

The Clay Research Group

RESEARCH AREAS

Climate Change ♦ Data Analysis ♦ Electrical Resistivity Tomography
Time Domain Reflectometry ♦ BioSciences ♦ Ground Movement
Soil Testing Techniques ♦ Telemetry ♦ Numerical Modelling
Ground Remediation Techniques ♦ Risk Analysis
Mapping ♦ Software Analysis Tools



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September 2013

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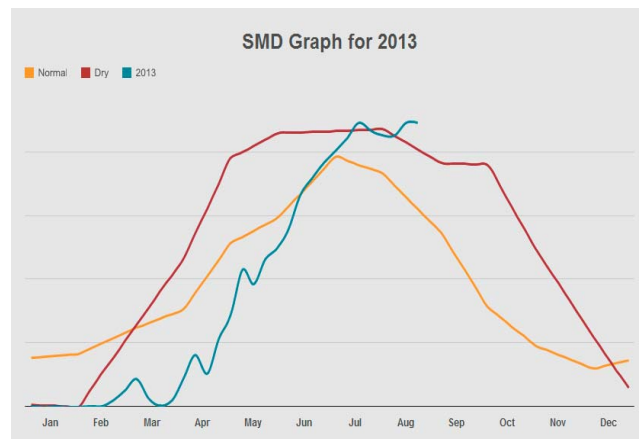
Big Data

NEXT MONTH

Intelligent systems. Our current work is focused on building intelligent systems that interrogate the data to identify significant factors to drive solutions. Pattern matching and learning modules have provided applications that allow systems to think for themselves.

August 2013

The SMD is lingering at the top of the chart, and temperatures have been high enough to cause concern – claim numbers have been increasing over the last three or four weeks but not in sufficient numbers to cause alarm.



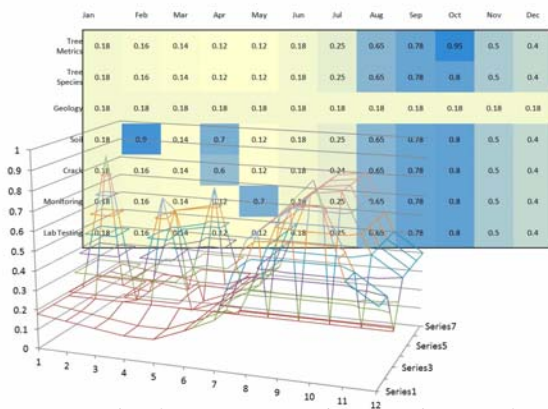
The Met Office confirm that their summer (June, July and August) has been the warmest, driest and sunniest since 2006.

Tree Root Liaison Group

A meeting of the Tree Root Claims Liaison Group of the Subsidence Forum is being held on the morning of Wednesday 25th September 2013 at Welwyn Hatfield Council offices in Welwyn Garden City.

The primary objective will be to go through the draft Liaison Model to obtain a consensus opinion on its content and value but discussion will also be held about future activities for the Group.

Anyone who would like to attend should contact Andrea Plucknett - A.Plucknett@welhat.gov.uk



An example of a pattern matching application from the next edition.

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Such cases still present a challenge to experts as we see from differences between the witnesses in this case. One may be forgiven for taking the view that even if it is common knowledge that trees cause damage to houses, anticipating which one, when and where is simply not possible.

The Judge in this case took the view that a 10m tall conifer hedge immediately adjoining the neighbours wall was a risk that was foreseeable, but tall trees, further away were different, and it was not sensible to expect the average homeowner to anticipate the risk.

The fact that some of the vegetation was covered by a TPO adds a degree of complexity.

It also emphasises the 'hit-and-miss' aspect of tree root nuisance.



Foreseeability

Khan and Khan v Harrow and Kane
High Court, Technology and Construction Division

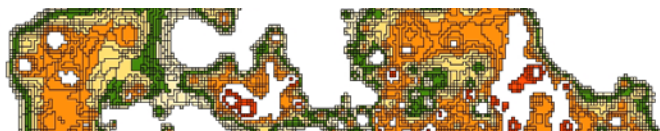
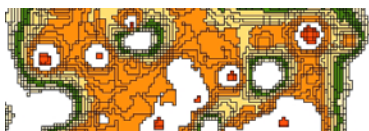
Our thanks to Margaret MacQueen of OCA and Ian Brett-Pitt for passing on details of this recent decision, published on 3rd September. The preliminary assessment suggests that it doesn't change the law on tree root nuisance following Berent and Robbins, but may clarify the thinking on foreseeability where householders are concerned. We see few such examples with the ABI Tree Root Agreement in place.

