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

The Clay Research Group

September 2012

The Clay Research Group

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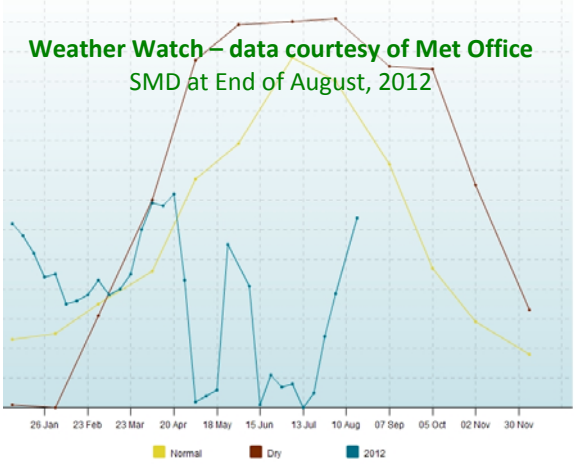
Issue 88, September, 2012



Climate news. Have we seen the last of the glaciers, or are they just in a state of flux prior to stabilising? Research from Denmark suggests that we might have been worrying unnecessarily. NASA suggest otherwise.

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This Edition

This months edition explores the decisions delivered in the cases of Berent and Robbins (download both judgements from CRG web site). Berent (an Appeal Court decision) set out the position regarding foreseeability, and Robbins neatly provided an example.

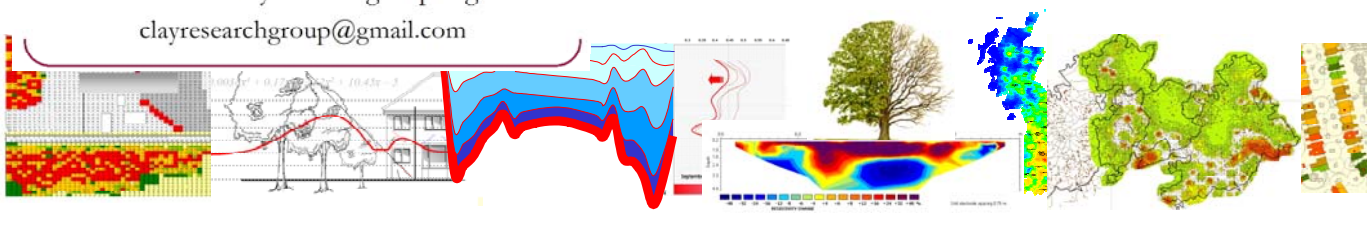
In Berent the Court ruled that it was unreasonable to expect Boroughs to trim all of the trees under their control every few years simply to avoid the few cases where they cause damage. Instead, it recommended that Boroughs identify hot spots of subsidence claims, and take prompt action when put on notice. Notice should be accompanied by good evidence in the form of root ID, soil sampling and monitoring etc.

Damages would commence once adequate notice had been served.

The Court recognised both the amenity provided by trees, but also took into account the very real issues around budget constraints. Lopping all of the trees reduced the amenity they provided, and cost a disproportionate amount in relation to the danger they posed.

Using the CRG database of claims and trees, we explore the idea of hot spots. Some means of reducing the risk would be beneficial and particularly as it is proposed to increase the tree population by around 20% to counter the effect of the Urban Heat Island otherwise known as London.

As it happened, and within a very short period following the Berent decision, the Robbins judgement provided an example of what was meant by hot spots. Our thanks to Ian Brett-Pitt for the updates. Ian has been closely involved with both cases.



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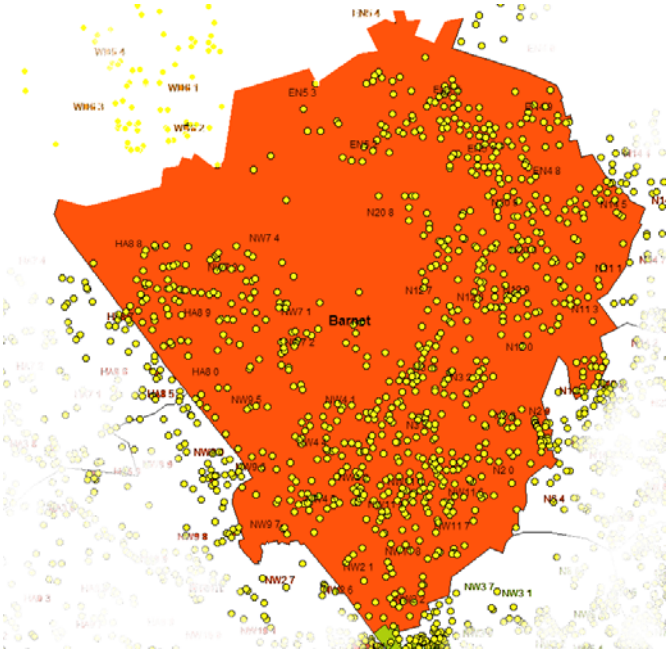
Subsidence Hot Spots District –v- Sector Mapping

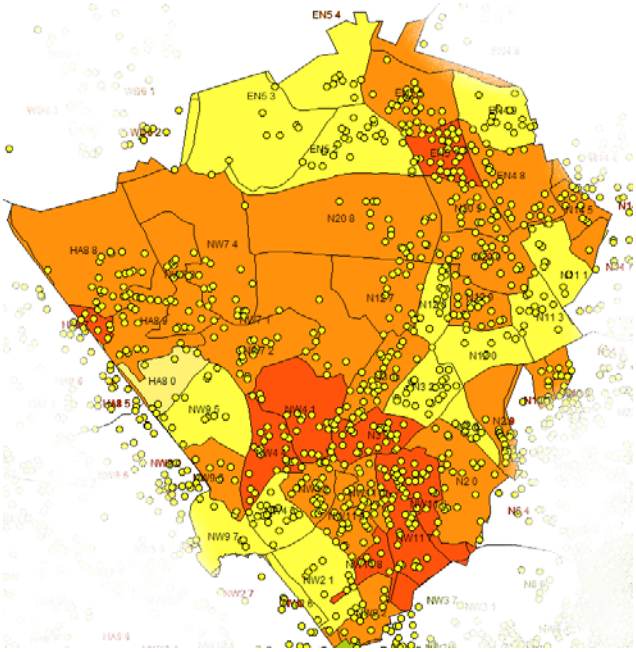
Should we aggregate the claims into postcode districts to try and make sense of the data? Or is that too broad brush? Would sectors be better?

