

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



September 2011

The Clay Research Group

CONTENTS

- ⊕ RICS Subsidence Handbook
- ⊕ Climate Update
- ⊕ Weather Anomaly Data
- ⊕ Precise Electrollevels
- ⊕ Precise Levels : Thinking Plants
- ⊕ Stomatal Conductance and RH
- ⊕ Research Update
- ⊕ The Carbon Fix Foundation



Launch of the RICS Subsidence Handbook

The Royal Institute of Chartered Surveyors launch their Subsidence Handbook towards the end of September, and a series of seminars are planned across the UK as shown below.

- Birmingham – 7th November, 2011
- Hampshire – 11th November, 2011
- Manchester – 15th November, 2011
- Leicester – 22nd November, 2011
- London – 30th November, 2011
- Wales – 6th December, 2011

Visit <http://www.rics.org/subsidence2011> for more details. To book, E-mail conferences@rics.org

THE CLAY RESEARCH GROUP

www.theclayresearchgroup.org

clayresearchgroup@gmail.com

innovation

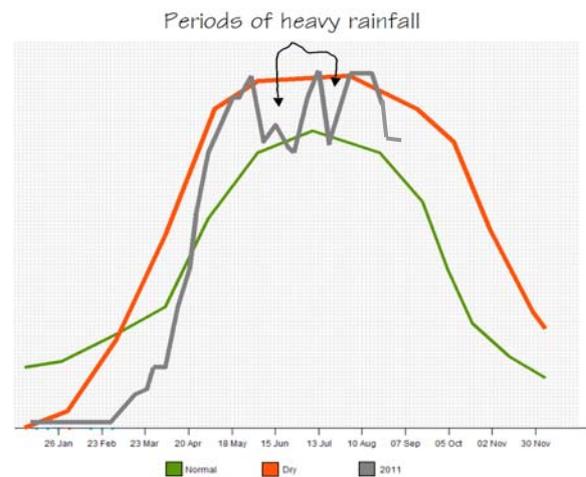
ADDRESSOLOGY

UAWIURU



CLIMATE

2011 continues to confound the more traditional interpretation of the SMD model with hot dry spells interspersed with bouts of heavy rainfall, as we see below.



The highs and the lows touch on the two boundary conditions and by the end of the year, we can add another very different characteristic signature to the growing database.

Paul Thompson of Marishal Thompson writes...

“Following the recent Subsidence Forum AGM and presentation by the Clay Research Group stating that models developed by CRG were predicting a Subsidence claim profile matching 2005; Marishal Thompson undertook an empirical test of their dataset. Results of the analysis (claims October 2010 to June 2011) found a 0.94 correlation coefficient with the normalised (to account for client variation) 2005 dataset; the results substantially corroborate the CRG model.”

2005 delivered losses amounting to £225m from 37,000 claims.