In brief, Mr & Mrs Khan's home was damaged by subsidence caused by the action of tree roots. The case against Harrow Council was settled prior to proceedings.

The Honourable Mr Justice Ramsey explained the position on foreseeability as far as it applies to the average homeowner. The claimants lawyers argued that, because there was widespread publicity in the press, all homeowners knew the risk presented by vegetation and should take appropriate action – they were of the view the damage was foreseeable.

The Honourable Mr Justice Ramsey's view was *"In my judgement, the purpose of the standard being set by the knowledge imputed to a class of person is to impose a standard on persons in that class. It therefore creates a floor but not a ceiling on the level of knowledge so that subjective knowledge can raise the standard. However, lack of actual knowledge cannot lower the standard or exclude liability which would be imposed based on the standard generally imposed."* He ruled *"In the present case I do not consider that, on the evidence, Mrs Kane had any relevant subjective knowledge which meant that she had actual knowledge about the risk of damage to Mr and Mrs Khan's property caused by T1 and H1."*

Damages against Mrs Kane amounted to just over £17,000, with an amount of 15% against Mr & Mrs Khan for contributory negligence. Full judgement can be downloaded from our web site.

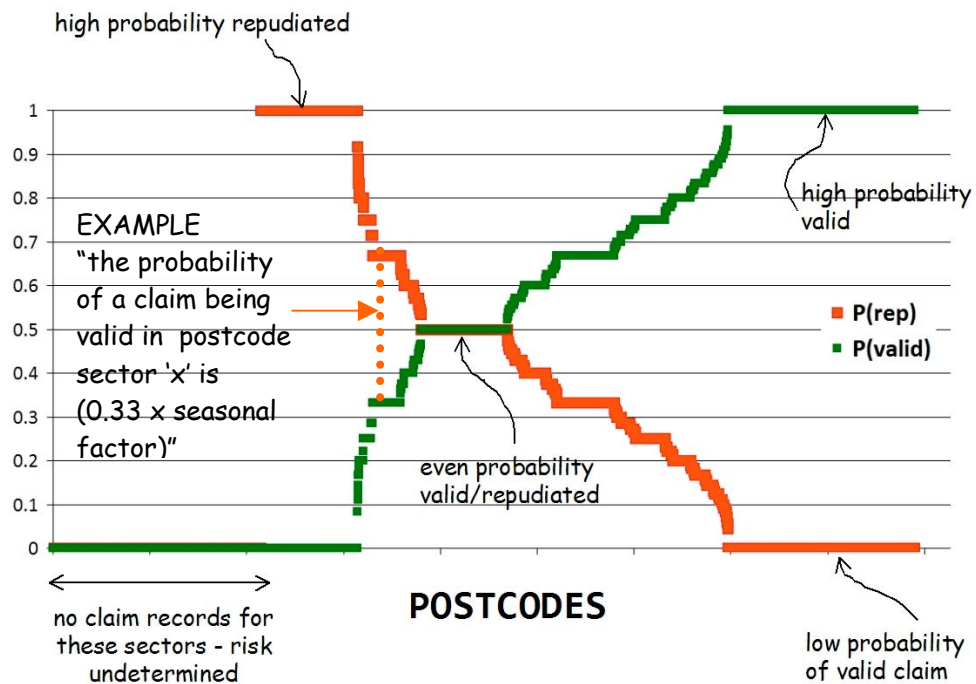


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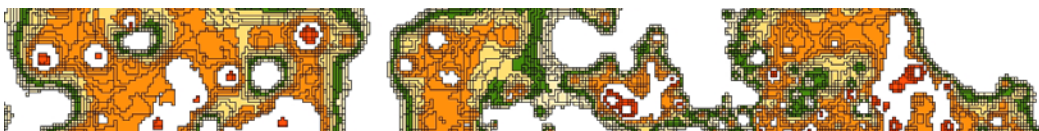
‘Probability Of Valid Claim’ Application

The graph below is a retrospective plot of valid and repudiated claims for an average year for every postcode sector in the UK. It forms the basis of a Triage application. The ‘y’ axis has a scale of 0-1 reflecting the certainty associated with the end of year figures because they are a record of what has actually happened, but the triage application – assessing whether a claim is likely to be valid or not at notification of loss, has a scale of 0.2 – 0.8, reflecting the uncertainty.

