

Welcome to 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 relates directly to the recent cold weather we have been suffering and the probable causes.



On Page 5 we look at 2009 and use this alongside early 2010 indicators to build a framework for decision making.

On page 6 we give our first Summer and Autumn season forecast of most likely assumptions for capacity planning.

This is of course the first and undoubtedly the earliest forecast of any group considering the issue of tree related subsidence of low rise buildings.

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.

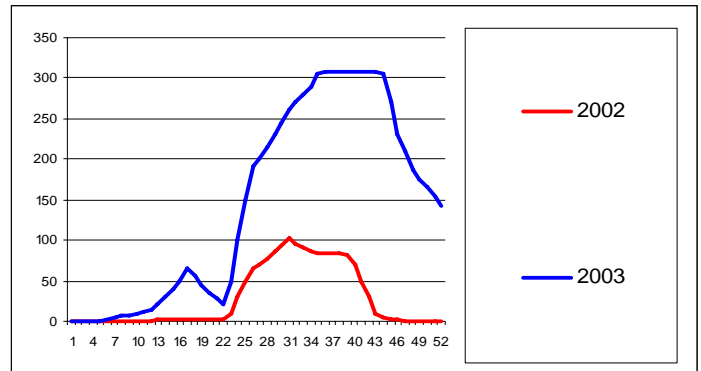
In temperate UK, the period between leaf drop (say November) to bud/leaf burst and the temperature drop (if you are an evergreen), means water loss in this period is effectively '0'.

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).



Crown Copyright

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:

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

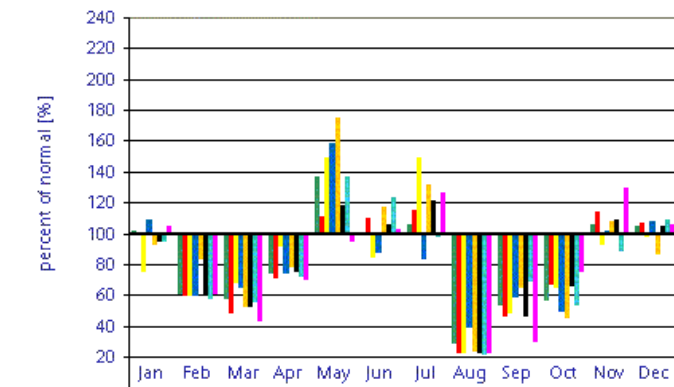
However, presence at a meeting point of the Gulf Stream bringing warm and wet air from the Atlantic, the Azores high interface with the Arctic high interface and straddling a line of influence between continental Europe, Asia and the Atlantic Ocean, is not one of those places on the planet where reliable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

