Mohammed bin Rashid Space Centre Magazine

Majarat

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Inspired by Space Science and Technology

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SALEM AL MARRI

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How to become an innovator

Salem Al Marri: “An Emirati astronaut? I hope within the next five to 10 years...”

As we welcome in 2016, Majarat caught up with MBRSC’s Assistant Director General for Scientific and Technology Affairs, Salem Al Marri, to look at the major landmarks of the last 12 months, and what we have to look forward to from MBRSC in the future.

As the Assistant Director General for Scientific and Technology Affairs of MBRSC, Salem oversees everything related to the core scientific business of the centre; this includes the manufacture of the Hope Probe and KhalifaSat, the ongoing operations of DubaiSat-1 and DubaiSat-2, and all other technical projects - of which there are many.

"It's been a very significant year," Salem tells us as we ask for a summary of 2015 for the centre, and he's not wrong. MBRSC has been thrust into the spotlight of the Arab world as a result of the events of the past 12 months, and it all began with the decree that effectively saw EIAST integrated with the newly established Mohammed bin Rashid Space Centre we all know today.

"What that brought with it was a lot of responsibility, and a lot of hope for the futurefor what we can achieve," exclaims Salem, but from there the 2015 milestones just kept on coming.

"The next big news was the announcement of

the Hope Probe and the details of the project. This was a huge event, attended by Sheikh Mohammed and the whole cabinet, where our team presented what the Hope Probe will be doing, and how we are going to be developing it."

The Hope Probe announcement drew the attention of both the nation and the world. Sheikh Mohammed bin Rashid, Vice President and Prime Minister of the UAE and Ruler of Dubai, announced at the time that "the UAE leadership and people will be keenly following your progress," a statement that must surely place a lot of pressure upon those working on the project? "I think that we don't look at it as pressure, we look at it as a responsibility to achieve, and a strong driver towards our success.

"We've been working effectively for the past 10 years kind of under the radar, so now we're very much in the public eye or under the microscope, as it were, those initial 10 years were the years where we developed our capabilities, and this was the time where we made sure we gained the engineering expertise to be able to move forward on such high profile and important projects. Now, I think we're still going on the same path, however on a much bigger scale in terms of projects, ambitions and our overall mission, and also very publicly. But I think we have a very strong team, and we're ready for this."

Following the Hope Probe announcement, Sheikh Hamdan bin Mohammed Al Maktoum, Crown Prince of Dubai, was installed as the Chairman of MBRSC. This was another huge milestone, particularly as he is so committed to the UAE's pioneering and innovative capabilities. So has his presence as chairman inspired the centre? "Definitely. He is always looking at technology and he's somebody who's very innovative himself. To have someone like Sheikh Hamdan installed as our chairman really does give us a huge confidence boost, while at the same time giving us the ability to be able to think bigger than what we're already doing. And I think that is something which is incredibly valuable to us."

One of Sheikh Hamdan's directives was for the centre to implement a 15-year strategy, which is "still in the works," according to Salem. But the centre is making good progress on it. "What we're trying to do for Sheikh Hamdan is to be able to look at the near and the medium-term future, develop projects that are innovative and that can give back to the government and community in a beneficial way. We'll also try and develop more projects, and develop them quicker, along with a few happy surprises along the way. This is what we want to develop for our chairman."

There were a number of other achievements at MBRSC during the course of the year, such as the launch of the new-look website, and the launch of the UAE's original and first magazine dedicated to space science and technology – Majarat. But for Salem, the final truly significant activity of 2015, from an operational point of view, came at the end of November as MBRSC participated in UAE Innovation Week.

"We were one of the main contributors to that event in Dubai along with the Executive Council. We had a very large exhibition area in Burj Khalifa Park, and it was opened by Sheikh Mohammed bin Rashid who attended our exhibition. We exhibited details on all of our projects, including the Hope Probe, and it was an area where kids could come, play with CubeSats, interact with our displays, and listen to talks by some of our leading engineers to try to inspire them and get them to think about STEM education at an early age. Get them inspired young, that's the way it needs to be. It was a great event and a truly inspirational week for us, and hopefully for those we met. For me, these were the key events that happened during the course of 2015."

> *"If you had asked somebody a year ago about the Emirates Mars Mission, he would've said: "Impossible"."*

As we look forward to 2016 and beyond, it is the Hope Probe that will continue to command headlines, and for the centre too it will dominate the year. "Going forward through 2016, the Hope Probe will really now start to take shape and kick off and I expect to see great progress on it throughout the year. It will take a huge presence over all our activities in 2016."

The probe is still in the preliminary design stages right now ahead of the proposed 2020 launch, while KhalifaSat is scheduled to be launched in 2018. These two projects are both hugely significant, and both immensely complex individually, so taking on the two tasks simultaneously represents many challenges.

"We have a pool of engineers, and these engineers work on both of these projects," Salem explains to us.

"Both the projects are quite staggered, so while the probe is in its early design phases, KhalifaSat is just finishing its final design. As KhalifaSat moves into manufacturing, the Hope Probe will start ramping up on design. That staggered effect on the projects gives us the ability to be able to allocate our resources as effectively and efficiently as possible.

"Obviously it is a learning experience for us to manage multiple projects, because we don't only have these two, we also have many others as well. And although they are smaller projects, they do take resources, so we have a dedicated team that tracks our resources in terms of man-hours, and that team then tries to work on looking at how we can effectively utilise those hours per project. So that's really what we try to do – maximise the output of our engineers."