A few claims can translate into a high frequency if, for example, half of the sector is parkland, and we have two or three claims, but only 20 houses.

Or do we ignore frequency, and just look for incidence? Would it be more helpful to look for claim groupings, setting aside frequency? Would that better reflect the risk and as a consequence, reduce claims? Would it help Boroughs target tree works?



Claim distribution plotted on the District map, which reveals that Barnet is a high risk Borough. At this level of mapping, the suggestion might be that the entire Borough requires tree surgery to counter the problem experienced with root induced clay shrinkage.

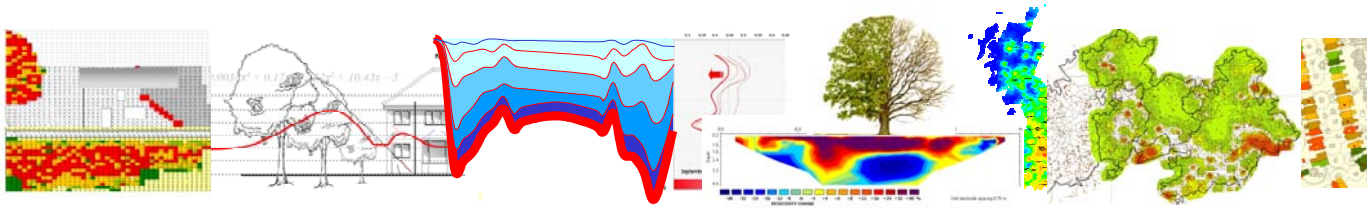


Calculating claim frequency (claims divided by housing population), the postcode sector map above adds a degree of refinement that may be useful, although we suspect that it would lead to an overspend when compared with the more granular unit postcode dataset.

The postcode sector map indicates around 7 - 8 of the very high risk sectors (red) in the Borough.

Or is it the case that in the absence of a regular pruning regime, we would see even more claims? In fact, are there hot spots at all, or is it simply a normal distribution tinged with some bad luck?

Are most properties with trees nearby, on clay soils, moving seasonally, and every now and again one 'gives way' and cracks?



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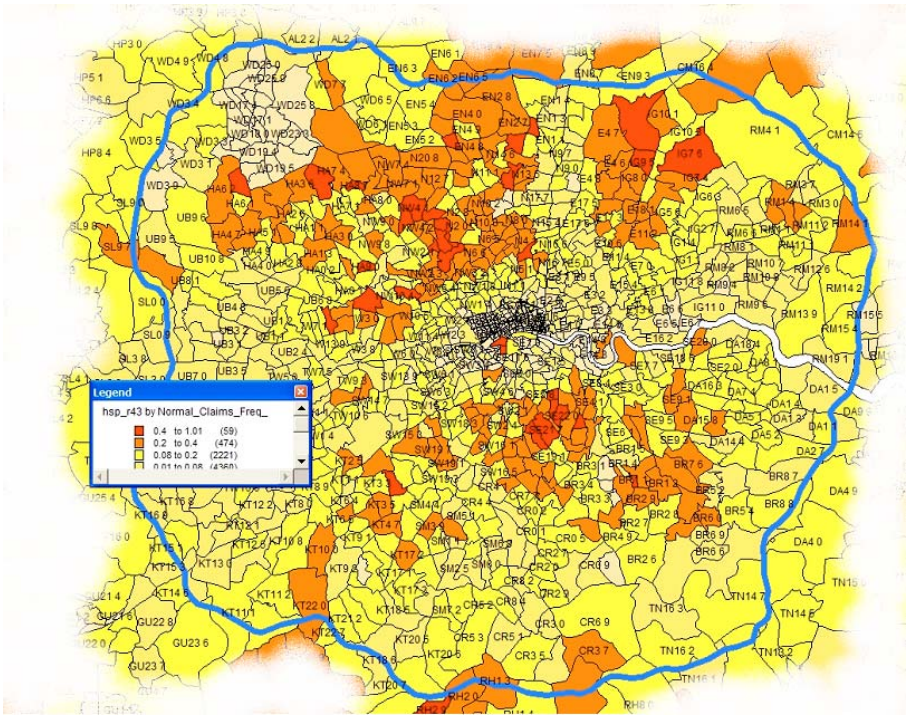
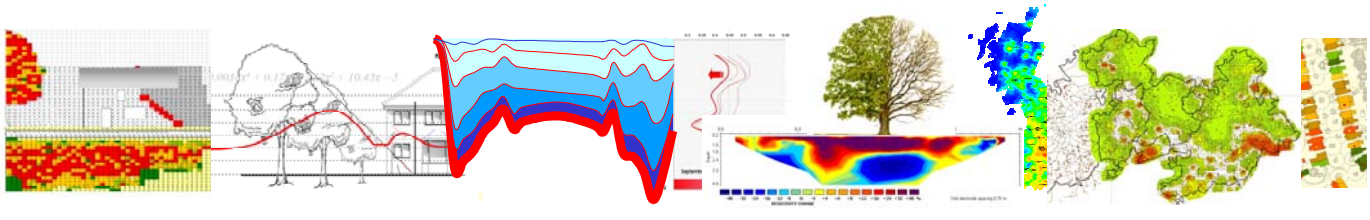
Hot Spots by Postcode Sector

The top 5% of sectors at risk across the UK are shaded red (0.6%) and orange (4.4%). The map tallies with the general perception of risk, but will it be sufficient to satisfy the criteria posed in Berent? Will a tree officer be able to use this as a basis going forward? Is 5% the right figure, and what happens if other trees in less risky postcodes aren't maintained? Will we see an upturn in claims that is counter to the Risk Limitation Strategy? The strategy was introduced to counter the problem of high claim numbers across Boroughs and the associated costs.



It also poses the question of whether trees act randomly, or is there a pattern that can be detected? Will that pattern be the same for a population of trees that are crown thinned regularly, compared with trees that are not?

