



A connection with antennas - TanDEM-X Project Manager Manfred Zink

11 October 2010

By Bernadette Jung

Manfred Zink likes to arrange things. For the TanDEM-X radar satellite mission he is organising when and where the antennas of the satellites are to point, in order to acquire the best three-dimensional images possible of our planet. Manfred Zink is Project Manager for the Ground Segment of the mission at the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) in Oberpfaffenhofen. He is responsible for directing the entire mission, from the close flight formation of the TerraSAR-X and TanDEM-X satellites to the creation of the digital elevation model. This is the thirteenth of our series of portraits on the DLR web portal. One look at his desk is enough to see where the 47-year-old physicist's heart is. To the left side, close to the window, are photos of his family, at the other end are miniature models of the TerraSAR-X and TanDEM-X satellites. The actual satellites have been orbiting Earth together since June 2010, and from October 2010 they will be flying with each other in a close helix formation to scan Earth's surface from different viewing angles using their radars.

Butterflies in the stomach

Close formation flight, the critical phase of the mission, is just around the corner. In mid October, the distance between the satellites will be reduced from 20 kilometres down to 200 metres, at an orbital speed of 27,000 kilometres an hour.

"I've got butterflies in my stomach. No one has ever flown two satellites so close to each other before. The control system is very complicated and we have to be precise to the last decimal point. After all, neither of the two satellites knows that the other is there, so to speak. It's especially difficult to match the two radar systems to one another and keep them synchronised," he explains. During a radar data take, the two satellites exchange synchronisation signals ten times a second, and everything has to be set up correctly in advance. This is the only way we can obtain precise and up to date elevation models of Earth's surface.

"We have to go right to the edge of the envelope"

For these images, the satellites are operating in bistatic mode. One satellite sends out a radar signal, but both receive the reflection from the Earth's surface. The aim of the TanDEM-X mission is to map the entire Earth's surface in three dimensions – a total of 150 million square kilometres. This data will be the foundation for a series of applications, from environmental research to the development of advanced navigation systems.

Manfred Zink has to push the radar systems to the limit to achieve this. "The challenge is in going right to the edge of our envelope. For example, the imaging cycles usually last three minutes per orbit. The time window is limited, because the satellites heat up quickly when the radar is operating. But to create our digital elevation model, we have to run the satellites for another 30 seconds. We're able to do this because we've modelled the thermal budget of the satellites very precisely."

The road to DLR

Manfred Zink already had a connection with antennas while studying to obtain his physics degree at Graz. His thesis was titled 'Numerical methods for antenna modelling' and he found the ideal home for his specialisation after graduation in 1987 – at the DLR Microwaves and Radar Institute in Oberpfaffenhofen, Bavaria. The Austrian packed his bags and soon found his

place at DLR – in 1991 he won the DLR Science Prize (Wissenschaftspreis), and received his doctorate two years later. But he didn't settle down. A specialist in radar system calibration like Zink is always on the move – whether visiting the European Space Agency (ESA) in the Netherlands and Italy or NASA in the USA.

Unforgettable experience

One of his most memorable experiences was at NASA Houston, for the Shuttle Radar Topography Mission (SRTM) in 2000. "The shift at ground control started at midnight and lasted for 12 hours. That was hard enough, but even on arrival, the atmosphere was charged," he recalls. The remote sensing mission lasted 11 tense days. The aim was to map around 80 percent of Earth's surface in 3D, similar to the current DLR TanDEM-X mission. During the SRTM mission, the second antenna was mounted at the end of a 60-metre long deployable mast on the shuttle, while DLR with TanDEM-X is using two nearly identical satellites. Both missions employ SAR (synthetic aperture radar), which can acquire imaging data regardless of cloud cover or the availability of daylight.

Always one more dream ahead

Manfred's eyes twinkle when he talks about his various projects. He treasures the opportunities his work has already given him. With TerraSAR-X and its successor TanDEM X, he is back in Oberpfaffenhofen since 2005. "I have great memories from my years at ESA and collaboration at Houston. But it's great to be back home – with my family and a real dream project," he says. What could be better than this? "This close formation flight is a real milestone. There's no doubt about it." But he's already looking ahead, "We could go one step further than TanDEM-X – with a Tandem-L mission, two low frequency radar satellites, flying in close formation." This would enable scientists to observe dynamic processes on Earth, such as the changes in forest biomass that occur as part of the carbon cycle. DLR's infrastructure makes such visions possible. "We're a really good team," the DLR department head emphasises. For Manfred Zink, the close formation flight of the twin satellites is by no means the end of the excitement.

