EON FUSION

4D Environmental Data Analysis **...with Vision!**

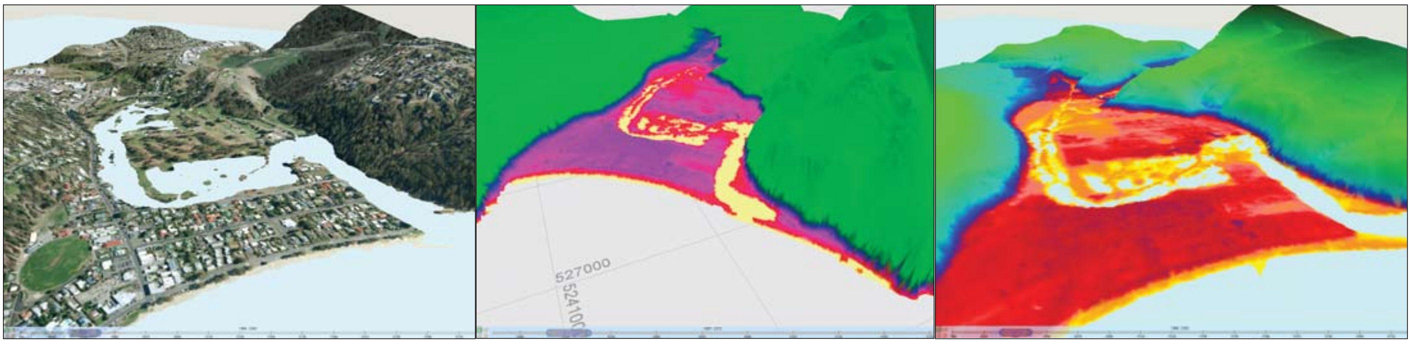
CASE STUDY: COASTAL INUNDATION AND SHORELINE RETREAT

Application: Prediction of the effects of Climate Change and Sea Level Rise on Kingston, Australia

Data Provider: Intergovernmental Panel on Climate Change (IPCC), Antarctic Climate & Ecosystems Cooperative Research Centre (ACE CRC),

Key results:

- Efficient integration and processing of large data sets
- Implementation of complex environmental models within a single 4D environment
- Easy sharing of analysis methods with colleagues



Using Eonfusion, researchers predict the effects of storm surges on a low-lying community, (left), the extent of high tides (middle) and the retreat of the shoreline (right) in the year 2030 based on IPCC's sea level rise predictions.

Project Description

Nearly one third of the world's population live in coastal areas, and ten of the fifteen most populous cities in the world lie on a coast. Inhabitants of the Low Elevation Coastal Zone (LECZ) - defined as the contiguous area along the coast that is less than 10 meters above sea level - make up 10% of the world's population and 13% of the world's urban population. Sea level rise, coastal inundation and associated shoreline retreat have emerged as one of the primary threats to these populations and the resources located near the coastal fringe.

In order to assess the potential impacts in these zones, researchers at several universities are using Eonfusion to model and predict the effects of sea level rise and hopefully prevent damage to populations and resources in these low-lying areas. Combining LiDAR data from the Antarctic Climate & Ecosystems Cooperative Research Centre (ACE CRC) with sea level rise scenarios published by the Intergovernmental Panel on Climate Change (IPCC) and other research on the geomorphic structure of the local area, researchers have been able to develop a model for coastal inundation and damage in these low-lying areas.

The Challenge

To date there has not been any single software application with the capability to combine the various types of data, model dynamic systems and multiple scenarios and then produce 4D visualizations of the results for further study or communication to stakeholders.

This has forced researchers to cobble together methods and analysis in a series of steps using a number of different software applications and then produce flat 2D graphs of their results.

