May Report 2010

Purpose:

In 2008 OCA issued 4 updates between April and August and in 2009 we issued 6 updates to try and track key indicators for surge. We have been asked by various clients and partners to repeat the exercise for 2010.

The **OCA** summer surge modelling report extends our research over the last 15 years into the interactions of clay soils, trees and climate. We are seeking to provide quantitative and qualitative analysis of a wide range of data sources such as to help those involved in claims management and subsidence of low rise buildings to plan more effectively.

The methods used and the reported results are experimental and are designed to be able to subsequently measure results against actual reported events to build confidence in the model used.

The report is therefore not yet appropriate for financial, resource or formal capacity planning.

Setting the scene:

Pages 2 & 3 of this report deals with the basics of soil and trees and with the climate of the United Kingdom.

Page 4 looks at comparisons between Pacific phasing and the UK claims experience.

Pages 5 & 6 looks at the weather year to date and looks for any developing trends.

On **page 7** we give our latest Summer forecast of most likely assumptions for capacity planning.

Our intention is to produce a monthly report, which will build a record of the forecast assumptions against the gathered actual data, such as to build confidence in the most reliable forecasting techniques available.

If you have any comments on this newsletter, on any of the content, assumptions or modelling techniques, then contact us as indicated below:

michael.lawson@landscapeplanning.co.uk

Additional resources:

For more information on our research visit:

http://www.oca-arb.co.uk/research_unit.htm

Meteorological Office Rainfall & Evapotranspiration Calculating System (MORECS)

The plot you have here is for a geographic area dominated by high plasticity soils and is a plot for trees (rather than grass or bare soil). The clay over its entire depth responds to water in/out over a 36 month window and this geotechnical behaviour makes it the perfect model soil to study without short term rain clouding the issue.

So '0' is every place that water could be in the soil it is. It is fully hydrated and the trees will have to slowly work at extracting the resource so they can move down the profile and under foundations.

Look at 2002 and ask yourself if in weeks 1 - 12 you see a soil at full hydration.

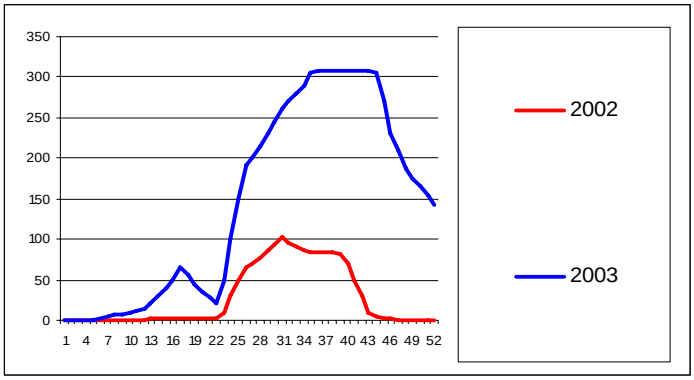
In temperate UK, the period between leaf drop (say November) to bud/leaf burst and the temperature drop (if you are an evergreen), means water loss in this period is effectively '0'.

So what must happen is that from week 15 there is bud burst, the days lengthen and hopefully the temperature rises.

This spring event means that loss from the soil begins and between week 15 and week 22 grass is the main evaporative vehicle for soil water loss. For these 8 weeks grass dominates the first metre of water loss because grass works early in the spring and summer to get a head start and make seed many months before trees, its an early season specialist.

However, you are not seeing the effect of grass in this chart.

Week 15 is bud burst and the leaves of most trees are out shortly thereafter (go look at a tree). This is because they are under hydraulic pressure from water in the wood of the tree and are blown up like a balloon (put a marigold glove under the tap and turn the tap on).



Between week 15 and week 22 the tree is setting itself up for work by getting all of its growth done. There's new wood and new places to put this summers sugar harvest from sunlight. In this period they are not in big transpirational mode (water loss), they know they have 8 weeks before the sun is going to be very high in the sky and they can set sail for a summer of making sugars to get them through the next long, cold, wet winter.

Now look at the chart for week 23, the growth phase is substantially complete and the tree turns all of those beautiful solar panels (leaves) up to heaven and points them at Sol.

The soil model suggests that once 300 is reached there is now no freely available water to plants and the plants must either:

a.) stop working for the year or wait for more rain in the upper soils (say Birch, Beech).

b.) move down the soil profile and get more water from another clay resource.

The key is how quickly does 300 get reached leading to a need to go find more water? (Do note that even in the wettest year on show, the automation of this process is still clearly in view and does not deviate from the model even when the winter is miserable).

The climate of the United Kingdom

There are many places on this planet in which settled and stable weather systems dominate.