In use, the graph is dynamic, with the ‘y’ scale varying by month. The data at one end of the ‘x’ axis might reflect the situation on clay soils for example, in which case the variability is also linked to the Plasticity Index, as we have seen in earlier editions. The probabilities of a valid claim on clay soils will be high in a hot, dry summer, and much lower in the winter.



The zero values to the extreme left represent postcode sectors with no claim records; houses built on granite perhaps, but more likely city centre postcodes, high concentrations of social (un-insured) housing etc. Others where there is an even probability, in which case conversation management might be a determining factor, but support applications of this sort, along with others being illustrated in future editions, help in Triage.

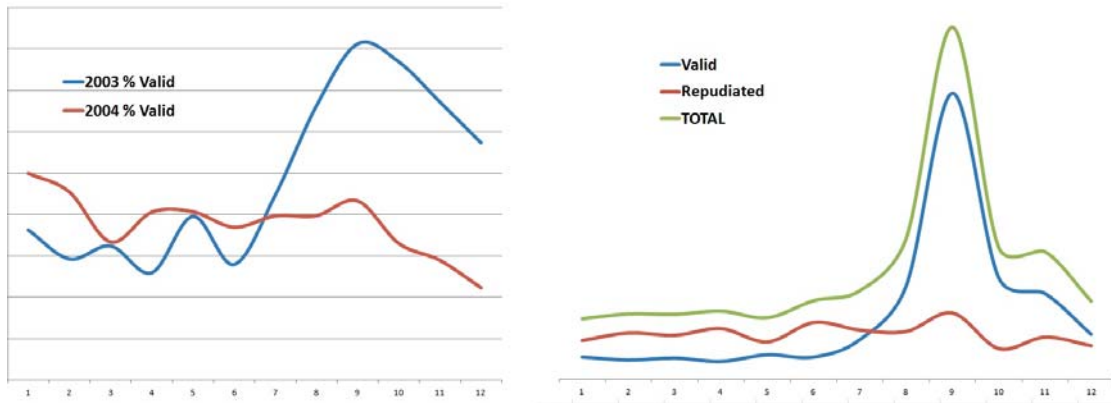


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Probability and Geology - over Time

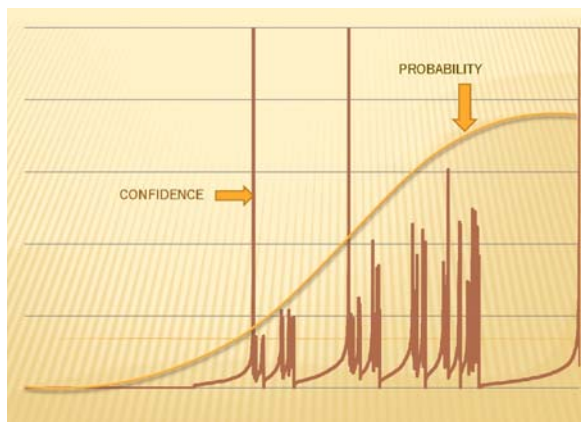
The next step is accounting for the periodic signature. The probability of a claim being valid or otherwise varies not only by location, but by month. To complicate matters further, it also varies by year.

There are postcode sectors in North London where, in an event year, nearly every claim notified is valid. How do the two elements – claim validity and cause – vary by month, by year and between event and non-event years?

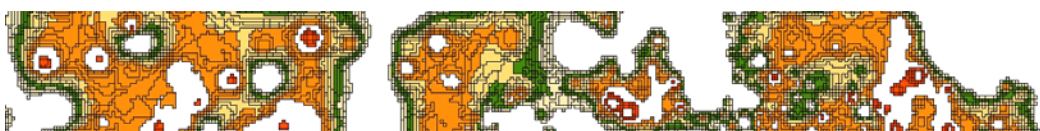


In winter months, valid claims may fall to 20% of those notified. In hot summers, the figure can increase to around 80%. This wide fluctuation is illustrated above. The difference takes place – in the main – on the clay series. Trees are the biggest driver of this increase on clay soil. The intermediate values in the triage graph on the previous page reflect the variable geology of the drift deposits predominantly.