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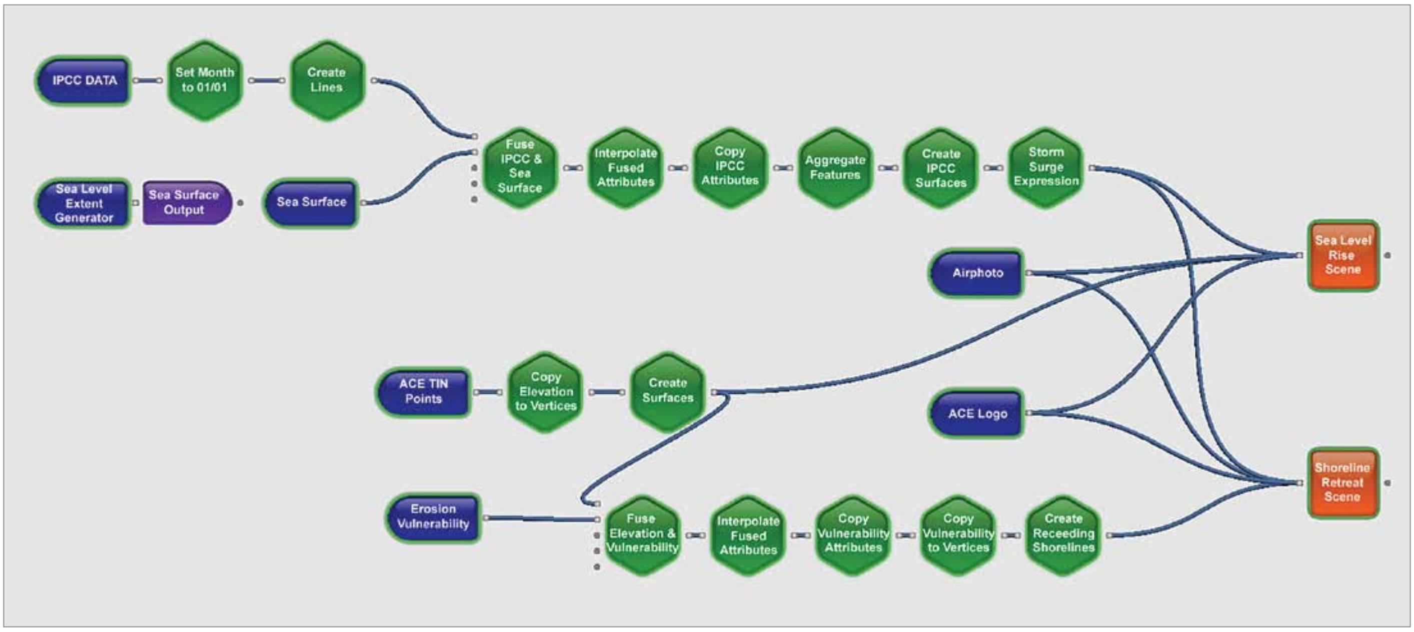

The coastal inundation and shoreline retreat model has been made available to other researchers who wish to study other low-lying areas of the globe. Eonfusion's ability to share methods through the export and import of data flows (through XML) has enabled other users to pick up the method, modify the data inputs and rerun the model for their own areas of interest.

The Result

Eonfusion enables the complex modeling and visualization of the coastal zone and can easily convey complex changes in both the sea level and land surface through time. In a small study in southern Tasmania, researchers have used two publically available datasets in a first pass assessment of vulnerable areas.

Starting with a detailed LiDAR data set from ACE CRC, Eonfusion was used to process the data into a 3D surface representing the ground. The surface was then color coded for height above mean sea level and overlaid with an aerial photo to provide a visual spatial context. Sea level rise data was converted into a time series of surfaces which represented three possible IPCC sea level rise scenarios and were also integrated with the model. This basic model enabled a rapid analysis and visualization of the sea level rise scenarios and allowed users to easily visualize storm surge events of any magnitude.

The model was then enhanced to predict shoreline retreat. Utilizing knowledge of the local geology, a 3D model of the terrain and its vulnerability to erosion was fused with the original model. The Bruun Model – which states that for every 1 cm of sea level rise an unconsolidated shoreline will retreat by 50 to 100 cm – was implemented in Eonfusion's Expression Evaluator and used to calculate shoreline retreat in 10 year intervals out to the year 2120. The result was a visually stunning animation of the predicted rise in seal level combined with shoreline retreat over this period.

Additional Information

For additional information on Eonfusion or to review other case studies, please visit the Eonfusion website at eonfusion.myriax.com or email us at info@eonfusion.myriax.com