2016 will also be a year of change, as more engineers arrive, and the centre undergoes a complete renovation. Combined with keeping the existing projects on track and announcing new ventures, it promises to be even more action-packed than last year. "I think that 2016 for us is a very big year. We plan on increasing the number of staff we have, and attracting a number of young engineers to come and be a part of our projects. We are also planning to announce new projects, which are still in the works. These will be announced throughout the year, but I can't give you anything else just yet on these!

"It will also be the year when we complete construction of our high bay clean room facilities and officially open them. These will be the very first dedicated clean room facilities anywhere in the Middle East.

"As well as this we are also now working on building a new HQ, which will be a building that can house our management, our engineers, and provide facilities that are suitable for the work we do. It will include facilities that will enable us to host events, provide an environment that is conducive to research and development, and provide an environment which encourages people to feel comfortable and at home."

The working environment often dictates the

level of creativity and happiness in the work place, and this was one of the considerations when designing a brand new building due to be opened at MBRSC during 2016. "I think our new office block should be complete by around February, and that building will be very different in terms of office space. It will be completely open, no hallways, just spaces where people can work and collaborate together. So there won't be individual box rooms or cubicles. It will be open plan, with plenty of natural light."

The MBRSC diary for 2016 looks full already, but despite the numerous changes and projects scheduled for the year that Salem must effectively oversee and manage, it is something else that he sees as his own biggest challenge.

"The biggest challenge is without doubt attracting the correct talent and the volume of talent that we require. I would say that if we could get 100 national engineers now who were qualified and enthusiastic to work on our projects, we would hire them right away. So getting the right talent with the right experience is a big challenge. Another big challenge is making sure that now we have collected this wonderful group of engineers, it's keeping them excited, keeping them engaged, and keeping them onboard with the projects. Because when you've got this core team of talent, if you can keep them passionate, if you can keep them engaged and excited about working on these types of very large projects, the more that team will grow and give back to the country. So I think these are the two major challenges. One of them is a current challenge and one of them is an on-going and future challenge."

One might argue that a career in the space industry should be enough to engage anyone, and that the excitement of making new discoveries and even having the nation's eyes focused upon the projects they participate in would be fulfilling for even those hardest to impress, but as Salem points out: "Our people are very talented, smart people, so we need to be challenging them, we need to continually task them with bigger and more ambitious projects. This is what we are trying to do, and this will help us to grow together."

One of the ways in which MBRSC is hoping to uncover new talent to join their voyage through space exploration and discovery, is via the implementation of a couple of notable initiatives. As Salem explains: "We have recently announced phase two of our University CubeSat initiative and the second year of our applications competition. These are two initiatives that have seen MBRSC work extremely closely with national and international universities. The first focuses on getting students engaged in designing and developing satellites, and the second is all about developing applications that will work with the solutions provided by these satellites. These are things that we want to continue doing, and that we will continue doing. And I think they are very important as a way to identify the new talent coming through that may be qualified to work at MBRSC."

There is such a great deal to look forward to, and so much optimism surrounding the space sector in the UAE, that it's easy to forget just seven years ago the country hadn't even launched a satellite project of its own. When they did, it was

> *"2015 saw the announcement of the UAE Space Agency and MBRSC, so the UAE is now specialising in space. For me, the future is very bright"*

with DubaiSat-1, and the project manager was a young Salem Al Marri – something he still looks back on with fond memories.

"I was very proud of that – for both myself and the team. The core team that worked on DubaiSat-1, although I was lucky enough to be the leader of that team, they were a team full of leaders. And those that participated in that mission now form the project management lead team for KhalifaSat, and the lead team for the Hope Probe, so that's something that I'm proud of for the centre. The team that went there and put the effort in has now become a team that is leading multiple projects. And I think from these projects underway now we will get multiple teams as well for the future, so I look at DubaiSat-1 as a massively successful experience. The goal of it was that we would get UAE engineers, UAE scientists, UAE capabilities, and that is what we are doing. And I will never say that's what we've done, because it is a continuous journey that we won't stop."

The fact that the integral parts of the past have become critical parts of the future speaks well for MBRSC and their ability to identify those making the contributions to their progress. It also says much that the majority of the employees at the centre during those early years remain there now, something which reaffirms the success the centre has had in their long-term and continuing strategy to implement bigger, better and more exciting projects each time in order to continue inspiring and engaging their people. So how about beyond 2016? What does Salem think the long-term future holds for MBRSC and the space industry in the UAE?

"Recently you have the announcement of the UAE Space Agency and obviously our centre's establishment, so there's no doubt the UAE is specialising in space going forward. For me, the future is very bright, and I think there's a lot of potential going forward.

"Currently I would look at what we've got: we have Earth observation satellites, we've got communication satellites and we have scientific/exploration missions like the Hope Probe. If you had asked somebody a year or a year and a half ago about the Mars project, he would've said: "Impossible that a country like the UAE would even think of doing something like that," so going forward I expect that we will see more of the same. You will see more missions that people were not expecting us to be interested or involved in, and that don't have a commercial sense to them. They will have a far more scientific objective, and a different goal behind them - for example, contributing to humanity or developing engineers. So I really think the sky's the limit in terms of where we're going."

While the Hope Probe has captured the imagination of children and adults across the nation, there is nothing like a human representative, a role model, a heroic figure to inspire the masses to think about space. So when will we see an astronaut from our country boldly go where no other Emirati has been before? "I think that's something that needs to happen. There are no solid plans for it right now, but I think it's something the UAE should really be looking at, and I know the whole nation would be extremely happy to see

Salem was the project manager for DubaiSat-1, the first UAE satellite

one of our own write their name into the history books by becoming the first UAE astronaut. When? Who can say? I hope within the next five to 10 years maybe..."