If we can't find a method of identifying single trees, why would we imagine that identifying groups would be easier?



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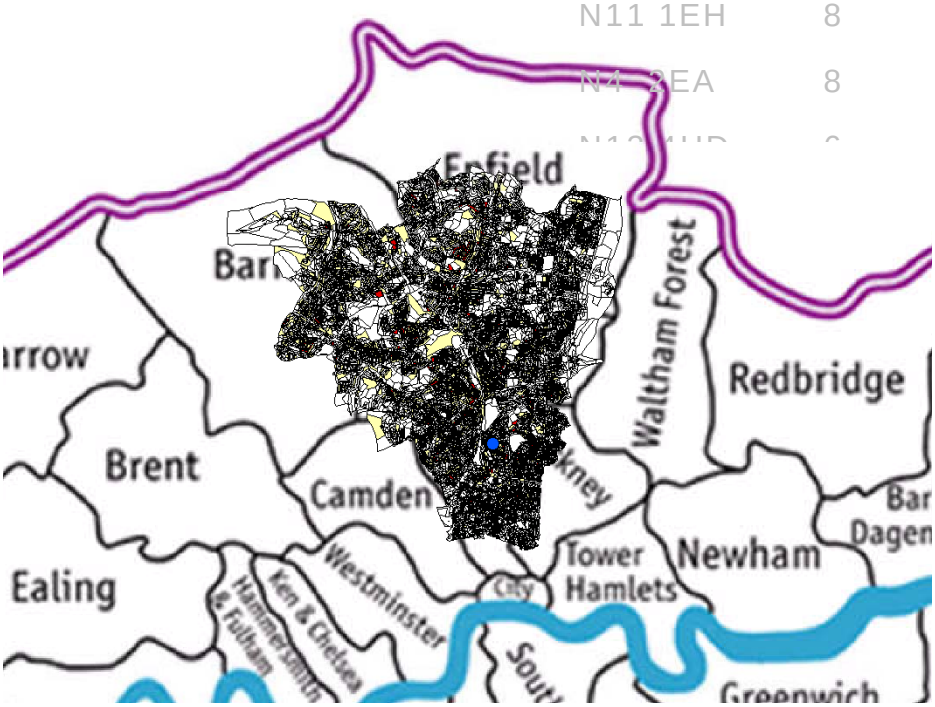
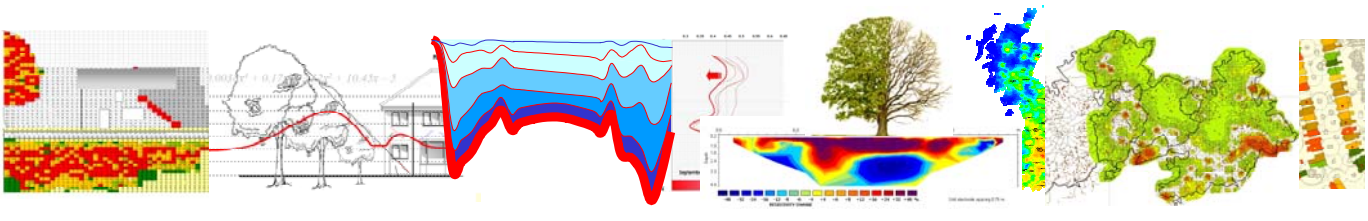
Mapping by Full Postcode

The sample we have used consists of just over 60,000 valid claim records at full postcode. This equates to something like 3 – 4 years of industry records of valid claims. There are around 2,000 properties in a postcode sector ("N13 4"). A unit postcode ("N13 4SA") will include 15 houses – on average. There are usually more houses per postcode in the London area.

Below is a map showing the location of the "N" postcodes in relation to the London Boroughs, and right is the risk table listing the count of claims at unit postcode level from the CRG sample.

N13 4SA	10
N5 2JS	10
N13 4PR	9
N4 3DR	9
N11 1EH	8
N4 2EA	8





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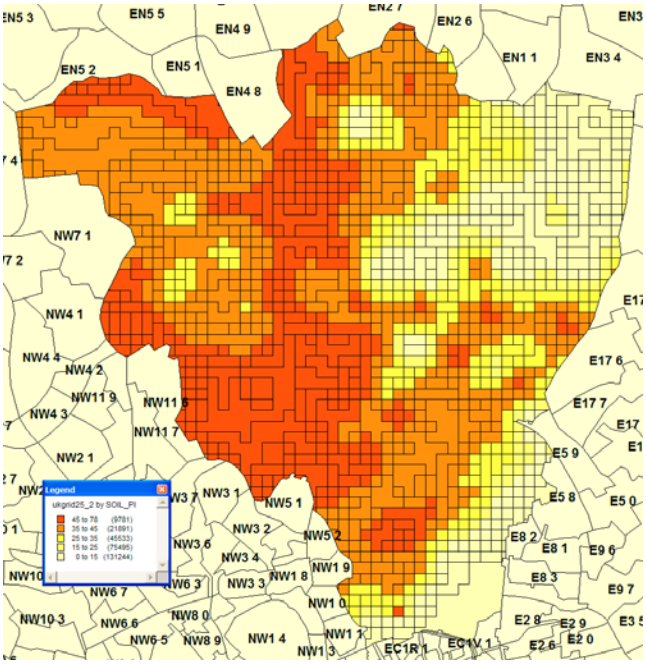
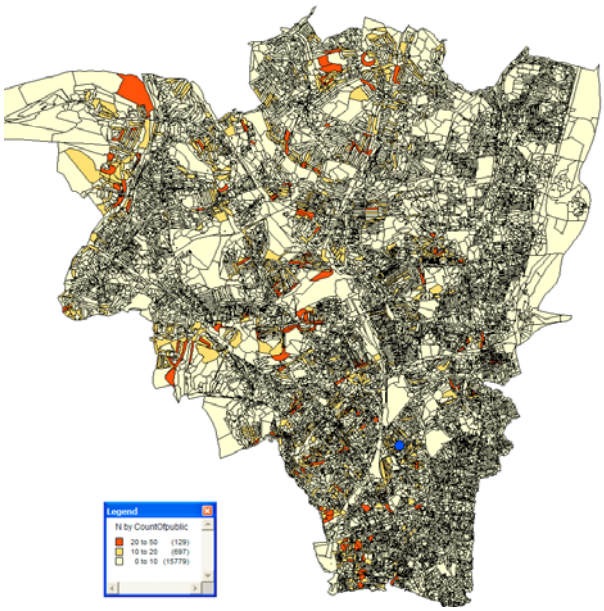


The geology of the N postcode area, shown left.