Contacts

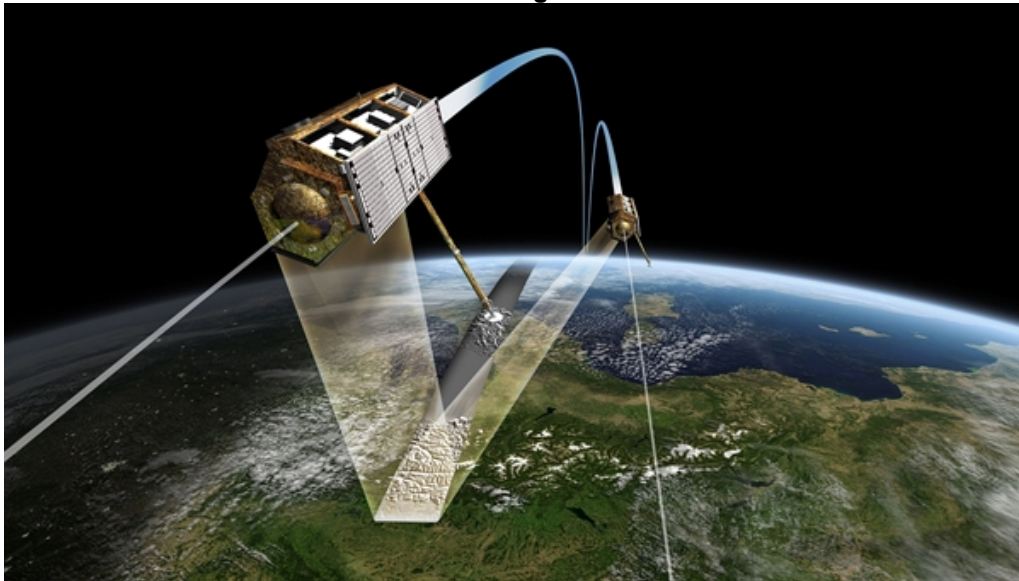
Bernadette Jung
German Aerospace Center (DLR)
Public Affairs and Communications
Tel.: +49 8153 28-2251
Fax: +49 8153 28-1243
Bernadette.Jung@dlr.de

Manfred Zink, Project Manager for the TanDEM-X ground segment



Manfred Zink is a Department Head at DLR Oberpfaffenhofen and also the Project Manager for the TanDEM-X ground segment. He is responsible for operation of the mission, from the close formation flight to the creation of the digital elevation model.

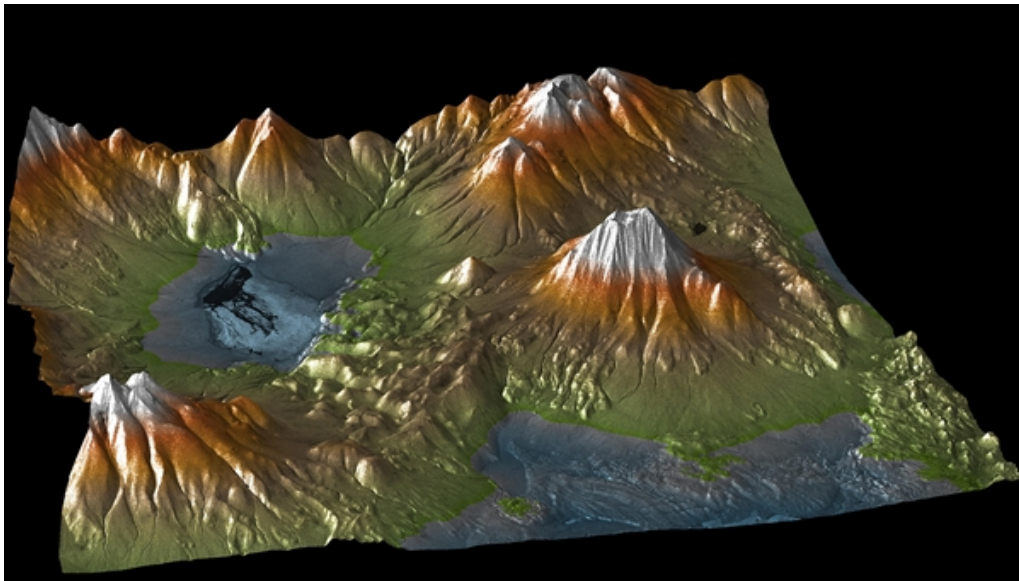
TerraSAR-X and TanDEM-X in formation flight



The twin satellites have been orbiting Earth since June 2010. During the close formation flight, the satellites fly in a helix orbit. The closest distance between the satellites is just 200 metres. With their radar instruments, the satellites are scanning Earth's surface from different angles.

Credit: DLR (CC-BY 3.0).

TanDEM-X digital elevation model: the Aracar volcano on the Chilean-Argentinian border



The goal of the TanDEM-X mission is to measure the entire surface of the Earth in 3D. The data will form a basis for range of applications, including environmental research and development of navigation systems. This elevation model shows the Aracar volcano on the Chilean-Argentinian border. To the left is a salt lake (bright spot) that encloses the remains of a former lake (black spot).

Credit: DLR (CC-BY 3.0).

Manfred Zink has TanDEM-X under control



Manfred Zink has TanDEM-X under control - he is responsible for planning where antenna of the satellite must point to deliver the best three-dimensional images of Earth. To achieve this, he must push the radar systems to the limit.

Credit: DLR (CC-BY 3.0).

Contact details for image and video enquiries as well as information regarding DLR's terms of use can be found on the DLR portal imprint.