changes in river flows.

"The outcomes of undertaking this work would be better flood forecasts at large scales. And if this proves the utility of high temporal wide swath imagery for smaller scales, it will mean a quantum leap in the volume and resolution of data that can support flood modelling," says Bristol's Dr Guy Schumann, from the School for Geographical Sciences. "This is undoubtedly needed and will support planned satellite missions targeted at monitoring hydrological change."

Conceptual analysis of the Tewkesbury floods of 2007 have already confirmed the feasibility of the models being proposed, by accurately mapping the predictive algorithms on to spatial imagery of the water levels at different times during the floods.

The next step of the project will be to apply the same methodology combining space-borne radar imagery and large scale flood forecasting to areas surrounding the rivers of the Mississippi, the Amazon, the Nile, the Danube, the Po and the river system of Bangladesh.

The results will provide a benchmark data set of global floodplain water levels, which combined with satellite date, could ultimately be made freely available via a search engine facility such as Google Earth, and provide a new resource in efforts to combat climate change.

Provided by University of Bristol