The Clay Research Group

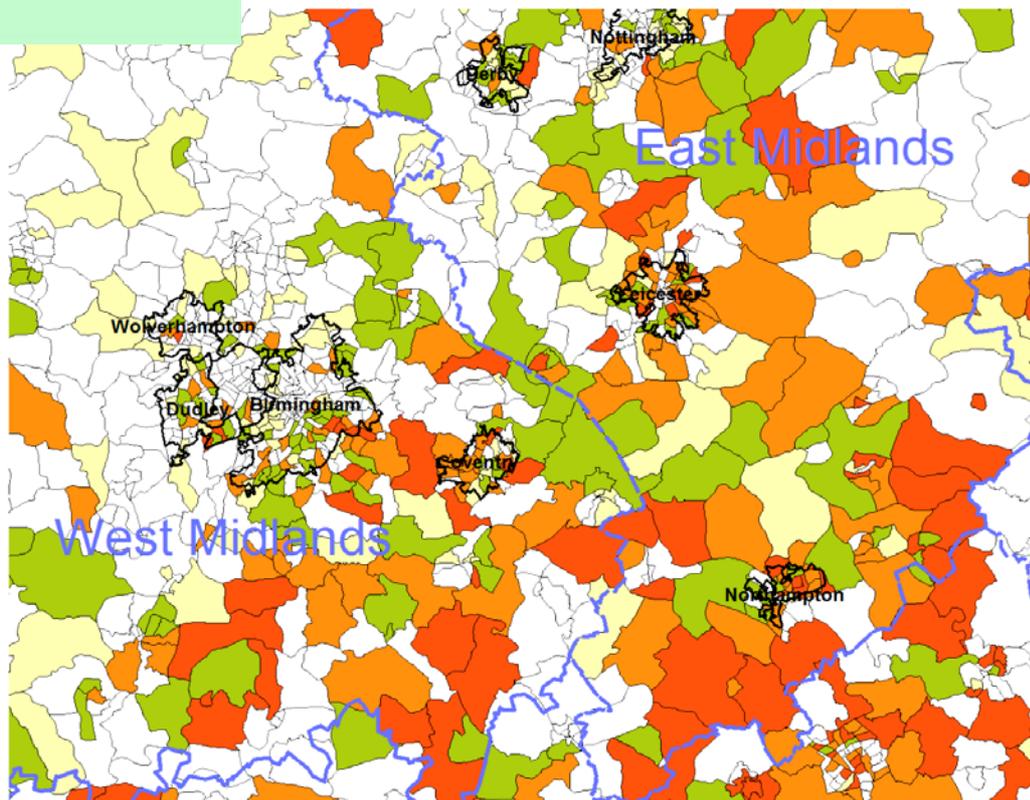
ANOMALY DATA

Michael Lawson from OCA has provided anomaly data left, supplied by the Meteorological Office, showing the Midlands as having less rainfall and slightly higher temperatures than in past years.

| Regions 1st- 25th | Temp Anom | Rain %age | Sun %age |
|----------------------|--------------|--------------|-------------|
| N Scot | -0.5 | 150 | 81 |
| E Scot | -0.6 | 210 | 73 |
| W Scot | -0.8 | 161 | 67 |
| CentScot | -0.6 | 215 | 72 |
| NE Eng | 0.0 | 142 | 86 |
| EAnglia | +0.4 | 88 | 88 |
| Midlands | +0.6 | 62 | 73 |
| SE Eng | +0.1 | 112 | 87 |
| NW Eng | -0.4 | 144 | 67 |
| Wales | -0.6 | 88 | 70 |
| SW Eng | -0.4 | 125 | 69 |
| N Ireland | -0.8 | 74 | 76 |
| Irish Rep | -1.1 | 98 | 74 |

Rainfall is only 62% of the average, and the temperature has increased by +0.6 degrees when compared with the 30 year average. These are the highest values in the table.

Any increase in claims would most likely effect the south east of Birmingham, Coventry and Leicester due to the Smectite rich clay mineralogy of the Mercia Mudstones in the locality, as we see below.



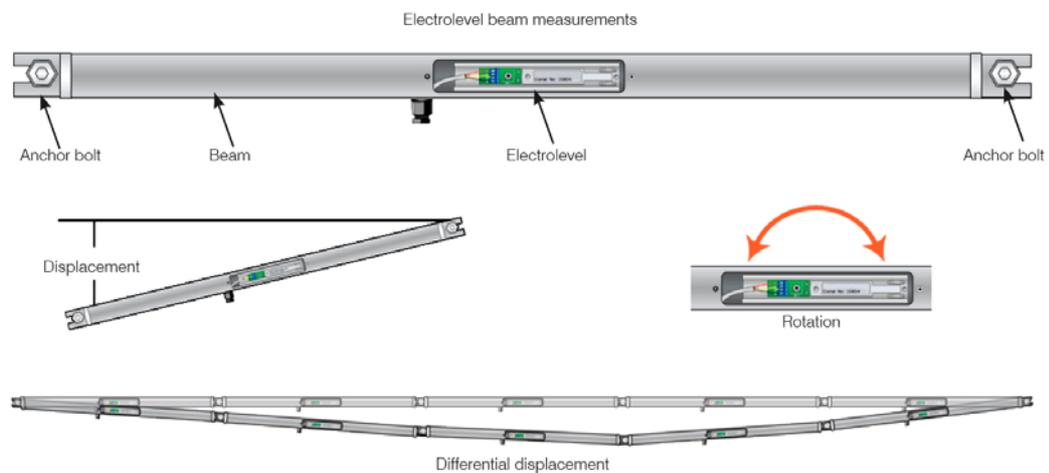
The map describes the shrink/swell potential and the increased geological risk to the south east and eastern areas of the Midlands.

Fortunately, the shrink/swell characteristics of this series are less than half that of the London clay deposits and the housing density much lower which means that even if there is an increase in claim numbers, it is unlikely to produce an Event.

The Clay Research Group

ELECTROLEVELS

Electrolevels measure tilt – the angular rotation of a structure. This is useful, but doesn't allow us to determine the vertical component in the same way as precise levelling. Knowing that a wall has rotated by so many arc seconds is difficult to translate because we don't know the fulcrum of movement in relation to the length of wall effected.



Electrolevels fitted to a series of connected beams provides a neat solution, and have been in use for many years. Supplied by Soil Instruments at Uckfield, they have been used by Gerwyn Price and others to measure vertical movements and deliver data in a similar way to precise levelling.

Angular rotation over a known length allows a series of triangles to be built that provide a clear profile of building movement. Soil Instruments say “Linked end to end, beam sensors can provide absolute displacement and settlement profiles.” An interpretation application like Argus is available on the web, and can be downloaded from <http://argussoftware.co.uk/home.htm>.

