Perspectives from the 12th Appleton Space Conference

Last week I attended the **12th Appleton Space Conference**, it was the first time I'd been to one of these conferences, and I was excited to be giving a talk. It was hosted by RAL Space at the Harwell Campus.

After the welcome, the day started with a talk from Ross James (Deputy CEO at the UK Space Agency). He's new to the space community, and so has enjoyed learning to understand it more fully. It was interesting to hear him reinforce the conclusion that the space industry's value-added multiplier is two, but also that the industry needs to be more regionally and user focused.

Talks then followed by members of European Centre for Space Applications and Telecommunications (ECSAT, the UK's ESA centre) and the Harwell Campus. I was surprised hear the comparison that the Harwell Campus site is roughly equivalent to the size of the City of London. Whilst Harwell doesn't yet have any of the iconic tall buildings of the City, it does mean it has plenty of space to grow – with plans to increase the campus to 5 500 jobs by 2020; although it was acknowledged that an upgrade of the underpinning infrastructure would be needed to support this.

After the break we swapped to the topics of growth and innovation. The Autumn Statement had a strong focus on creating an environment for backing winners, with Innovation UK targeted on turning scientific excellence into economic input and scaling up high potential businesses. Two quotes from Tim Just (Innovate UK) that particularly resonated with me:

- Research is the transformation of money into knowledge; and
- Innovation transforms it back again.

There was also a debate on whether the space industry is reaching the threshold for a tipping point as outlined in Malcolm Gladwell's criteria - i.e., where a slow moving trend reaches critical mass and causes a larger change such as the use of space applications and technologies becoming the everyday norm. The last two talks before lunch were on the development of new instruments – including the recently launched Sentinel-3 mission.

The first afternoon session was on understanding scientific advances. We started off by discussing exoplanets (a planet which orbits a star outside the solar system), followed by detecting signals using ground based radars and then understanding gravitational waves. My own talk on harnessing the increasing volumes of Earth Observation (EO) data came at the end of this session. I focused on discussing how there has been a massive change in the amount of available EO data with the need to bring the abilities of computers and humans together to best use this wealth of information.

The slides from my presentation can be found here. It was interesting to see some of the

messages people took away from my talk on Twitter such as:

- The availability of free satellite data is revolutionising remote sensing
- We have to make the most out of the large quantity of data made available by Earth Observation

After lots of people coming to talk to me during coffee it was great to see Paul Jerram from e2V showing what EO sensors look like, ranging from much larger version of the snapshot imagers found in smart phones to time delay imagers that collect the signal over a period of time so we can have very high resolution imagery. For example, the planet Mars is being imaged at 30 cm resolution. Prof Martin Wooster (Kings College London) focused on biomass burning emissions. Research has shown that the Malaysian fires in 2015, linked to El Nino, contributed to 15% of the global carbon dioxide increases that year but also to thousands of deaths due to the air pollution they caused.

Our day of talks concluded with a keynote lecture by Tim Peake, giving a personal insight into his mission into Space onboard the International Space Station (ISS). As an afternoon speaker I had a front row seat, and so I'm easily spotted on Tim's room selfie! It was interesting to hear that Tim found adjusting to gravity back on Earth more difficult than weightlessness in space. How much he enjoyed his time on the ISS was obvious when he said he'd be happy to go again as the journey into space was particularly exhilarating.

Whilst aboard the ISS Tim used his limited amount of spare time on Sundays to take photographs of the Earth. Anyone who followed Tim on Twitter will have seen some of these, but he has also now brought out a book of these pictures titled *'Hello, is this planet Earth? My View from the International Space Station'*. An interesting footnote, although not from the conference, is that the UK has just purchased the capsule Tim used to get to, and from, space and it will go on display in the Science Museum next year.

Overall, it was a fantastic day jam packed with interesting, exciting and inspiring discussions about space!