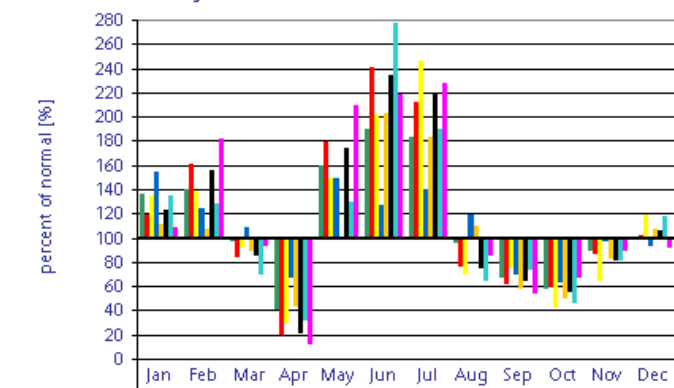


Fig 2. United Kingdom
Some of the influencing factors

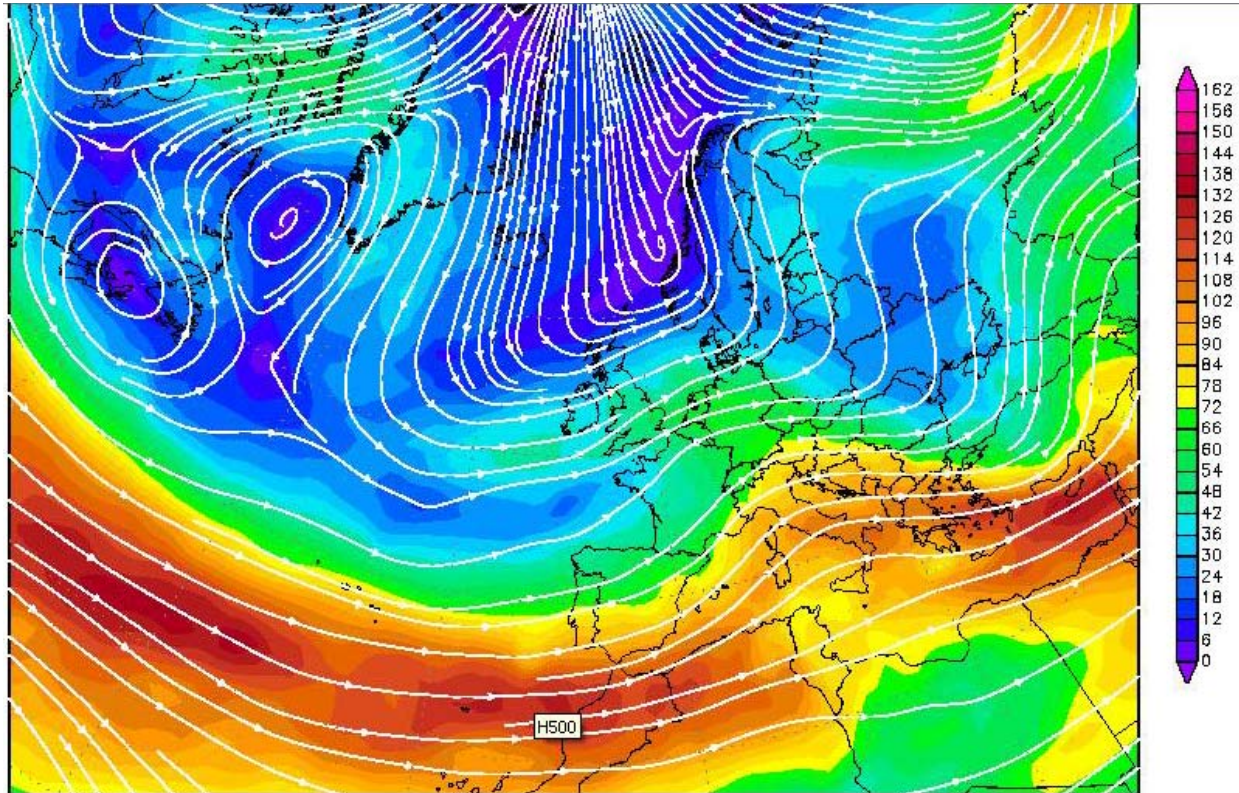
If you want to learn more about weather patterns, past weather or MORECS then you can contact the Meteorological sales office on:

Tel: 0870 900 0100

Or just visit: www.metoffice.gov.uk



Coldest Winter for 30 years?



We have all suffered man-hour losses and snow affected claims management in what has been called one of the coldest winters for the last 30 years.

The chart above shows the track of the jet stream which you will see has been driving across the Atlantic and into the Mediterranean and is the cause of the record number of landslides across the Madeira islands, Italy and the Eastern Mediterranean.

