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Young, at ease, responsible – Edith Maurer and Alessandro Codazzi control the TerraSAR-X radar satellite

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Maurer and Codazzi: controlling satellites requires teamwork

Dr Edith Maurer and Alessandro Codazzi are young, at ease and laugh a lot. They do a job which carries a great deal of responsibility: as a team, the two control the German TerraSAR-X radar satellite from the German Space Operations Centre (GSOC) located at the German Aerospace Centre (Deutsches Zentrum für Luft- und Raumfahrt; DLR) in Oberpfaffenhofen. No signal leaves the control room and heads towards the satellite without their approval – and mutual coordination.

Simulation training has taught both of them that wrong commands in crisis situations could lead to the loss of the mission. "Fortunately, the reality has so far never been nearly as serious as our simulation training," says Alessandro Codazzi, Mission Operations Team Leader with TerraSAR-X. For almost two years the 31-year-old Italian, a bundle of energy, has steered the satellite safely through space from a control room in GSOC, together with Edith Maurer and a team of about ten people.

Flight Director Edith Maurer

Edith Maurer is the epitome of calmness and an impish smile frequently plays about her lips. Nothing appears to escape her large, alert eyes. They serve the 32-year-old flight director well as she keeps an eye on the approximately 500 orders that the command team sends to the satellite each day. She coordinates everything that the satellite does in orbit: the time when it starts taking its images as well as the transmission of data to a ground station.

Control is a question of communication

The workplace of Edith Maurer and Alessandro Codazzi is, on the one hand, a plain office with an ordinary PC. But on the other hand they also sit at huge screens and control consoles in the control room when they send the programmes and orders they have produced into space. The aerospace engineer and the doctor of physics know that they not only have to communicate with their satellite, above all they must communicate with each other. "Communication is everything in our job," says Codazzi. "Our work is made easier through the fact that we understand one another well, I understand what Edith is saying and often I know what she is thinking." And both of them must be able to rely on each another: "The job cannot, of course, be done by one person. After all, we have to represent one another when we are on holiday or ill," says Dr Maurer. Describing the nature of the teamwork, Codazzi says in his Italian accent: "I am no super expert, sometimes we are given tasks where I don't know immediately how to perform them. That is when I need Edith’s know-how. We come from different areas. I am more involved in satellite systems and Edith is more involved in planning systems. We try to learn from one another."

Mission Operations Team Leader Alessandro Codazzi

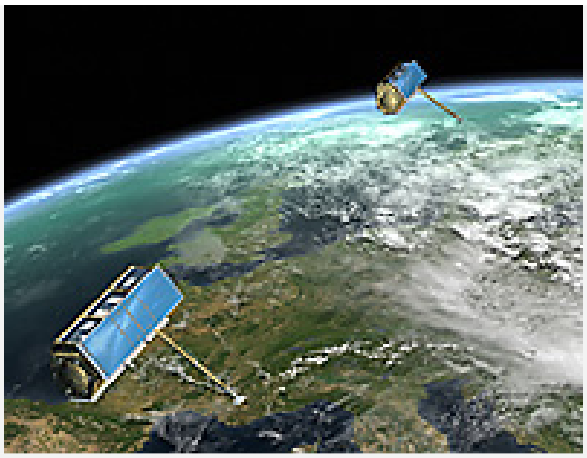
Tests on the ground and the baptism of fire in space

In this way the two flight engineers also survived the thrilling moments when they assumed command of TerraSAR-X in orbit for the first time: "Testing a satellite on the ground is something quite different from flying it in space at seven kilometres per second – you can't simulate that," says Codazzi. The team gradually had to familiarise themselves with the satellite in space with all its possibilities and limitations. During the first attitude control operation, the satellite reverted to safe mode, for example. "At this moment we had to stay calm," Codazzi recalls. "We repeatedly booted up the system, kept receiving data and checked them precisely." Soon the flight engineers realised that the culprit was a small programming error. "Such errors often occur at the start of missions. For us it was important to see that our team reacted well and was able to correct the error immediately."

Manoeuvring in space to look at the polar caps

The exciting times during the test phase in orbit have in the meantime turned into routine. At the request of many different researchers, they scan selected areas of Earth each day. There is great interest in radar images of Germany and Europe. When natural or environmental disasters occur, they direct the satellite, among other things, on behalf of the Centre for Satellite Based Crisis Information (Zentrum für satellitengestützte Kriseninformation; ZKI). These data, processed in the German Remote Sensing Data Centre (Deutsche Fernerkundungsdatenzentrum; DFD), offer aid organisations an important basis for planning and carrying out aid actions.

Above all, the by now regular requests for observation of the polar caps must be well planned by the TerraSAR-X team. During normal flight, the satellite looks to the right, that is, it scans the area below it to the right in the flight direction. In order to avoid looking into space when it is flying over the polar regions, Maurer and Codazzi must turn the satellite when it is taking images of the polar regions and initiate what is known as a 'left-looking manoeuvre'. "It all starts with program codes and a long list of rules which must be observed when generating orders," Maurer says, describing the communication with the satellite. "On this basis the computer generates command lines which we finally send to the satellite once they have been thoroughly checked."



In formation flight – TerraSAR-X and TanDEM-X

Opportunities to learn – from successes and mistakes

Alessandro Codazzi and Edith Maurer are proud of the confidence that was shown in them by giving them responsibility for TerraSAR-X: "This has given us the opportunity to learn from our experiences – and our mistakes. It is important in a team that each person takes responsibility and has the opportunity to prove themselves. That is how we try to do it in our team," says Codazzi.

As the next step, the two flight engineers are preparing for the launch of the second German radar satellite, TanDEM-X, in September 2009, an almost identical satellite that will orbit the earth in formation with TerraSAR-X. This will give the two satellites in combination a stereo view of Earth and the aim is that they will create a three-dimensional topographical model of Earth. "TanDEM-X will take us one step further because then we will have to coordinate the two control teams and steer the satellites in formation. That will be another learning curve for us," says Codazzi.

Both are firmly convinced that they will still be commanding TerraSAR-X beyond the planned mission end in 2011: "The satellite is well-built, it will keep going for some time yet," says Codazzi, who probably knows it better than most.

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