Interview with Professor Paul Curran... a gold medal in Remote Sensing

The right mind, in the right place at the right time.

What is the objective of your research and how has it developed through time?

First, a bit of background; I was in the very fortunate position to be reading for a PhD in remote sensing when it was still a very new field. I did that in Bristol during the late 70s and at that time there was hardly any remote sensing research going on in the UK, in fact in the world. The first phase of my work was to identify where, and more importantly, what vegetation was on the Earth's surface - whether it was woodland, grassland and so on. The second phase was to calculate how much vegetation was there. The third phase developed during the '80s, when I started to estimate the condition of that vegetation via its chemical composition. This research fitted in with a wider realisation that if we were going to understand what was happening in terms of climate change then we needed to look at the whole planet and the only way we could do that was from space! I was working for NASA by then and we started to develop the technologies that would enable us to estimate the chemical composition of vegetation using sensors onboard aircraft. More recently we moved from aircraft to satellites but still using the technique of 'imaging spectrometry'. A similar technique is still used to identify the chemicals in your blood. This is done by bouncing light off the blood sample, looking at the spectrum and then using features in the spectrum to determine the blood's chemical composition. You can do exactly the same by bouncing light from the Sun off the Earth's surface and recording it using an imaging spectrometer on a satellite. The problem in those early days was that we did not have kit that was accurate enough... but we do now!

The first sensor that was really good enough to do this work from space was called MERIS (Medium Resolution Imaging Spectrometer) on ESA's Envisat satellite. A recent success was when a colleague and I determined an algorithm that would enable us to take data from MERIS and estimate the amount of chlorophyll on the Earth's surface. That is now the standard algorithm and you can now download chlorophyll maps of the Earth's surface on a regular basis (http://www.neodc.rl.ac.uk).

What are the advantages and uses of these chlorophyll maps?

There are many. In the study of global environmental change it is used to monitor growing seasons that are increasing in length and variability. For example, in 2006 our spring started very early and went on very late, so during that year vegetation was growing for a much longer, absorbing more CO_2 from the atmosphere and so fixing more of it on the Earth's surface. But this year (2009) spring started around the normal time, finished a little later and much less carbon was fixed on the Earth's surface. If we can monitor how long growing seasons are then we can use this information in a global climate model to drive our estimates of CO_2 removal from the atmosphere. There are also some very practical applications. For example, after the tsunami in south east Asia, chlorophyll content maps were used to identify areas of land that had been inundated by sea water as part of a post-disaster monitoring system. One of the largest early applications was in Vietnam where 'Agent Orange' - a defoliant used by the US military – had been dropped by American forces. Around 40 years later some is still in the soil, it reduces the amount of chlorophyll in the forest and so is visible from space. That information is of direct relevance to those using the land today and to those who were there at the time.

We have an ESA grant at the moment to investigate the various factors that influence the relationship between signals at the sensor and chlorophyll in plants. The reason why this is important is that the next generation ESA satellites will have similar sensors to MERIS but with an

even finer spatial resolution. Thus we will be able to see in more detail and have more accurate estimates of chlorophyll on the ground. These 'Sentinel' satellites will be up there for a very long time, monitoring what we are doing to our planet.

You have been Vice-Chancellor at Bournemouth University since 2005. Do you still maintain an active research interest?
I am active in research and am a Visiting Professor at the University of Southampton (where I was previously Deputy Vice-Chancellor). The research grant I was mentioning is run out of Southampton. I am a Council member of the NERC and this is the primary funder of environmental Earth Observation Research in the UK. I am also involved with various aspects of national research policy via Universities UK. More recently I have had the honour of being appointed as President of the Remote Sensing and Photogrammetry Society and it is has been a great pleasure for me to see the innovative remote sensing research being undertaken by its members.

Do you work with other sensors?
It depends what the question is. The main thing I am interested in is how our planet works and how this understanding can be used to gain insight into contemporary environmental changes. Consequently, the satellite sensors I tend to work with utilise relatively narrow portions of the visible to near-infrared spectrum. If I was interested in say sea surface temperature, sediment load or productivity then I would use appropriate satellite sensor imagery and algorithms to extract that specific information.

At Bournemouth do you do a lot of research of this type?
We are a relatively new university and so our remote sensing research group is still quite small. My task here is a leadership one that is not driven by my own research interest. In the past four years or so I have concentrated on transforming the University. The recent Research Assessment Exercise identified Bournemouth as the fourth most improved in the UK and ranked eight of our research areas amongst the very best in the world. Bournemouth is also the fastest rising University in the Times league table and number one new university in the Guardian league table for the second year running. We have just opened our new Business School building and are forging ahead with new programmes and areas of research. The intention was to take a modestly performing south coast university and produce something that people can be exceptionally proud of - we are almost there!

Bournemouth University is the only university in this, the largest non-industrial conurbation in Europe, with around 17,500 students and a turnover of over £105 million.

In terms of my research interest ... well if you are a senior academic who is leading a university, you simply find yourself running your research in one part of your life and the university in another and yes, these are very different worlds.

How do you manage to reconcile that?
I'm not sure you can. The reflective world of research, be it in NERC meetings, academic conferences or engaging with colleagues in ESA, NASA or elsewhere is very different to the strategic and operational challenges of changing a university... well maybe all these activities overlap but not as much as you think...but it is possible to combine them!

Is there commercial research going on at Bournemouth?
A considerable amount; for example, in computer animation where we are the best in Europe. Staff and students have been involved in big movies such as Gladiator, the Lord of the Rings, the Shrek series, Avatar and many more. Forensic archaeology is another area we work in, identifying genocide sites, undertaking mass grave excavations and so on. We also consult in specific areas such as intellectual property and Tourism where we are very strong. In ecology and biodiversity we have a very successful research group who undertake commercial work too. Earlier this year they published three consecutive papers in Science.

What is your next goal?
It is to ensure that Bournemouth University offers high quality higher education geared to the professions. We want to be an even stronger academic institution which also means ever higher quality research and enterprise (the business side we discussed before) and levels of student satisfaction. I am fortunate to be surrounded by excellent colleagues and so I'm sure we can achieve our rather challenging ambitions.

So this engagement with commerce is going to be a focus?
Yes a focus, as one would expect, given our close links to the professions. We are going though a transition at the moment as many staff were recruited in the 1990s, primarily to teach. In the past few years such colleagues have been engaging with much more research and commercial activity, stimulated by colleagues who have joined very recently. We recruited over 150 academic staff in 2008/9, have just recruited 37 more and will be recruiting again in 2010.

Finally, out of curiosity you are primarily a man of science, so how did you decide to get involved in this particular job?
I was for a time, Dean of Science at Southampton. We had an art school which was part of the university, called Winchester School of Art and it had some problems. I was asked to solve them... and in 18 months we did it. When I was offered a similar situation on a much bigger scale, I was attracted as I do like the challenge. If you had looked at Bournemouth five years ago it was towards the bottom of the UK university pecking order and it has now moved up to the middle. And we did that, and more, in a very short space of time!

The full interview - available on line www.geoconnexion.com/geouk_articles.php free to download - explored other areas more in depth.

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