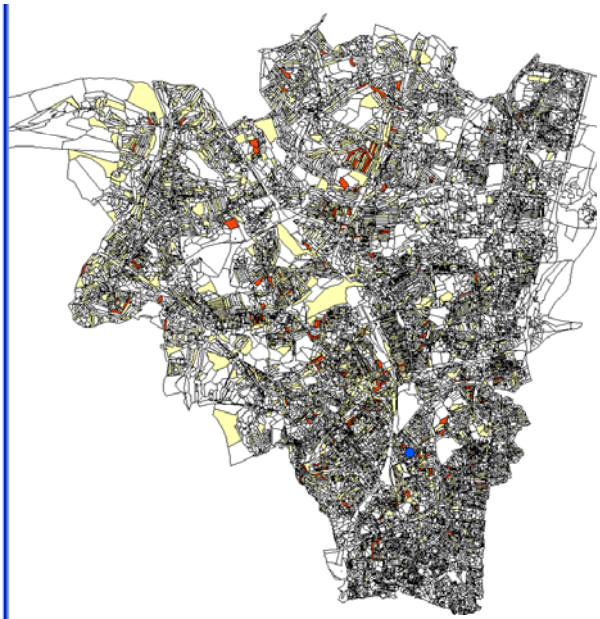
Would the inclusion of private tree claims assist in improving our understanding of risk? Probably not.

Do these high risk areas have any distinguishing characteristics. Species, building type, 'by height' and 'by distance' risk factors?

As we will see in the case of Robbins (following pages), the hot spot may be easier to identify than we thought.

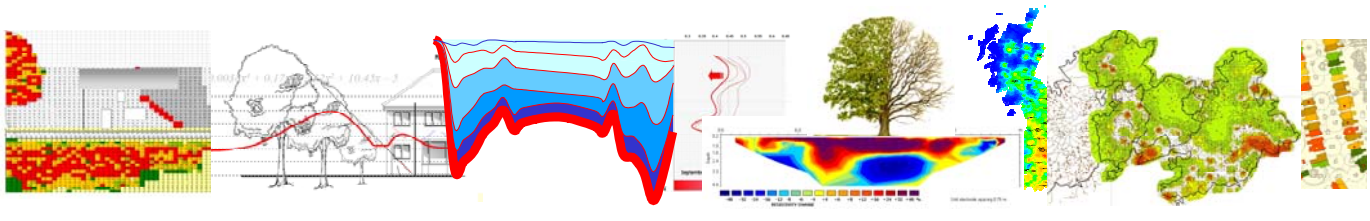


Council Trees by Code Point



Valid Claims by Code Point

There is no obvious correlation between the Count of Claims and the Count of Trees maps (public and private, plotted separately – private not shown here), suggesting that 'trees take their victims as they find them', and that it is not a case of 'more claims simply because there are more trees'.



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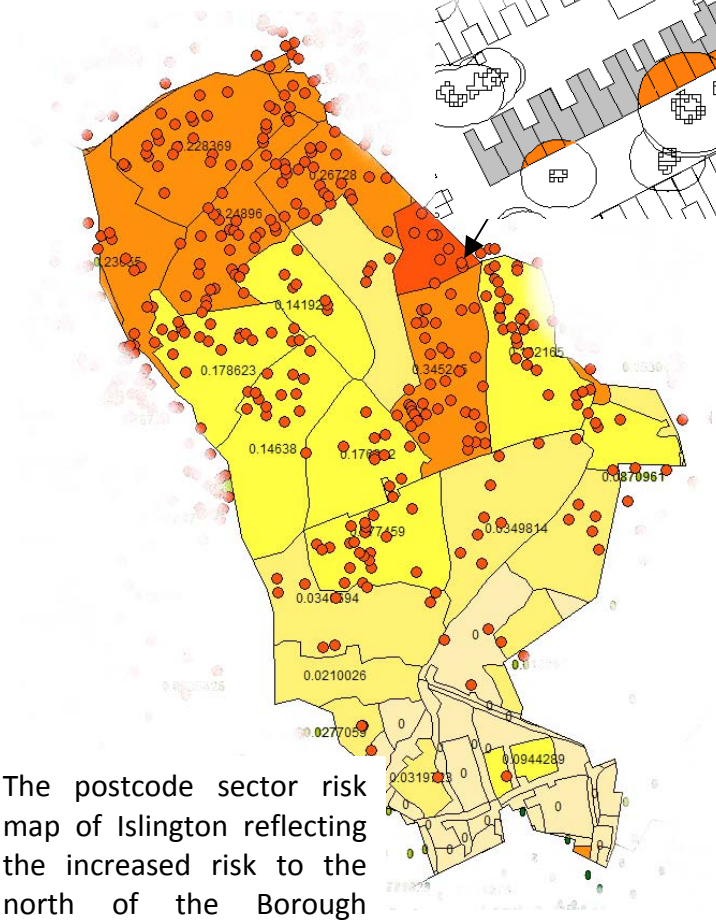
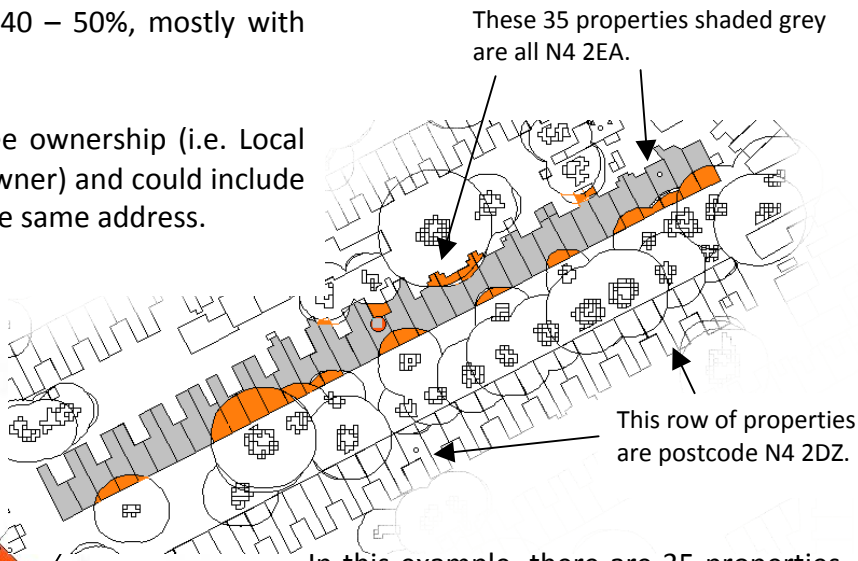
"N4 2EA" – Mapping Hot Spots by Unit Postcode