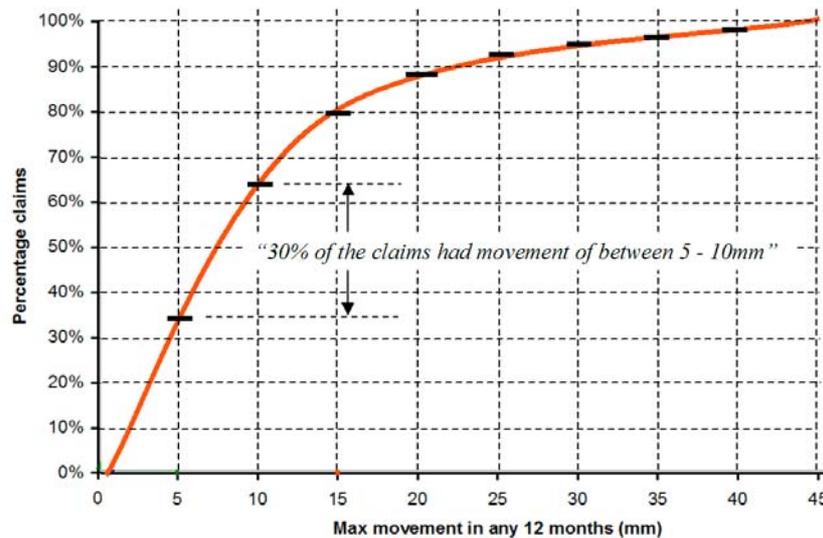
The drawbacks when considering domestic dwellings are cost, practical constraints (door openings, bay windows and party walls etc) and balancing capital and installation costs, plus the logistics – when and where to move the equipment – that are less of a problem with precise levelling.

The Clay Research Group

PRECISE LEVELS

~ Cumulative Frequency Plot of Recorded Movement ~

An extract from Tim Freeman’s analysis of movement over the monitoring term for a range of claims, as delivered at the Aston Subsidence Conference a few years ago.



A cumulative frequency plot of movement recorded over a 12 month period using precise levels. The data does not take account of the initial movement that has led to cracking - it records movement in the monitoring term. Around 35% of the sample has movement of 5mm or less. 30% of the claims had movement of between 5 - 10mm, 15% had movement of 10 - 15mm, and so forth.

Thinking Like a Vegetable: How Plants Decide What To Do



Professor Ottoline Leyser from University of York explains how plants ‘think’ when they don’t have a brain and provides a fascinating insight into the role of hormones.

The link below gives access to her Royal Society Rosalind Franklin Award Lecture in 2007.

<http://royalsociety.org/All-our-Web-casts/>

SUBSIDENCE DRAMA

Subsidence has suddenly become quite popular. John Peterson from Foundation Piling Limited appeared on Grand Designs recently. Sarah Beeney is explaining how houses that have cracks fall down. Auger Solutions Ltd., are investigating leaking drains and soil conditions, and the BRE are lending a hand building models to show homeowners what could happen if they don’t do as they are told.

The Clay Research Group

Responses of Stomatal Conductance to Simultaneous Changes in Two Environmental Factors

Krööt Aasamaal & Anu Söber
July 2011

This paper appears in the latest Journal of Tree Physiology (Vol 31, Issue, 7, July 2011) and is of interest in determining the factors that influence stomatal opening and closing.

Six species of temperate deciduous trees (unspecified in extract) were shown to be similar in their relations between the stomatal responses to two simultaneous environmental changes.

The rates of change in stomatal conductance were measured after simultaneously changing two environmental factors from the set of air humidity, leaf water potential (hydraulic environmental factors), air CO₂ concentration and light intensity (photosynthetic environmental factors).

The stomatal responses to changes in leaf water potential were not significantly modified by any other simultaneous environmental change.

A decrease in air humidity was followed by a decrease in stomatal conductance, and an increase in air humidity was followed by an increase in the conductance, irrespective of the character of the simultaneous change in the photosynthetic environmental factor.

The stomatal response to air humidity dominated over the responses to photosynthetic environmental factors.

This is an interesting study putting relative humidity at the top of the league in terms of water uptake.

Research Update

Clive Bennett is well into the research element of his work on soil testing having completed the background literature review. He is looking at a new suction technique and developing his previous work on measuring strains. Allan Tew is undertaking the literature review on new methods of repairing damaged buildings and Tom Clinton (full time student at Birmingham University) is studying stabilisation of clay soils using electrokinesis.

The study of the benefits or otherwise of crown reduction alongside East Malling has suffered from the usual summer increase in workload, but will re-commence shortly.

The Carbon Fix Foundation

Paul Thompson informs us that he has managed to raise £250,000 so far, and registration as a charity is underway. The objectives are...

INFORM :

- a home for accurate audited scientific information
- trained staff able to deliver presentations nationally and guide local development strategies

EVALUATE :

- Staff qualified to audit and work with the Industry to assess true carbon footprint

ACT :

- Formulate industry best practice
- Implement Carbon offset schemes

Paul says, *“My new charity which will be fully registered with the Commissioners in September ... will be undertaking work towards a reduction in the risks associated with climate change. This will be mainly in the third world but there are 2 UK based projects due to start in 2012”*

Contact paul.thompson@marishalthompson.co.uk