The UAE as a nation continues to make tremendous advancements in many fields, driven by a vision and ambition unique to the region. Science, technology, education and courage are at the very core of many of the country's principles, and these are the reasons the UAE has progressed so far in the last 30 years. It is also Emiratis like Salem who have made the rest of the world begin to take notice of the country, particularly in a sector that was once the reserve of global super powers.

The UAE may be young and it may be small, but what burns brightly inside it is an overriding desire to put the country on the global map, and to stand shoulder to shoulder with the best nations. It is only the Emirati people that can make this a possibility; they must have the desire and passion and national pride to want to contribute to their country becoming an international success, something which must be instilled in a child from an early age through the improving education system in the country. "I think the college and university system here in the UAE has produced a lot of excellent graduates," Salem tells us, "and just looking at MBRSC, around 90% of our employees are educated here in the UAE, and I'm one of those. "I'm proud to have studied here and I'm able to contribute back to the nation. I studied in public schools, so my whole education has been purely government funded. I'm very proud of that because I think it can show people that our Ministry of Education and our Higher Education system is sufficiently equipped to produce people who can then achieve and excel in higher positions. I think we have many examples of that fact here at MBRSC.

> *"I would say that if we could get 100 national engineers now who were qualified and enthusiastic to work on our projects, we would hire them right away"*

"When I was growing up, there was always this thought of the Arab world, or indeed the wider Islamic world that when you're hoping to become an innovator or a scientist or an engineer, if you really want to achieve something significant you have to go to the USA or you have to go to Europe or Japan. I think now, with what's happening in the UAE, scientists and engineers have definitely found their place. And I think for the young people that are inspired by science and those that are studying engineering, this is the place for you, and this is your time."

Hessa Al Matroushi – Inspiring the Mars Generation

Majarat talks to one of the bright young stars of MBRSC, Hessa Al Matroushi, the Instrument Science Lead in the Emirates Mars Mission. She speaks of her hopes of inspiring the next generation, her own progression since she joined MBRSC, and what she sees as being the amazing opportunities for women now in the forward-thinking UAE.

Hessa Al Matroushi has the rare combination of infectious enthusiasm and genuine passion for the work she carries out, and it is perhaps a combination of these qualities (as well as her intellectual capabilities of course) that have helped her to become one of the fledgling talents now leading the UAE's Mars Generation.

"Since I was small I have always had two ambitions," she tells us. "One is to inspire people, and the other is to really have a hand in helping UAE continue its development on a worldwide scale."

Hessa took the first steps towards accomplishing her ambitions while at university in Sharjah. "I was doing my Masters and was told by a friend in my class that we had a space centre that was sending national engineers to South Korea to learn about satellites. I said to her "really? We have a space centre?" I didn't even know, but I did some research and once I discovered what they were doing, for me it was amazing.

"My ambitions at the time seemed far away because they were so big, I really didn't know how I could have an impact on the development of our country. But once I visited the centre and realised it will play huge part in the UAE's development, I was sold, I knew I wanted to be there."

> *"I think the centre shows everyone that they can achieve anything they set their mind to"*

Despite the announcement of the Emirates Mars Mission, which has gained great media coverage, there are still people in the UAE that haven't heard about the work MBRSC is doing, and this is something she takes upon herself to try to change.

"When I was at university, I was unaware the UAE was looking at entering into the field of space science, so one of my missions personally is to let everybody know about the fact that we are doing some great things at

Hessa at MBRSC innovation week event "Mission Space" trying to inspire children about space science and technology

the centre, and we really are becoming an advanced nation in space."

MBRSC and other government entities that work to break new ground for the country act as an example to the new generation of young people, showing what can be achieved with the right application and attitude, and this again is something Hessa hopes will become more widespread.

"I think what the centre shows to everyone is that if we can launch successful space projects, being just a relatively small team of Emiratis, then anybody can achieve whatever they set their mind to. I think it's a really important message to send out to young people. Impossible is not a word we use in the centre, and this is the message we are trying to send - that the UAE can do it."

The Emirates Mars Mission has started to increase the momentum and belief in the UAE, and as the mission nears completion (we are now just five years from the scheduled launch) we will surely see an inspired new generation of Emiratis come through. Set to be dubbed "the Mars Generation", these will be the scientists, the engineers, the creatives, the innovators, and maybe even the astronauts of the future in the UAE. Hessa is one of those working hard to make that happen, and her journey is an example of where the right attitude and the right level of commitment will get you.

"When I joined the centre I worked first in the image processing and applications department, so I was doing a lot of image work and learning about application development too. I actually developed the first internal change detection tool for the centre, and it was something I was really pleased with. After that I became far more into applications, and I learned so much. Success with application development is related to the amount of research you do. I was always looking at global trends and things that were going on in the applications industry. You don't want to invent something that's already been done, so I was looking at what we have now, and trying to see how I could utilise it, adapt it and make it better. How can I make an application that can be used by everyone, and that can benefit the government and the country? That type of research really helped me gain a lot of knowledge.

"A key to staying ahead of the game is to be open to new ideas and to always be looking for opportunities to grow. For example, when I was doing my applications work, the opportunity to be a part of the CubeSat program came up, so I applied for it and I was then chosen to be the Deputy manager of Nayif-1 project.