Left, the probabilities and count are plotted together, to provide a confidence factor by sector.



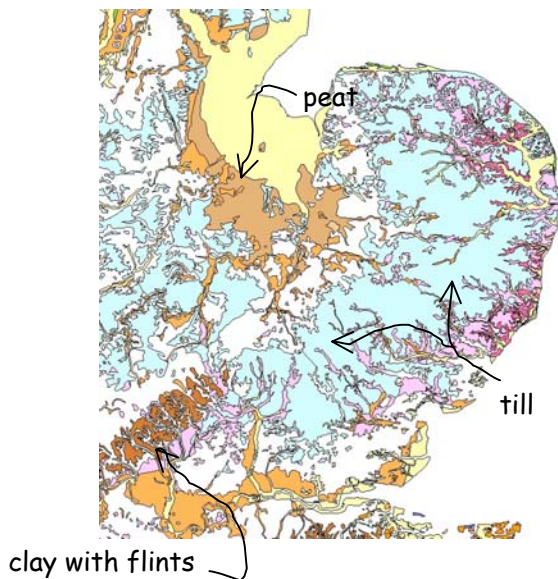
The 'x' axis represents the postcode sectors, and the 'y' scale our experience. A few postcodes stand out, but removing the outliers and those sectors with no claim records provides a reasonable confidence limit in over 60% of the sectors.



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Geology and Risk, by Series

How does geology influence risk? Is there a difference between series, and if so, can we quantify it? The extract below shows how risk might be evaluated using the British Geological Survey maps, using the count of claims divided by the count of houses, by geological sequence.



Extract from the large (1:625,000) scale drift map issued by the British Geological Survey at Keyworth. The map indicates the location of the series noted. By plotting claims onto each series, and dividing by the count of houses, a risk rating can be derived.

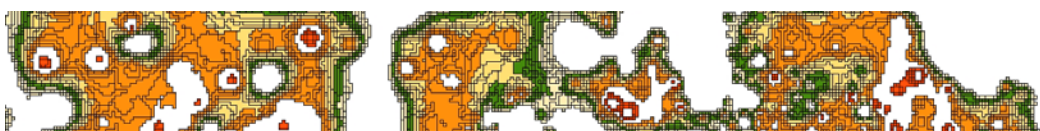
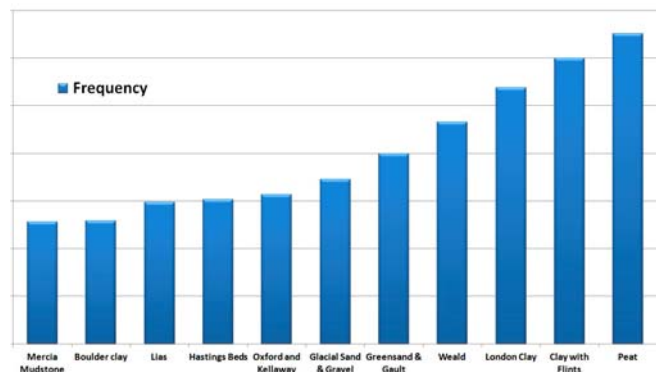
This very approximate exercise uses selected areas of the 1:625,000 scale geology, drift and solid, and derives frequency by dividing the count of claims by housing density for defined polygons of varying area and location.

Taking Boulder clay as an example, we have used the area shaded in blue on this map. Not the entire UK coverage.

With this limitation in mind, it can be seen that, from the areas measured, peat is riskier than Boulder clay, but clay with flints is riskier than the Mercia mudstone.

Where does London clay sit? In terms of risk it is towards the top of the table. See following page for more information. Count of claim per series would put London clay at the top of the risk table.

There are drawbacks to this approach. For example, there is considerable variance within a series due to mineralogy and clay content. Taking the Mercia mudstone as an example, the smectite bearing areas are far riskier. In this respect, claims can help to identify the series.



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Telemetry

According to The Post *“true innovation is a rare thing, particularly in the insurance sector. But telematics could turn out to be a technology that will revolutionise the entire motor insurance industry”*

Remote measuring is a tried and tested methodology in engineering. The CRG have been promoting it for the past 10 years with the help of innovative partners.