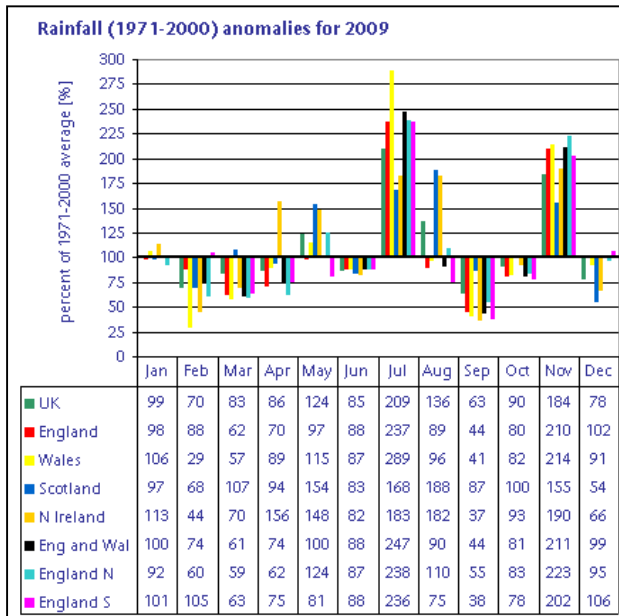
When the jet stream travels so far south, the UK can find itself in the grip of high pressure with repeat cold events.

A key issue for us to track in 2010 is whether the jet stream, under the influence of El Nino in the pacific tracks to the north of the UK.

The big battle for weather in 2010 will be the pacific influence on the jet stream.

2009–2010 Sun-spot the difference!

2009 began as a year following the quite unprecedented 30+ month wet period beginning August 2006. The late winter, spring and early summer to June 30th saw dry weather dominant for the southern half of the UK. In July there was a very large anomaly in rainfall and then a long 3 month spell to November when again an exceptional rainfall month was recorded. However what is important to appreciate is that 2009 broke the continuous wet cycle of late 2006, 2007 and 2008. The two very wet months and particularly July stopped what was developing as a surge / event year but the key point is that it it was a year that in our opinion broke the wet phase.



Courtesy and Copyright Met Office

We have previously suggested that we could find no direct correlation between sun spot numbers and event years (see Vo 1 April 2009). However for those interested in the link the following may be of interest.

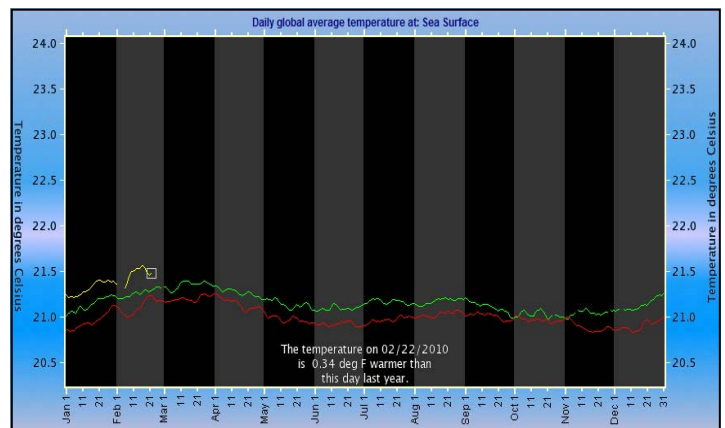
Sunspot number: 31
[What is the sunspot number?](#)
 Updated 22 Feb 2010

Spotless Days
 Current Stretch: 0 days
 2010 total: 2 days (4%)
 2009 total: 260 days (71%)
 Since 2004: 772 days
 Typical Solar Min: 485 days
[explanation](#) | [more info](#)
 Updated 22 Feb 2010

Courtesy Spaceweather.com

The issue worthy of note is the Sun appearing to emerge from one of longest minima periods in a century with 2009 being 71% spotless and 2010 being 4% spotless.

Probably of more interest to us is the return of El nino (warm Pacific) in late 2009 which is perfectly illustrated in the following link showing average earth temperatures, note that 2008 at the height of la nina (cold Pacific) is coldest and then 2009 warms up but 2010 is really interesting as it's the highest figure (for now) in a decade.



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 returned to field capacity following a very rapid decline in soil dryness from November 1st to January 31st.

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 tropical Pacific Ocean and 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 May 2010.