Hessa running a workshop with her peers for university students teaching them how space missions are built

"Now I work as the Instrument Science Lead on the Emirates Mars Mission, and this is completely different to what I was doing. It's not applications, it's not management of a CubeSat, it's all about science. But I've always been open to these sorts of opportunities. Just because it's not my original field, I would never want to cut my learning cycle off. I'm open to learning and I'm committed to researching and embracing new ideas. This is how I've managed to cope with such a high responsibility job in a different field."

Hessa is a great example of an Emirati woman establishing a successful career for herself, but she sees this as being a common occurrence now in the UAE - thanks to the leadership and the way the country is run.

"In the UAE when we talk about women, we can see so many who are empowered. The government empowers women. We don't have that type of culture anymore where the ideal is that men should be empowered and that women should be at home. That doesn't exist anymore here. There is no difference now between men and women; it's now all about whether you have the experience, the drive and the talent to be able to do the job. Everyone now has an equal opportunity to prove they can contribute. I think we realised years ago that this is the way to do it, and this is how development begins.

"The UAE has changed a lot since I was born. It has opened up to the world. We can see daily just how much we interact on a global scale, and that has led UAE to visibly making a difference worldwide. We are contributing now, and it's amazing to see that. What I love about this country is that we are open, and there are no limitations imposed upon you. The mentality has changed over the years, and now it's like: "We want to be number one," and this isn't just some dream - they are serious about it. This is the mentality now, and when the leadership has that type of mentality, all the people in the country get inspired and get empowered by the energy that emanates from the very top. In the UAE it's very much a case of telling us: "You can accomplish anything you set your mind to, we will back you," and for me that is only ever going to breed success."

So while she remains steadfast in her commitment towards her role in making the Mars Mission a success that could continue to transform the nation, Hessa is also as committed as ever to spreading the message about the work they do at MBRSC and trying to engage young people in space science and technology. It's a task that keeps her busy and, as she continues: "It involves talking to everyone, trying to get people to be inspired about what you love, because you never know what impact you may have on someone.

"I was talking to a young girl about what we do at the centre yesterday, and she seemed to literally be amazed by what it was I was telling her. Now, if she goes away and works hard and researches space based upon what we spoke about, what impact might she be able to have in the future? That kind of thing really drives me on and you might not realise it, but these small things, these two-minute conversations, can end up changing people's lives. I love that idea. I want to talk to the school kids and try to help encourage them to be the best they can be – not because I have to, because I want to."

Turn the Page as Hessa gives us a guided tour of Mission:Space, MBRSC's exhibition during UAE Innovation Week.

Mission: Space – A tour of MBRSC's Innovation Week exhibition

As November became December, Innovation Week in the UAE was in full flow, and a collaboration between the Executive Council of Dubai and MBRSC saw Burj Park become 'Burj Space Park' for the week. Majarat takes you on a tour of Mission: Space, courtesy of our guide, Hessa Al Matroushi.

Sheikh Mohammed paid a visit to the Mission: Space site, and spoke with Hessa about Innovation Week, and the huge amount of children becoming inspired by space

We decided to call our event Mission: Space, and in Arabic it's called "Wojhatona Al Fadaa", which translates as "Our destination is space... The main thing we are trying to do with this event is to help people understand more about us, and inspire them to think about space. We want to show what efforts the UAE has put in place to develop our understanding of space, what amazing achievements we have made so far, and where we are headed.

It's all about pulling everyone together, because, when you learn about our heritage and where we started, this is where you realise that the UAE is really capable of doing something amazing. Because it didn't start from nothing, it's not like we just woke up one day and decided "Oh let's go to Mars," we have a whole heritage that has been leading us to this, everything that's gone before has built towards this. And that is what we hope our visitors will take away with them. It's been a crazy week, we have had so many visits from schools, and it was so amazing to see the young kids being fascinated by space. It means so much to me to see that!

So without further ado, let's take a look around the Mission: Space site...

The Interactive Exhibition gave the public a chance to meet engineers from MBRSC

The Interactive Exhibition

This is the biggest tent of them all, and in here we have a number of interactive exhibitions. We have a timeline of MBRSC starting from DubaiSat-1 going through DubaiSat-2, Nayif-1, and KhalifaSat, covering also the operations and groundstation of MBRSC along with the applications we are developing now. We have interactive touchscreens that allow everyone to find out basically everything about all the projects we have done and are working on. In here we have many members of MBRSC who are sharing their experiences and helping the kids to understand about what each of our projects has achieved and the innovation in each one of them.

Here in the middle of the room, we have a number of models. We have DubaiSat-1, DubaiSat-2, a CubeSat, a working 3D printer, and a model of the rocket which will carry KhalifaSat to space in 2018 which is pretty amazing to see.

The 3D printer I think shows the public how we are thinking ahead in trying to utilise technology to further our capabilities in space. 3D Printing is great because it is cost effective considering that you can utilise it to manufacture complicated parts of the satellites or other projects. I think this is just one idea we are looking at as we try to go forward, which shows how we are trying to be innovative and thinking ahead in terms of our own processes.

3D printing is likely to play an integral role in future of space exploration

360° Dome

So in here we have this huge 360° screen, and we are playing you this amazing movie. It has three chapters. The first part talks about the old days, our ancestors who were scientists and worked so hard to make sure we have this amazing culture of science and knowledge, but then something happened, and we don't have this anymore. So it shows how we used to be, and how we want to regain that, and having our space centre goes a long way towards getting our legacy back.