N4 2 is a high risk sector indicated red on the map below – see arrow. The sector has a total of 24 claims, 8 of which are recorded as occurring in N4 2EA. The soil PI varies somewhere between 40 – 50%, mostly with 100% passing.

The records do not identify tree ownership (i.e. Local Authority, neighbour or homeowner) and could include cases of recurrent damage to the same address.



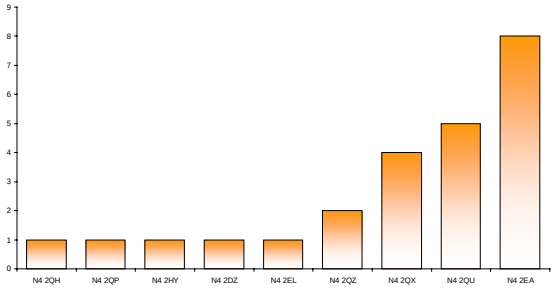
The postcode sector risk map of Islington reflecting the increased risk to the north of the Borough associated with the presence of the highly shrinkable clay soils

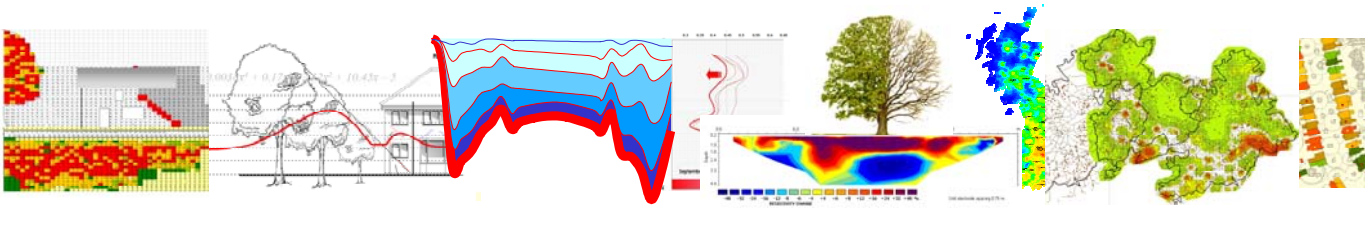


In this example, there are 35 properties in postcode N4 2EA, with 8 claims.

The sample has only 1 record of a claim across the road in postcode N4 2DZ. This has an apparently similar profile in terms of trees and geology.

Modelled root overlap zones are shaded red in the picture above. There are 22 properties within influencing distance of the modelled public tree zone, but only 7 in influencing distance of private trees.





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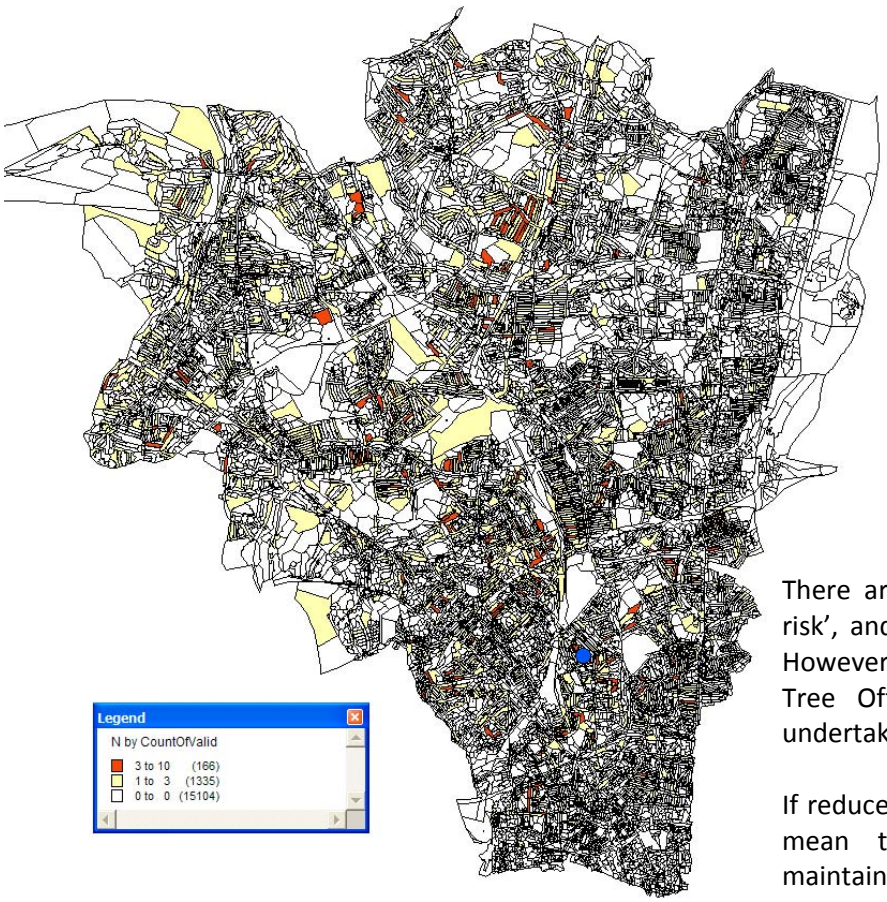
"N4 2EA"
Mapping Hot Spots using OS Code Point

Our records have 2,195 claims in the "N" postcode area, and there are claims in around 10% of the unit postcodes.