Measuring moisture change over time, from your desk-top, is far more compelling than any site investigation and laboratory analysis. Seeing the ground dry in the summer and wet in the winter isn't in itself compelling, but seeing the difference where there is a tree compared with a datum outside the root zone is clear to everyone.

Seeing the building move in sync with this change using electrolevels delivers the answer.

Better evidence, gathered quicker, displayed on the web without leaving the office, with a reduced carbon footprint is the way forward, but not without a significant commitment.

Moving from one technology to another has all sorts of problems, not least of which is the management of the kit - moving it from one site to another, detecting dropped signals, spotting anomalous data etc., and understanding the output.

Smart applications can resolve all of these, but it does require a dedicated resource to manage the operation.

Local Changes – Global Averages

A paper published in Nature suggests that, whilst there are regional changes in temperature, the global situation is largely unchanged. See Huntingford C., et al *“No increase in global temperature variability despite changing regional patterns”*, Nature, August 2013,

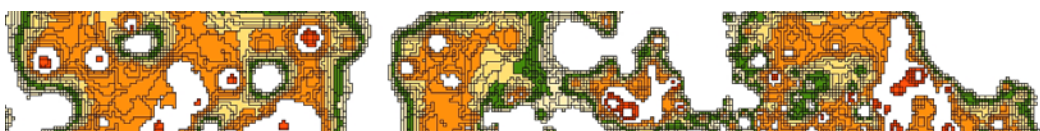
The authors say *“The normalisation of temperature anomalies creates the impression of larger relative overall increases, but our use of absolute values, which we argue is a more appropriate approach, reveals little change.*

Regionally, greater year-to-year changes recently occurred in much of North America and Europe. Many climate models predict that total variability will ultimately decrease under high greenhouse gas concentrations, possibly associated with reductions in sea-ice cover. Our findings contradict the view that a warming world will automatically be one of more overall climatic variation.”

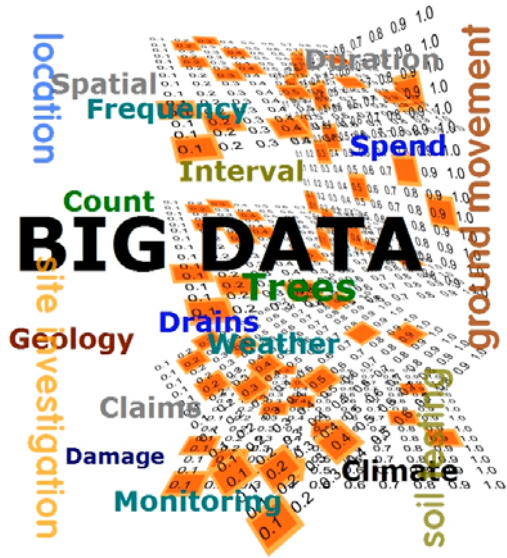
The technology already exists to measure building movement and moisture change remotely.

Equipment costs are falling and the telephony charges can be managed against claim costs.

It needs a supplier to offer a managed package to take this technology to the next stage.



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So-called ‘Big Data’ is fashionable and it drives much of what we do. But what is the relevance when handling a claim? How does recording moisture abstraction beneath mature trees, measuring associated ground movement, linking it to temperature help?

Reporting on the link with geology might be regarded as an academic diversion. Certainly 20 years ago, knowing the geology was almost incidental when handling a domestic subsidence claim.

Looking for links between disparate data sets might seem detached from claims handling.

And yet pattern matching is what we do. When we see diagonal cracks, and trees or drains nearby, we look for similarities and variance with templates stored in our memory.

Data matching is the topic for next month’s edition.

308mm

Maximum Soil Moisture Deficit (SMD) for trees.

People in the UK living in towns and cities.

80%

6%

Approx. percentage of houses damaged by subsidence in the UK over the last 40 years. Not claims.

The number of hits on the CRG web site in June 2012.

25k

5

The amount that London is a higher risk of subsidence than the West Midlands. “London is 5 times riskier than ...”

In the round, clay is approximately 2.4 times riskier than other geological series.

2.4

20%

20% of postcode sectors deliver 50% of subsidence claims.

Area of the UK covered by woodland

12.7

£6k

Taking into account inflation, the average claim cost remains unchanged over the last 20 years on.

The wilting point of plants. The negative soil pressure beyond which plants cannot extract moisture.

1,500kPa

3,300

Water uptake of the Aldenham oak in July, 2006, in gallons.