It shows the achievements of DubaiSat-1 and DubaiSat-2 and what we are working on now, before we then fast forward into the future. It's 2021, after the Emirates Mars Mission launch, and we see a dramatic scenario where the ground station is trying to communicate with the Hope Probe. It's tense, but then the data comes through and we are communicating with our probe. We see the type of information we will gain, and how we will share this with the international science community. So this shows the public, in a simple way, a perspective of why we are inspired to do space, because it was within us, even from before, and this is why we are going to Mars, and this is how we are going to do it."

The 360 Dome featured a film depicting the history of Arab science and the future of the UAE space program

It's an inspiring movie for sure, and so many people I have spoken to have said "oh it gave us goose bumps and we were really excited by it." It's great, I love it!

Edutainment Dome

Now the interesting thing about this dome

The Edutainment Dome gave kids the chance to learn about space in a series of workshops

is that it's educational, but should also be entertaining, so we called it the Edutainment Dome, do you see what we've done there? I didn't think of it myself, but someone came up with it and we all thought it was very cool, so that's edutainment!

In here we have many workshops, making it simple for people to understand about space, about satellites, about how to start out on a space mission, about CubeSats and why we need to use them. It's all to give people a good level of understanding, because of course when somebody just reads this type of information on a screen it might look really complicated, but once they have a one-to-one conversation in a workshop type of scenario, they start to understand it better. So they have some fun activities to do.

One of the workshops we have is really interactive and fun. It's comparing Earth with Mars. So we are trying to show people why we are going to the Red Planet, and also the similarities between Earth and Mars, and actually they are very similar. So we have pictures of places on earth, and pictures of areas on Mars, and you have to try to pick which pictures match up between Earth and Mars which is really fun. I tried to do it but it was actually really hard!

Learning about satellites

Attendees had the opportunity to experience what it might be like on Mars

The Mars Experience

We have a separate Mars dome, which we have made to feel just like you are on the surface of the Red Planet. So there's the rocks in there, and it's sandy and red, and we've made it a bit cold too so you get to feel just what it's like. Although it's got enough oxygen in there so it's fine to go in!

We show all the facts about Mars in there, and you can see the objectives of the Mars mission and speak to some of the key engineers that are currently working on the project. They explain everything about what we are trying to do.

We have tried to create a complete experience on the site so that when you come to see us, you leave feeling like you know exactly what we do and who we are, and hopefully you've learned something too!

Star gazing proved very popular at the event

HCT: 5,554 of our students could be ready for space in three years

Majarat speaks with Dr Abdullatif Al Shamsi, Vice Chancellor at the Higher Colleges of Technology, about the HCT priorities for the next five years, which includes the preparation of a generation of academically, scientifically and professionally qualified engineers to meet the requirements of a knowledge-based economy, advanced technology and the space industry.

"Our ambitions have no boundaries, and they evolve to keep up with the future aspirations and visions of the wise leadership and the rapid changes in science and technology," Dr Al Shamsi tells us as he considers where the UAE is headed, "and we want our graduates to be the job market's first choice."

Al Shamsi points out that since the announcement of the UAE entering the global race to explore outer space, there are new challenges for HCT related to the preparation of UAE nationals qualified to enter the space industry. As the largest higher education institutions in the state ("our 17 colleges include nearly 20,000 students in different emirates"), HCT will be a huge contributor to the emergence of the UAE in the demanding field of space.

"We have signed a Memorandum of Understanding with the UAE Space Agency for a five-year period," he explains, "and through this MOU, we will work together on developing human capital and attracting national competencies to the space sector, through granting scholarships, developing academic programs, building advanced laboratories specialised in space programs and satellite systems, providing practical training opportunities for students and supporting their employment in the relevant institutions."

Dr Al Shamsi stressed that the launch of space science engineering programs does not represent the first contact for the Higher Colleges of Technology students with the space industry, as the disciplines of engineering offered in the colleges prepare the students for this sector.

Dr Abdullatif Al Shamsi, Vice Chancellor at the Higher Colleges of Technology

"The space industry requires professional expertise in various fields such as engineering, technological, mechanical, electronic, electrical, mechatronics and aeronautical engineering. All these disciplines are being taught in our colleges and are characterised by distinguished outputs, in light of their dependence on the applied vocational education based on the "learning by doing" principle."

Space Courses

The collaboration with the Space Agency has been well-received by all those involved in developing the UAE's space advancement, and the long-term benefits are something Dr

Al Shamsi is keen to emphasise. "Through this collaboration, we will develop academic programs specialised in the space sector within the college programs, and review the scientific methods associated with it. Moreover, the UAE Space Agency will work on providing experts specialised in the development of academic courses related to the space sector to enhance academic programs, and provide training opportunities for space engineering students, as well as supporting their employment process after graduation in the national relevant institutions."

Dr Al Shamsi also explained that in pursuance of the MOU, "the UAE Space Agency will grant scholarships to a group of Higher Colleges of Technology graduates who meet the conditions, starting from the current academic year, in addition to the students enrolled in the Higher Colleges of Technology in the various stages and disciplines until they earn the required scientific qualification."

Space science programs are certainly going to be well-received by the students, many of whom are already pursuing vocational disciplines that lead directly into the space industry. According to the Doctor, "In light of our youth's awareness of the fields that are related to modern industries, many have already joined the disciplines of engineering and aviation sciences, 5,554 students in colleges are studying engineering disciplines, including 326 students studying aerospace engineering."

Dr Al Shamsi added that the UAE leadership has great hopes for the space sector. "The Emirates Mars Mission and the announcement of the MBRSC team in charge of designing and building the Hope Probe to reach the Red Planet, are all inspiring as they encourage the youth to major in space science disciplines."