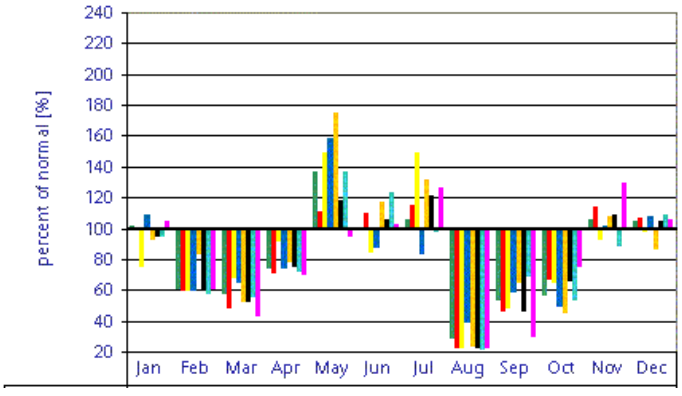
However, presence at a meeting point of the Gulf Stream bringing warm and wet air from the Atlantic, the Azores high interface with the Arctic high interface and straddling a line of influence between continental Europe, Asia and the Atlantic Ocean, is not one of those places on the planet where reliable forecasts can be made.

The complexity of even one of these elements is daunting. Add in the Jet Stream, El Nino, La Nina, various ocean oscillations and changing output of the sun and before we pause to think about Global Warming (or cooling), the position of the UK leads to some classically unpredictable weather.

Every UK year is different

Years can flip quite dramatically in when rainfall falls. Look at the below anomaly charts for two famous years for claims.

rainfall anomaly for 2003:



rainfall anomaly for 2007:

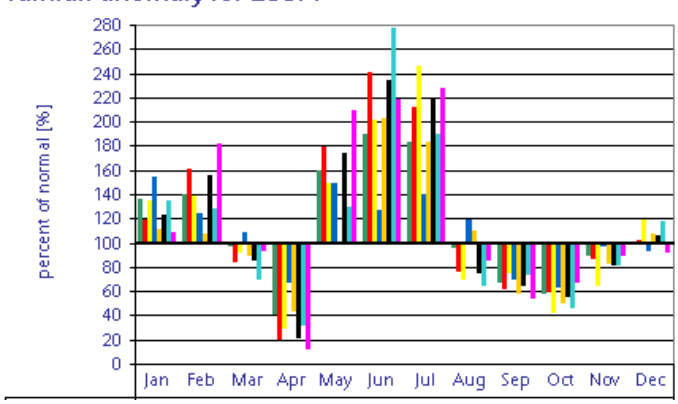


Fig 2. United Kingdom
Some of the influencing factors

If you want to learn more about weather patterns, past weather or MORECS then you can contact the Meteorological sales office on:

Tel: 0870 900 0100

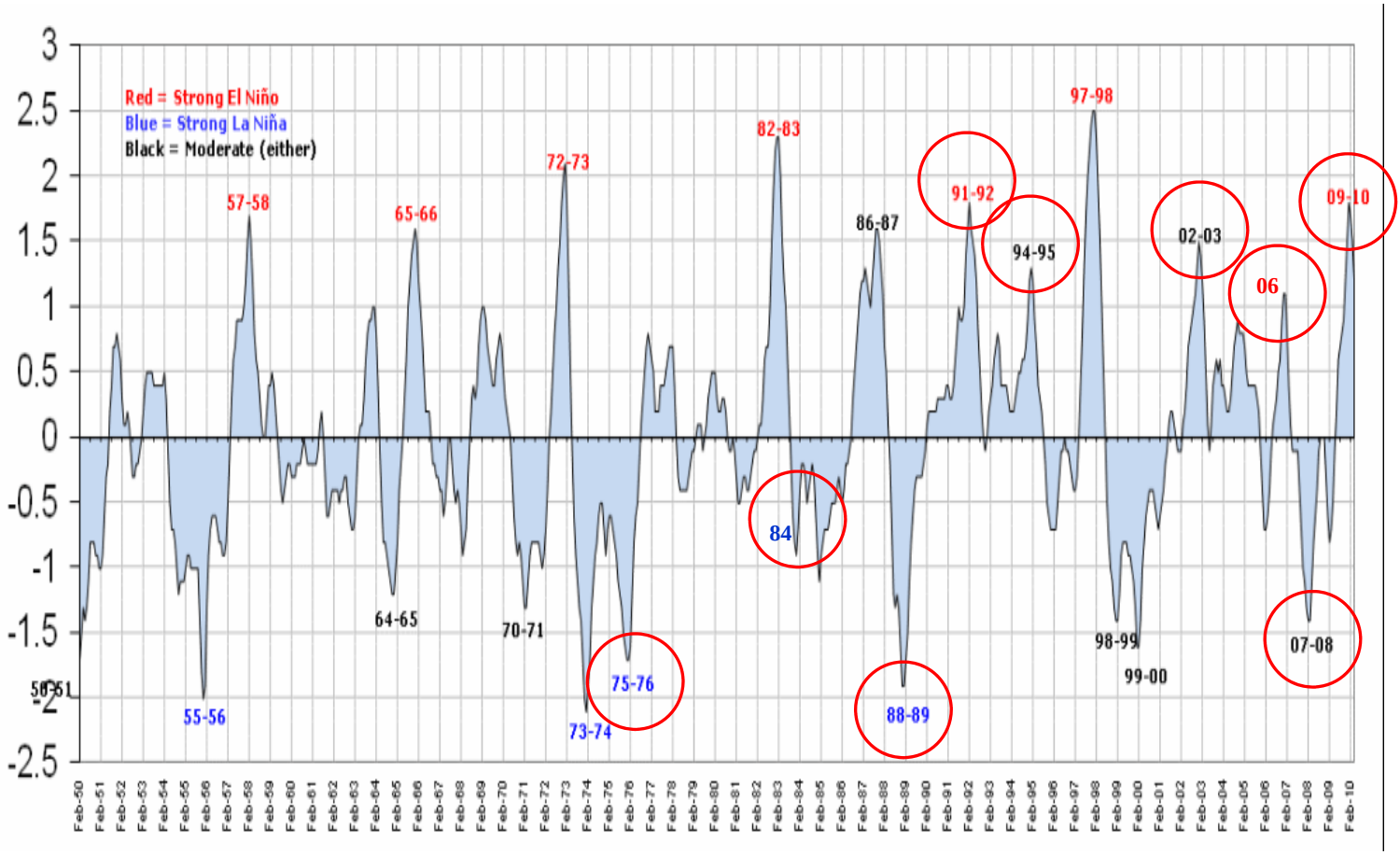
Or just visit: **www.metoffice.gov.uk**

El Nino—La Nina and claims peaks in the United Kingdom

The pattern of warming and cooling Pacific currents and the impact on atmospheric conditions are termed El Nino (warm) and La Nina (cool). The Pacific is the single largest influence on planetary climate because its so big and so deep. We thought it would be interesting to map our claims experience here in the UK against the Pacific pattern to see if any patterns are discernable.

What do you think?

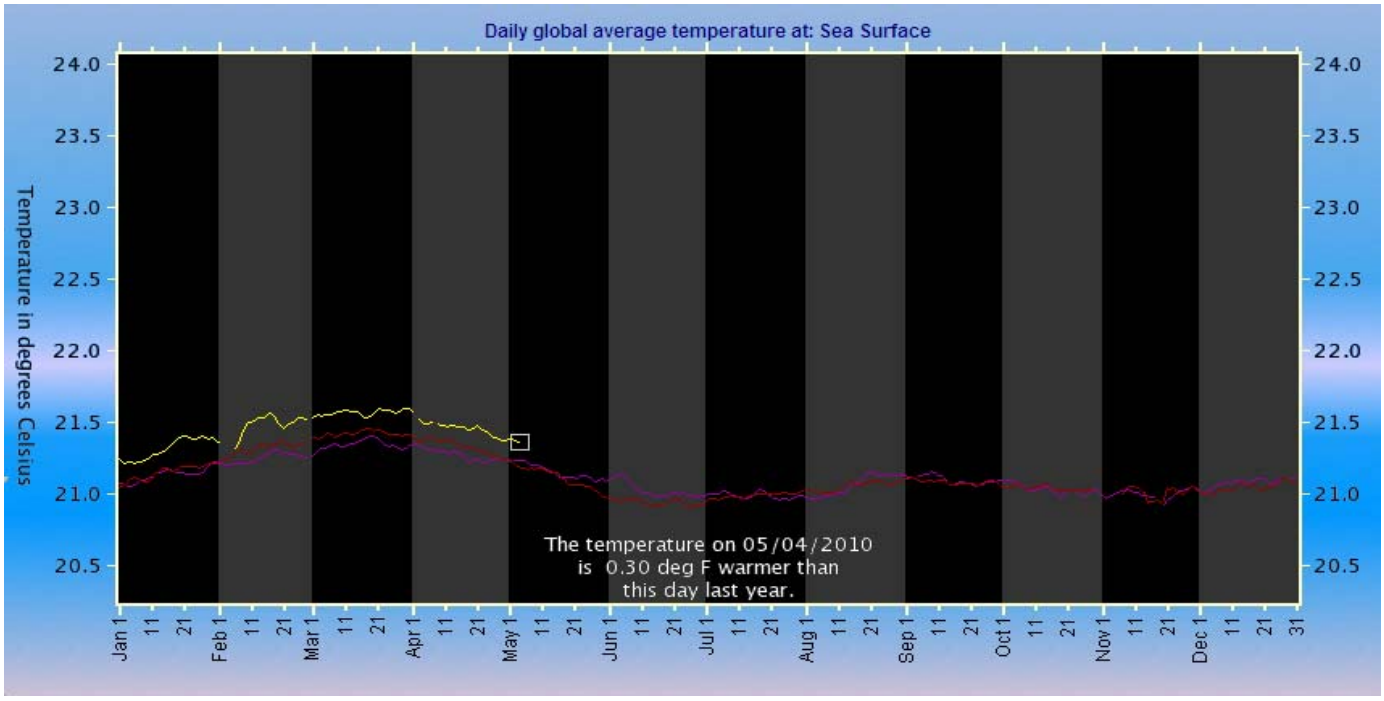
We do believe that the downstream signals created in a warm or cold Pacific impact the northern hemisphere, of that there is no doubt. It is also our opinion that the strength of that signal at the top of the peak and at its bottom must amplify this Pacific signal into the northern Atlantic. Note that a relatively strong signal exists in 2006 (warm) this swings to a strong signal 07/08 (cool) and a relatively strong signal 09/10 (warm). Does Europe respond to the relative elasticity between these signals in its Summer months?—we say it does.



