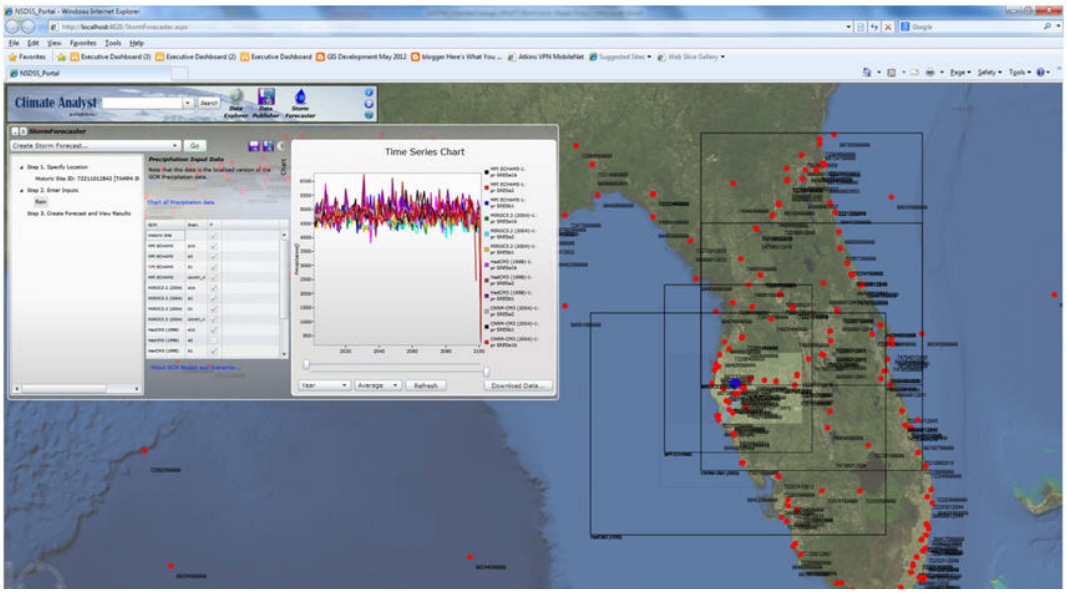
StormCaster: Forecasting the 100-Year Storm Under Climate Change

United States

ATKINS

"The StormCaster project introduces a novel method for estimating how the 100-year storm will change in communities across the country over the 21st century. Since storms are a driver of river basin, estuary, and coastal systems, we can use the forecasts to pragmatically estimate the impact of climate change on these environments."

– **Stephen Bourne, PE, Principal Investigator of the StormCaster R&D Project**



The StormCaster tool, which is a part of the Atkins Climate Analyst suite of tools, will be rolled out in the coming months. The map shows the city of Tampa (blue dot) and the GCM grid cells that overlay it from the various models.

Client
Atkins (Internal R&D)

Completion date
2012

Services provided
- Methodology development
- Software development
- Data management

In the last decade, there has been a 5 percent increase in the average annual rainfall in North America. Long-term predictions indicate that the southern portions of the continent will get drier, while northern portions will get wetter. Floodplain managers across the country are seeking practical approaches to planning under these emerging climate changes.

Researchers from Atkins and Texas A&M University (TAMU) developed the StormCaster methodology to build climate change forecasts of storms at the local scale—towns, cities, and counties. The method utilizes a suite of general circulation models (GCM) to estimate the possible range of future rainfall and historic weather pattern data to produce a realistic forecast at a sufficiently detailed time step. The forecasts are particularly useful to floodplain managers for estimating future floods and forecasting storms under climate change.

To forecast weather at a specific location, the Atkins/TAMU researchers integrated the general trends in the GCM projection with historic knowledge of the weather patterns normally experienced at a location. (Historic knowledge is provided in the form of precipitation records taken at 15-minute time steps over decades.)

The GCM projection, combined with the climate time series, creates a forecast with a local climatic signature and reflects any trends in rainfall magnitude and variability present in the GCM results. The GCM/time series process is repeated for each of four GCM models and three scenarios to produce an ensemble forecast of 12 time series of projected rainfall.

Next, the method focuses on converting the monthly ensemble forecast previously created to a 15- or 60-minute forecast. Then, a 2001-2100 detailed storm forecast is synthesized. Finally, the forecast is evaluated to establish how the 100-year storm changes over time. One-hundred-year storm amounts are estimated for each decade to produce a trend line that shows how the iconic storm is predicted to change.