HCT students' passion for space science and aviation

Students enrolled in aerospace engineering programs at HTC have spoken to us about their ambition to work in the space industry, and explained that majoring in aerospace engineering was the result of their passion for airplanes since childhood.

A workshop at HCT

They talked about their readiness to develop their abilities to major in space science, if given the opportunity, stressing their passion for science and technology, and their eagerness to work in advanced professional sectors that offer them the opportunity to innovate.

> *"With the UAE Space Agency we will provide huge training opportunities for space engineering students"*

One student, Mohammed Al Ghailani (specialising in Aircraft Maintenance at Abu Dhabi Men's College) spoke of his passion for space and aviation science, and about his dream of one day visiting the US space agency (NASA) to hone his skills and develop his expertise. Aircrafts were a passion for him since childhood, and for this reason, he chose to study the maintenance of aircrafts and their engines, and he has implemented various projects in this field throughout his studying years.

Another student, Abdullah Ibrahim Hamad (specialising in Aerospace Engineering), said that he has also had a passion for aircrafts since childhood, and that having some relatives working in aviation encouraged him to think about majoring in this speciality. He chose to study aerospace engineering, noting that he attended a lecture at the college during which a former astronaut from NASA spoke about his experience; this lecture aroused his curiosity and he hopes he will get the opportunity to study space engineering.

Maryam Moussa, a student at HCT in Dubai, tells us she is in her second year of aerospace engineering and that she chose this discipline because she has a passion for aircrafts, science and mathematics in particular. She pointed out that one of the most important advantages of aerospace engineering is the fact that it's an advanced and highly developed sector, offering promising opportunities for creativity, innovation and continuous improvement and self-development.

Aerospace engineering students at HCT Dubai during their designing of an aircraft

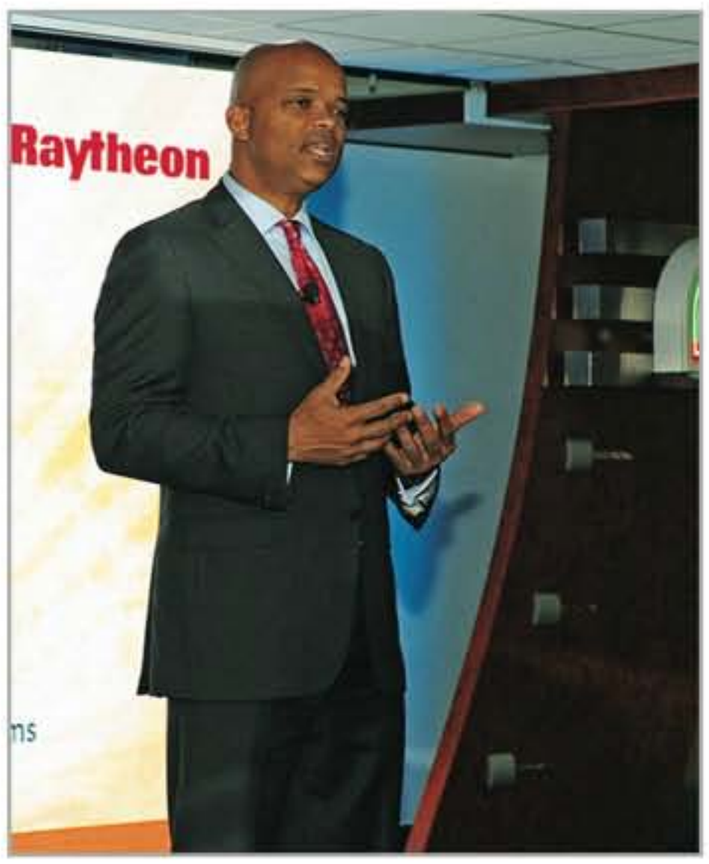
She added: "I look forward to learning to fly planes after earning a Bachelor's Degree in Aerospace Engineering. I will continue my studies to earn a Master's degree in aircraft maintenance."

She pointed out that she is highly interested in the space sector, and she's knowledgeable about it through her studies and the initiatives launched by the UAE in this area. If given an opportunity to study maintenance engineering in a way that is in line with the needs of the UAE's space projects, she would not hesitate to seize it because such sectors are interesting and promising, and form the industries of the future.

A lecture by an astronaut inspires engineering students

HCT recently hosted a lecture by the former NASA astronaut Robert Curbeam, in the presence of about 100 students of engineering programs in Abu Dhabi. Curbeam talked about his experience in space, and his space missions on board the 'Atlantis' and 'Discovery' space shuttles. He was the first astronaut to complete four space walks in one mission, and spent 45 days on one of his trips in space without feeling bored, as he has was enjoying the breathtaking views of Earth from space.

> *"The Hope Probe Mission is particularly inspiring as it has encouraged the youth to major in space science disciplines"*



Astronaut Robert Curbeam during his lecture at HCT

Curbeam's stories aroused the curiosity of the engineering students, which was clearly reflected in the questions they asked him. He talked about his dream of being a part of space projects since his childhood and how he achieved it, referring to the nature of his work in outer space stations and the challenges he had to face and overcome.

He stressed that the keys to his success are education, hard work and the determination to achieve his goals. He emphasised the importance of loving the job they are doing to be able to succeed and innovate, and shed light on the importance of teamwork and effective communication, noting that any of them could become an astronaut if he/she sought to achieve it.

The Mars Generation are coming through now, and with so many students able to access the relevant courses at HCT, plus the Technology Colleges' ability to attract such inspiring speakers, students are becoming inspired, and the future looks extremely positive.