The open polygons have no claims, those shaded yellow have between 1 – 3 claims, and red indicates between 4 – 10 claims.

In terms of risk by count-of-claim, red might appear a hot spot, but this is a historic glimpse in a dynamic world. It is likely that trees have already been pruned in these polygons, and the risk may have moved on.

The blue dot is postcode N4 2EA, and shaded areas are code points with claim notifications from the sample we hold.



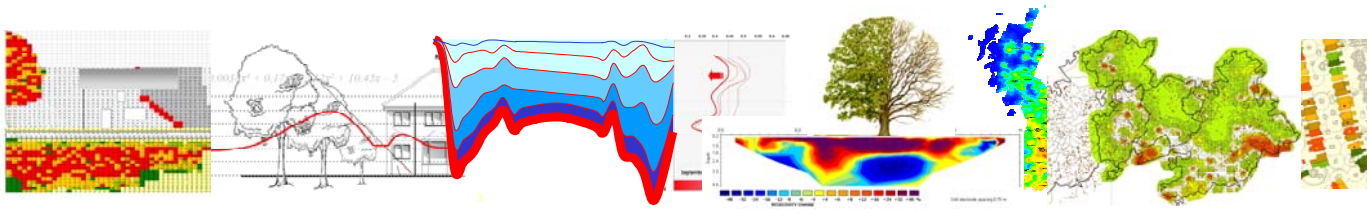
Left, the OS Code Point map plotting "N" postcodes.

The blue dot is postcode N4 2EA as shown above, and the distribution of risk is shown by red shaded polygons.

They include all claims from the CRG sample and perhaps the next stage will be looking at reducing the rating for postcodes with only one or perhaps two claims.

There are 1,501 postcodes notionally 'at risk', and 15,104 with no claims recorded. However, the map reflects a city where the Tree Officers have, in many Boroughs, undertaken pro-active tree management.

If reduced budgets and the Berent decision mean that trees will no longer be maintained, the picture may change.



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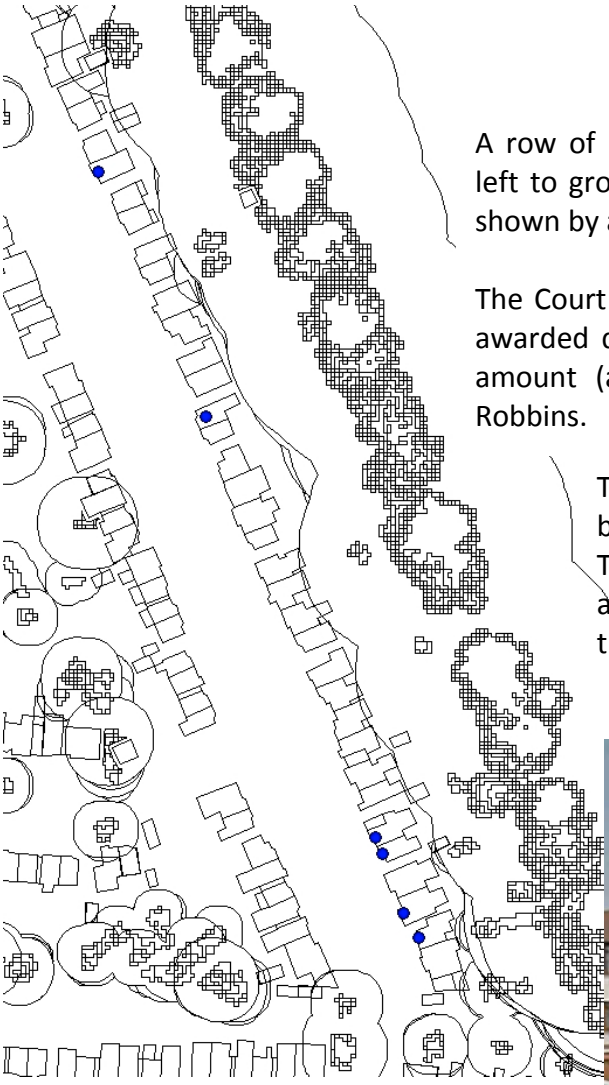
Robbins

The Court ruling in the case of Robbins clarified what might be regarded as a foreseeable nuisance. In this case, the Local Authority were put on notice following damage to the rear of a property in Radnor Avenue, but for a number of reasons, did nothing.

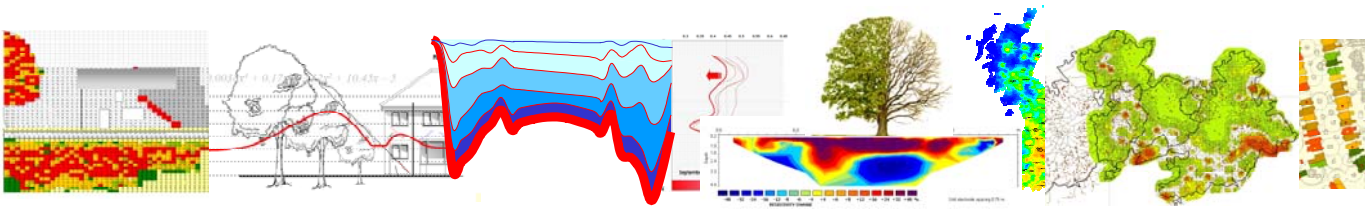


A row of Black Poplars bordering Damson Park were left to grow, un-maintained, damaging the properties shown by a blue dot on the plan, left.

The Court held that this was entirely foreseeable and awarded damages in the sum of £150k, with a small amount (around £3,000) for inconvenience to Mrs Robbins.

The row of Black Poplars would be a hot spot by the criteria set out in the Berent decision. They had caused damage to several houses, and notice had been given sufficient to alert the Council that action needed to be taken.

The street scene (right) courtesy of Google Earth, reveals the severe lopping of the Black Poplars post-Robbins.