2010 The Climate Year to Date

The global perspective:

The pacific
Continues to drive through its El Niño phase a peaking in world-wide temperatures which is evident from satellite data:



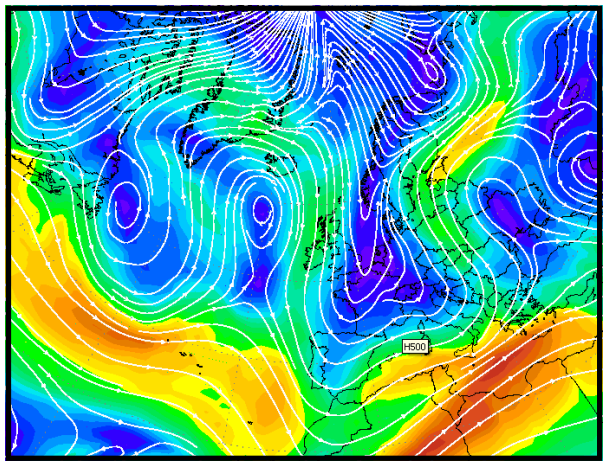
This graph illustrates a daily global track of temperatures from the advanced microwave sounding unit mounted on the NOAA—15 Satellite which passes over most points of the earth twice per day.

The data illustrated is for 2008 (red), 2009 (green) and the current year 2010.

There is no doubt that the earth is warmer in 2010 than in recent years, however this planet scale warming is driven by the Pacific which is in its warm phase and should not be extrapolated to possible impacts on local scale weather for Summer 2010 over the south east of the UK.

What we can probably state is that the global climate set up for 2010 is different from the La Niña / cold Pacific phase of 2007—2008 which it seems fair to assume had some major down stream impacts on the weather of the USA and then Europe with the exceptional wet summers of these years.

Of course the relative importance of the Jet-Stream to our weather will also play a major role and currently the Jet Stream is indicated in the following alignment far to our south:



2010 The Climate Year to Date

The late winter and early Spring 2010 produced an interesting set of UK meteorological figures:

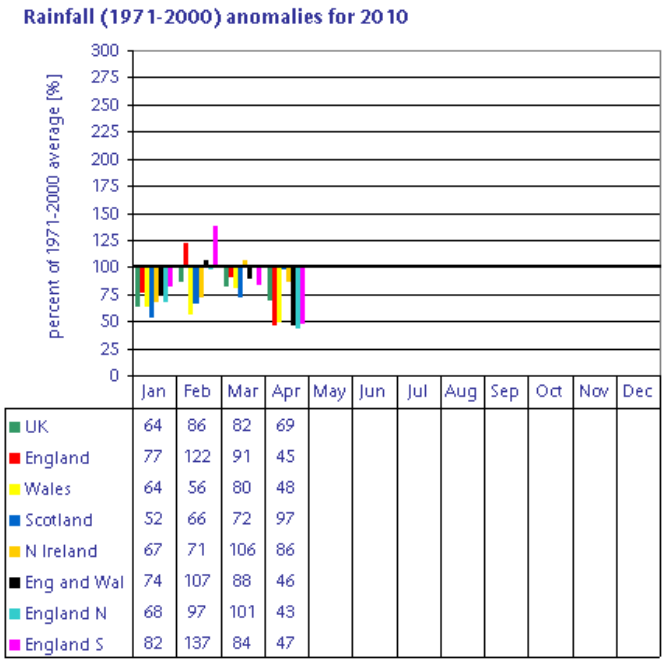
Rainfall anomalies

There were modest anomalies through January, February and March with the period being ordinary. However in April, some striking anomalies existed relative to rainfall.

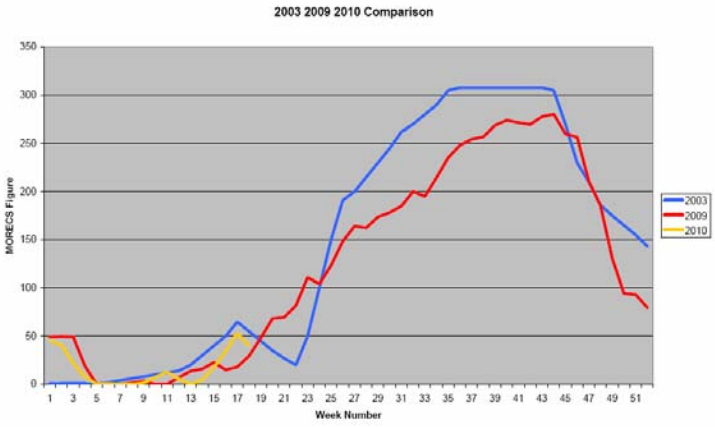
Parts of the south east had exceptionally low levels with East Anglia having only a quarter of normal rainfall, for the midlands and south east it was a month in which only 40% of normal rainfall fell.

Regions 1st-25th	Temp Anom	Rain %age	Sun %age
N Scot	+0.2	81	103
E Scot	+0.8	68	124
W Scot	+0.4	93	136
CentScot	*+0.7*	*86*	*131*
NE Eng	+0.7	40	131
EAnglia	+0.7	26	173
Midlands	+0.8	36	147
SE Eng	+0.6	40	177
NW Eng	+0.4	56	144
Wales	+0.3	41	154
SW Eng	+0.4	53	158
N Ireland	0.0	60	129
Irish Rep	+0.3	78	141

The impact and severity of this anomaly can be seen from the Met Office figures:



On the above basis we would characterise the early part of the year in its first calendar quarter as “Dry”. This is reflected in the sudden spike in MORECS values throughout April 2010:



Forecasting assumption 2010

Factor 1
The previous year
The year 2009 was dominated by a significant **April**, **May** and to end of **June** low rainfall anomaly and with an extraordinarily wet July followed by an ordinary August, then followed by a late dry September / October and second extraordinarily wet month in November. The MORECS data for the main site rose steadily to figures not seen since 2006 / 2003. Soils did come under drying pressure from plants with the July anomaly breaking the pressure on soils which picked up as a second spike through the months August, Sept and October.

Factor 2
The current model MORECS has jumped forward in response to the dry April and earlier modest anomalies. We also discount the Icelandic Volcano as a possible major factor in Europe's chances of a wet/dry/cool summer 2010.

Factor 3
The current plant health status
Since the last significant plant stress event during 2003, there has been a succession of warm and wet summers and a mix of ordinary and wet winters.

Plant health as a macro vegetation factor is driven by water availability and ease of access to water in the soil. With few stress periods of intense heat and prolonged dryness for the last four years and particularly after 2007-2008, plant health as a broad indicator is high and the plant community will respond quickly to any dry period in good health.

Factor 4
Societal issues
There is a high appreciation of subsidence as a factor of modern property ownership. Given the credit crunch of 2007—2009 and the low level of sales, of first time buyers and of mobility generally, there may be a dampening in identified subsidence cases from this source. However, with property owners concerned about equity values in their homes and with concerns associated with falling average sale prices, pressure from suspected building subsidence may cause greater sensitivity to cracking in buildings.

CURRENT FORECAST
Based on all of the data available and the current forecast for the remainder of 2010 the risk of a full blown event year is rated as **amber**.

The impact of an elevated claims experience in 2009, the partial pressure on plants with dry spells in early and late 2009, the current El Nino phase in the topical Pacific Ocean as well as the statistical likelihood of a return event year all indicate caution that an event in 2010 is a moderate possibility

This forecast position will now remain until June 2010.