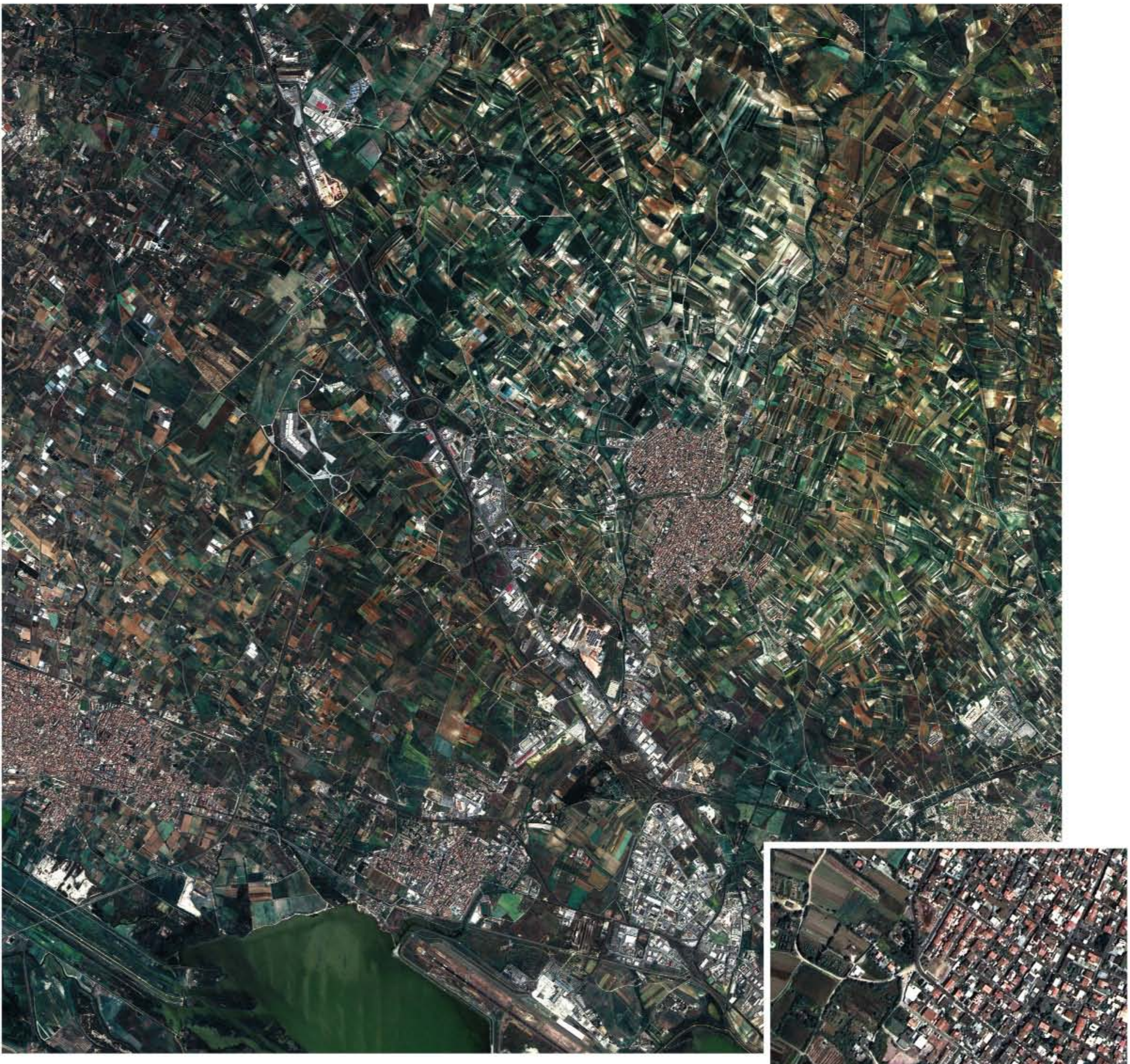
Commemorating two years since the launch of DubaiSat-2

In 2013, the UAE took another giant step towards becoming an advanced space nation when MBRSC launched DubaiSat-2, their second Earth observation satellite. DubaiSat-2 raised the bar and set the standard for Arab satellites, and for two years now it has been sending back some amazing high-resolution imagery of our planet from its orbit 600km above the Earth.

Majarat celebrates the second anniversary of the launch by taking a look at some of the most striking images captured by DubaiSat-2 on its journey so far...

Daegu, South Korea

Daegu translates as 'large hill', and the city sits in a valley between a number of mountainous areas in the middle of South Korea. Daegu is the fourth largest city in South Korea, and is also known as the hottest, although the temperatures there pale in comparison with those we see in Dubai. The city is home to 2.5 million people.



Cagliari, Italy

Cagliari is a famous city in the south of Sardinia, an Italian island steeped in beauty and history. The city is actually the greenest city in Italy, and is also home to architecture from throughout the ages, including a Roman amphitheatre and three Pisan-era towers. The port is one of the largest in the Mediterranean Sea.