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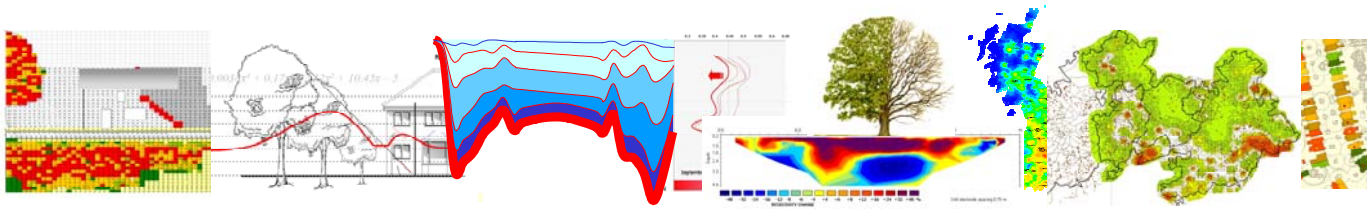
Hotspots Mapped by Unit Postcode

The CRG map of the 'N' area of London, plotted by number of claims and revealing hot-spots by graded circles. Some definition of what constitutes a hot spot, sufficient to warrant crown reduction or felling of nearby trees, would be required. This might be enhanced by some further risk analysis around tree species and metrics – height/distance etc..

Trees that have formed the subject of an earlier claim may have been reduced or felled already. The map of risk is changing month by month. The cases confirm that it is not possible to foresee risk in general terms. But what will happen if routine pruning is set aside in favour of doing nothing?

Research > Action

How long is it reasonable to wait for the recommendations of newly published research to be implemented? This was clarified in the case of Robbins, when the judge determined a period of 12 months would be sensible. Using the example of Hortlink (although the paper wasn't in fact published in a journal but was available for download from the BRE web site), it would be unreasonable and impractical to expect Councils to amend their approach 'overnight'. The judge said *"bodies such as local authorities cannot be expected to know about, let alone react to, current research the instant that it is published "*. They have budgets and contracts in place, and in any event, the results of the research had to be properly digested and understood.



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Discussion

Berent clarifies the legal interpretation of both foreseeability and tree root nuisance, and Robbins provides an example.

One of the benefits of Berent is that it may lead to improvements in the quality of investigations that are undertaken by engineers. Poor investigations could delay action with the tree. Good evidence is essential, and there will be no recovery of abortive costs related to second sets of investigations or worsening of the damage associated with delays.

Also, it is likely to reduce the time it takes for Councils to deal with trees that are causing damage. It is important that Councils, when put on notice with suitable supporting evidence, take appropriate action quickly.

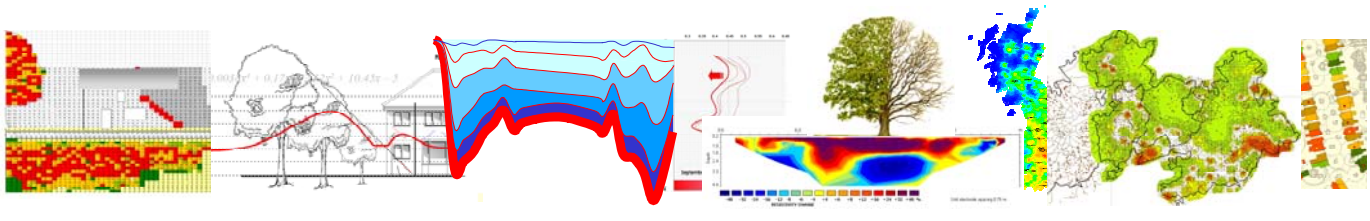
The amenity value of street trees is recognised, as well as the financial constraints of maintaining the amenity. Councils may benefit by reducing their spend carrying out routine crown reduction, knowing they will not be held liable for the first notification of damage. They will only be liable for costs following notification – underpinning for example.

This brings into question the position of The Risk Limitation Strategy, which was drawn up to avoid the costs of just this scenario and hopefully won't be discarded. Do Councils simply wait for trees to cause damage and then respond? If trees are not maintained will we see a return to previous, high claim numbers with insurers seeing an increase in spend?

Asking Boroughs for records of previous claims is essential to identify hot spots.

It would also be useful to determine the efficacy or otherwise of crown reduction if they shared their experience. Do claims tend to come back, or have they found that crown thinning is an effective means of controlling water uptake?

Both cases outline the reasoning behind the judgement in great detail and the particular circumstances of the claims are well worth reading in full. The practical ramifications are important for our industry and particularly with regard to the potential costs of a Borough not maintaining their trees.



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This paper was published a few weeks prior to the article on the following page, which arrives at a different – and more pessimistic - conclusion.

Ice Sheets in Retreat?

Professor Kurt H. Kjær *et al*
Science

Possibly not, according to new research from Denmark.

The University of Copenhagen in conjunction with the Technical University of Denmark (DTU) and the Danish National Survey and Cadastre (KMS) in collaboration with an international team of scientists reports that this is not the first time in recent history that the ice sheet has been in retreat and then stabilised.

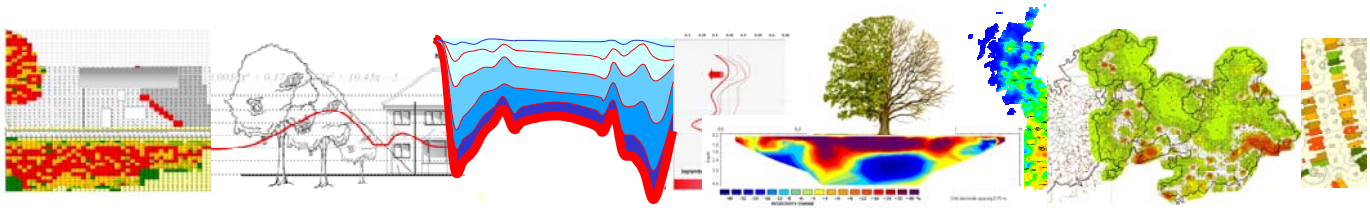
Over the past three years a number of scientific articles have suggested a sea-level rise of one metre or more. These reports presuppose that the melting will accelerate at the same rate as during the past decade.

