



## Browsing large natural hazard event sets

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Utilising output from dynamical modelling of the global climate system to produce large sets of simulated events is becoming an increasingly important means of assessing risk from climate-related extremes. Such event sets can be generated for timescales that exceed those available from the historical records. As a result, they may better represent natural variability, and the impact of natural variability on extreme events. With the use of increasingly large datasets of natural hazards, comes new challenges for validating, analysing and presenting the results. Data visualisation has an important role in exploratory data analysis, but these techniques are generally underused in natural hazard modelling.

The National Centre of Atmospheric Science (NCAS) have generated thousands of simulated storm tracks using a General Circulation Model and a storm tracking algorithm (Hodges, 1995). Data points are at six hourly intervals with vorticity and wind speed for several atmospheric levels. Examples of storm tracks that illustrate important implications of atmospheric risk are selected and used to accompany talks and presentations to the insurance industry.

We developed rapid visual browsing techniques to assist in the identification and extraction of such examples. However we found that these techniques were also effective means for exploration analysis, for helping validate the dataset and for identifying issues worthy of further investigation (Slingsby et al, 2010).

We present examples of how our visual browsing techniques have helped generate new insights from the data and identify compelling examples of storm tracks that illustrate aspects of atmospheric risk of interest to the insurance industry. These include:

- spatial and temporal clustering of tracks with potentially serious implications of risk to the insurance industry
- the observation that many extratropical storms have tropical origins, significant to the insurance industry because these types of events are usually modelled separated, therefore not correlated in time
- characteristics of storms at landfall

We are also adapting and extending the tool to help pursue other research questions. These include:

- establishing the atmospheric conditions under which particular configurations of storm tracks occur
- establishing the differences within El Nino years, La Nina years and neutral years
- establishing the conditions under which storms make extratropical transition
- establishing the conditions under which seasons start early or late.

Our work shows that there is strong potential for techniques similar to these to be used with other datasets.

### References

Hodges, K. I. 1995. Feature tracking on a unit sphere. *Monthly Weather Review*, 123:3458–3465.

Slingsby, A., Strachan, J., Vidale, P-L., Dykes, J. and Wood, J. 2010 Making Hurricane Tracks Accessible. Discovery Exhibition, IEEE VisWeek 2010, <http://de2010.cpsc.ucalgary.ca/pmwiki.php/Entries/Slingsby2010>