Iwaki, Japan

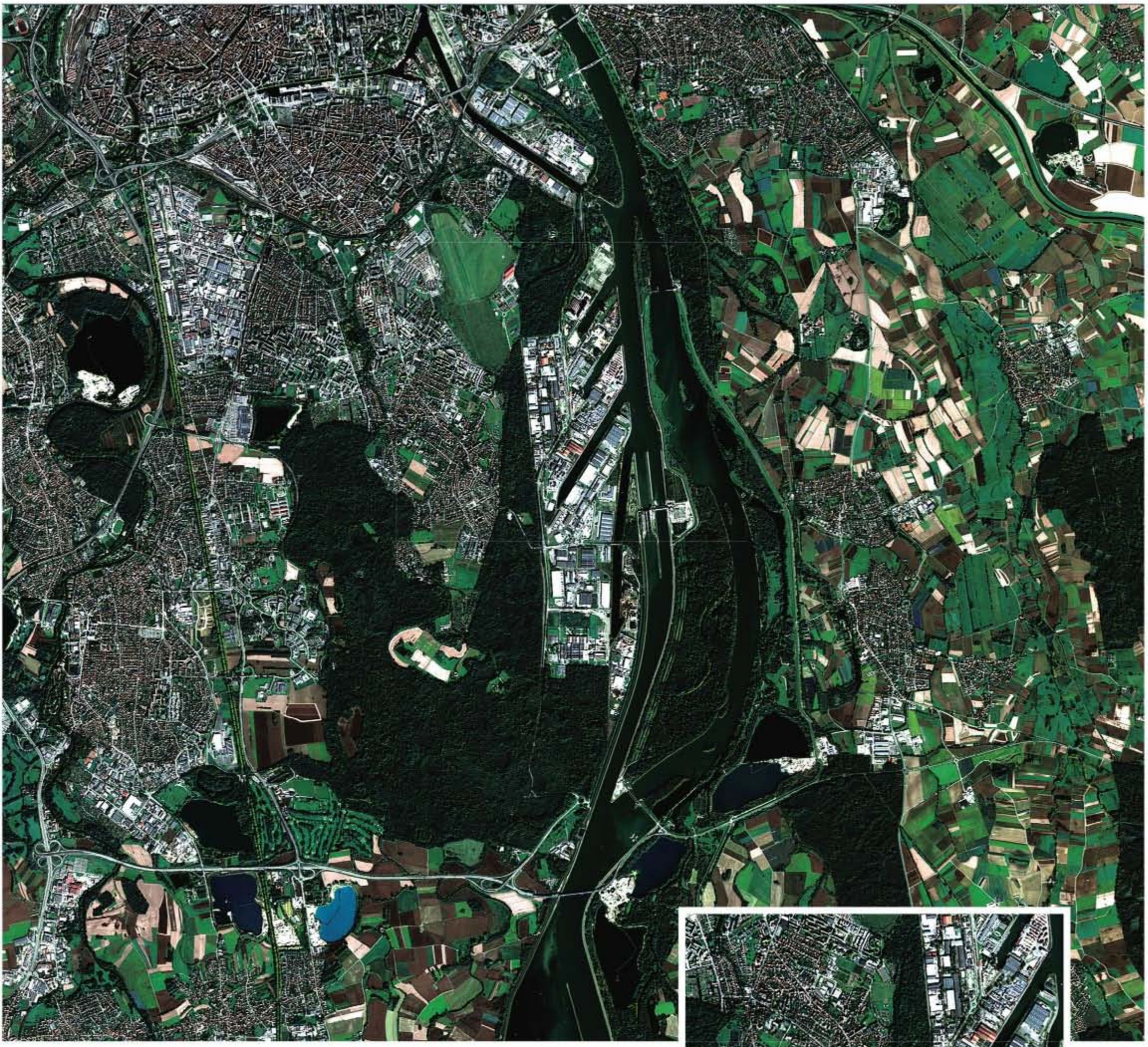
Iwaki is a huge city on the East coast of Japan. The city sadly fell victim to the Tsunami in 2011, with the rebuilding process still incomplete some five years later. Iwaki is situated very close to the Fukushima nuclear power plant that was compromised by the Tsunami, however it actually has some of the lowest levels of radiation anywhere in the area.

Marsala, Italy

Situated on the western tip of the Isle of Sicily, Marsala is a culturally rich town with a typically unspoilt Italian landscape. A feature of Marsala is the Natural Reserve called Stagnone Lagoon, seen here. This is a marine area with salt ponds that are particularly popular with locals and tourists during the summer, when they heat up to temperatures approaching 35°C.

The Pearl – Doha, Qatar

The Pearl in Doha is a man-made island that spans more than four million square metres. Once completed. The Pearl will feature more than 18,000 villas and apartments, as well as hundreds of shops, 5 star hotels, restaurants and cafes, not to mention of course, a Rolls Royce, Ferrari and Maserati showroom.



Strasbourg, France

The city of Strasbourg sits on the French-German border marked out by the Rhine, a European river that stretches 700 miles and travels through six countries. Strasbourg, despite being French, has elements of both European superpowers within its rich heritage and culture, and is also the seat of the European Parliament. The city is full of museums, fascinating architecture, and a diverse Franco-German culture, which is preeminent throughout.

DubaiSat-2 in numbers

Since the satellite's successful launch in 2013, DubaiSat-2 has been hugely active, supporting development and environmental projects, and assisting with global disasters. Here is a collection of DubaiSat-2's vital statistics in its story so far...

5,010
The total number of images sent back by DubaiSat-2 since it entered orbit

300
The weight in kilograms of DubaiSat-2

11.28
The size, in metres of the ground antenna which receives the data sent back

17,000

The size (in km²) of the image data DubaiSat-2 can store onboard at any one time

10,892

The number of times DubaiSat-2 has completed an orbit of the Earth

3,632

The number of direct passes over Dubai since 2013

600

The satellite orbits at 600km above the Earth

4,478,539

The total number of kilometres travelled