The research suggests that the ice sheets respond dynamically and stabilise quicker than the various models and computer calculations predict.

The new research findings were obtained by combining contemporary satellite data with old aerial photographs of the ice sheet in northwestern Greenland, one of two hotspots for ice sheet thinning and heavy glacial melt runoff.

Senior researcher Shfaqat Abbas Khan of the Technical University of Denmark (DTU) says of the research results: "We have used a combination of old aerial photographs from the 80's to construct a digital elevation map and recent satellite data. In this way we've been able to gain an overview of the thinning of the ice sheet over the last 30 years in northwestern Greenland.

“The results show that despite a significant thinning in peripheral regions from 1985



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Arctic Sea Ice

Ddr Seymour Laxon
Interviewed by the Observer

Arctic sea ice is melting at a faster rate than previously believed, a group of scientists have claimed.

The European Space Agency say that new satellites they are using have revealed that 900 cubic kilometres of ice have disappeared over the last year. This is 50 per cent higher than the current estimates from environmentalists, they claim.

Th8is image has been taken from a different paper, published by NASA in July 2012. The thawed ice area jumped from 40% of the ice sheet to 97% in just four days from 8 July.

Lora Koenig of the Nasa Goddard Space Flight Center says “Melting events of this type occur about once every 150 years on average. With the last one happening in 1889, this event is right on time”

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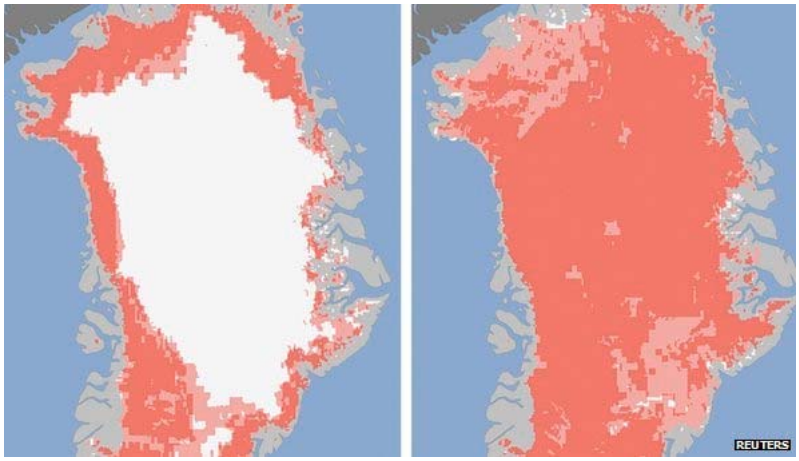
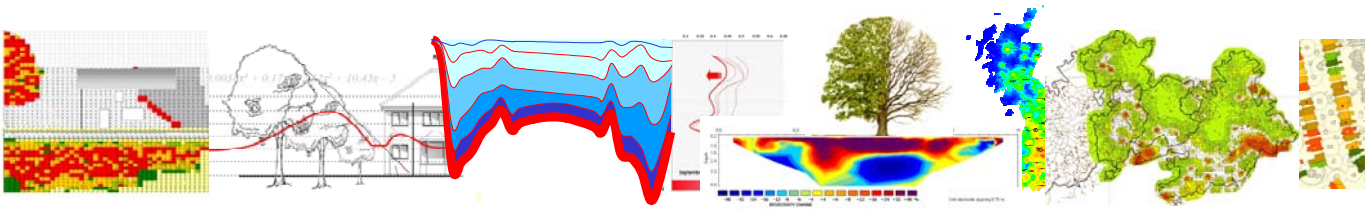


Images from NASA show melting of the Greenland ice cap. Scientists said the "unprecedented" melting took place over a larger area than has been detected in three decades of satellite observation.

Dr Seymour Laxon, of the Centre for Polar Observation and Modelling at University College London, talking to The Observer, says 'Preliminary analysis of our data indicates that the rate of loss of sea ice volume in summer in the Arctic may be far larger than we had previously suspected.'

The researchers have estimated that the volume of sea ice in the central Arctic was approximately 17,000 cubic km in the winter of 2004 and is now closer to 14,000 cubic km. Its area has almost halved.

Apparently, Greenland contains enough ice to raise sea levels by 7mtrs (23 ft) if it all thawed.



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NASA Link Warm Summers to Climate Change

Hansen *et al*

Proceedings of the National Academy of Sciences

NASA research team record more hot summers than expected in a normal distribution.

A new statistical analysis by NASA scientists has found that Earth's land areas have become much more likely to experience an extreme summer heat wave than they were in the middle of the 20th century. The lead author, James Hansen of NASA's Goddard Institute for Space Studies (GISS) in New York says, *"This summer people are seeing extreme heat and agricultural impacts. We're asserting that this is causally connected to global warming, and in this paper we present the scientific evidence for that."*

The research team analysed mean summer temperatures since 1951 and showed that the odds have increased in recent decades for what they define as "hot," "very hot" and "extremely hot" summers. The researchers detailed how "extremely hot" summers are becoming far more routine.

In summary, there are more hot summers than a normal distribution would account for.

Elevated Methane Concentrations in Trees of an Upland Forest.

Covey *et al*

Geophysical Research Letters, August 2012

Rotting trees a significant source of methane emissions. Normal air concentrations of methane are less than 2 parts per million, but the Yale researchers found average levels of 15,000 parts per million inside trees.

"Could account for 10% of global emissions."

Diseased trees in forests may be a significant new source of methane that causes climate change, according to researchers at the Yale School of Forestry & Environmental Studies in Geophysical Research Letters.

Sixty trees sampled at Yale Myers Forest in northeastern Connecticut contained concentrations of methane that were as high as 80,000 times ambient levels. Normal air concentrations are less than 2 parts per million, but the Yale researchers found average levels of 15,000 parts per million inside trees. The trees producing methane are older -- between 80 and 100 years old -- and diseased. Although outwardly healthy, they are being hollowed out by a common fungal infection that slowly eats through the trunk, creating conditions favorable to methane-producing microorganisms called methanogens.

Kristofer Covey, the study's lead author and a Ph.D. candidate at Yale says "we believe we have found a globally significant new source of this potent greenhouse gas."