Wide-angle view from space

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Officially, the German radar satellite TerraSAR-X should have been out of service for over a year and a half – that's how long it has exceeded its intended lifespan. But engineers at the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) have switched the satellite, which was launched to space on 15 June 2007, to yet another mode: TerraSAR-X can now record image strips over 200 kilometres wide. "The satellite does so by sweeping this large area in multiple stages, very quickly pivoting the radar beam numerous times across the direction of flight," explains DLR mission manager Stefan Buckreuss. For example, the image of the German Bight shows the Frisian Islands from Borkum to Wangerooge and cities such as Wilhelmshaven and Bremen. This new 'wide-angle' mode is of particular interest to oceanographers, who will be able to use it to investigate the tidal range, changes to mudflats, shipping movements, wave patterns, ice floes and wind levels.

Since its launch, TerraSAR-X has already delivered over 120,000 images since being launched. However, the image strips from the TerraSAR-X satellite have been limited to a width of 100 kilometres to date. "For the first time, we now have an image of the entire German Bight from east to west, at a single point in time and in high resolution," says Susanne Lehner. The radar image, acquired from an altitude of over 500 kilometres, is providing the oceanographer with a great deal of information on the tidal flat and associated inlets between individual islands and the coast, as well as on the high water level in the Elbe estuary and near the island of Sylt. Further to the north, the satellite shows Sylt and numerous wind farms, where wind turbines appear as geometrically arranged bright points in the black and white image. Individual ships can also be made out in the radar images, which means that, with a resolution of 40 metres, the Wide-ScanSAR mode can also be used for monitoring shipping routes. Thankfully, one thing was not evident in the initial test images: "We couldn't detect any signs of oil pollution in the German Bight – it would have been clearly visible in the image had it been there," explains DLR scientist Susanne Lehner. On the other hand, the scientists did come across oil pollution near platforms in the North Sea when assessing other satellite images.

Extending the TerraSAR-X mission

DLR scientist Dana Floricioiu is using the images to investigate things such as the calving of icebergs and the movement of glaciers. "The new mode makes it possible to observe glacial processes and map ice structures on a large scale." Using images in time sequence, the scientist can also observe fissures occurring in the ice before an iceberg is released from the ice mass. In Pine Island Bay in Antarctica, Floricioiu has been watching Iceberg B22A, which, at 81.5 by 44.4 kilometres, is a remnant of an even bigger iceberg from 2002.

"The scientists have been able to use the new mode to get a very good overview of a large area in one go," says mission manager Stefan Buckreuss. For the engineers and scientists, this new imaging technique, which was never originally planned for the mission, is evidence that the satellite is not yet ready for retirement: "The technical condition of TerraSAR-X is very good, and the fuel reserves should enable it to continue operating until at least 2015."

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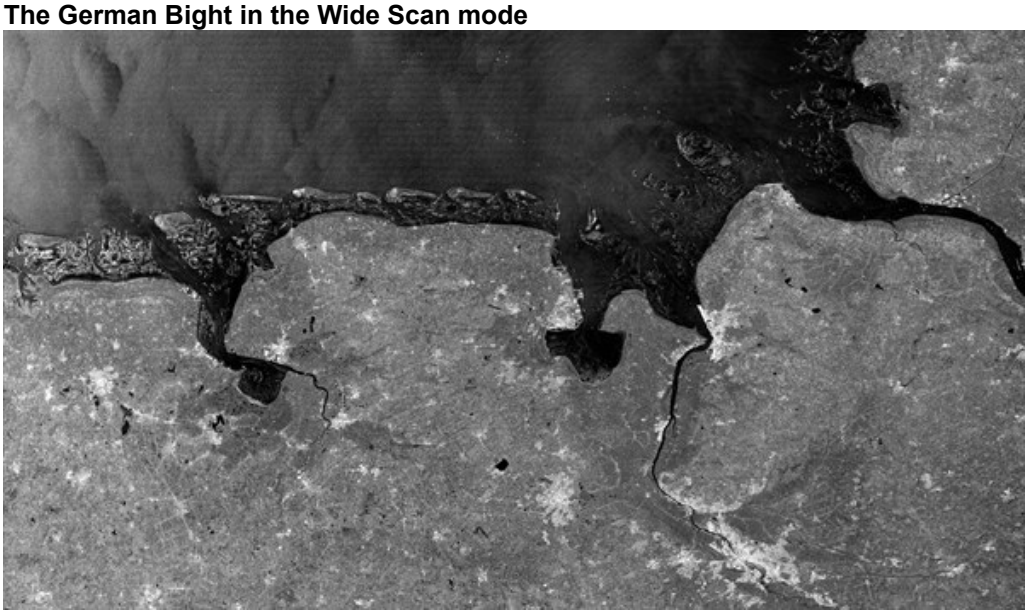
The German Bight in the Wide Scan mode



The images acquired with the radar satellite TerraSAR-X show, for the first time, the Frisian islands of Borkum to Wangerooge, including the cities of Wilhelmshaven and Bremen, at a single point in time and in high resolution. The scientists at the German Aerospace Center (DLR) examine these images to study, for example, tidal range, changes in the Wadden Sea, waves, or even wind levels.

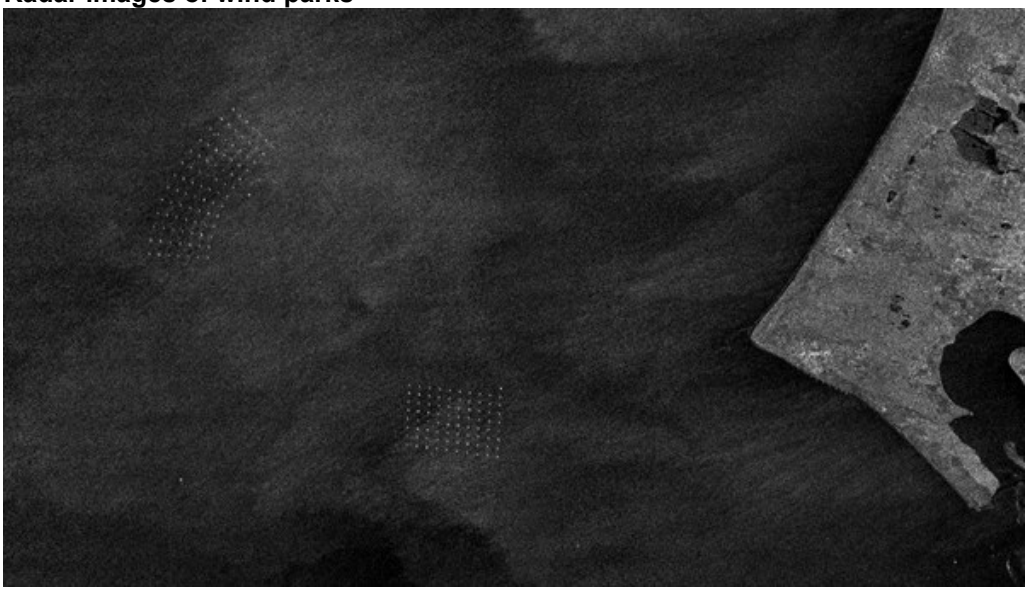
Credit: DLR.

Sylt as seen by TerraSAR-X

Until now, the German radar satellite acquired image strips with a width of 100 kilometres. With the new Wide-scan mode it can cover larger areas. At the German Aerospace Center (DLR), the recordings will be evaluated and provide information about, for example, water level or sea swell.

Credit: DLR.

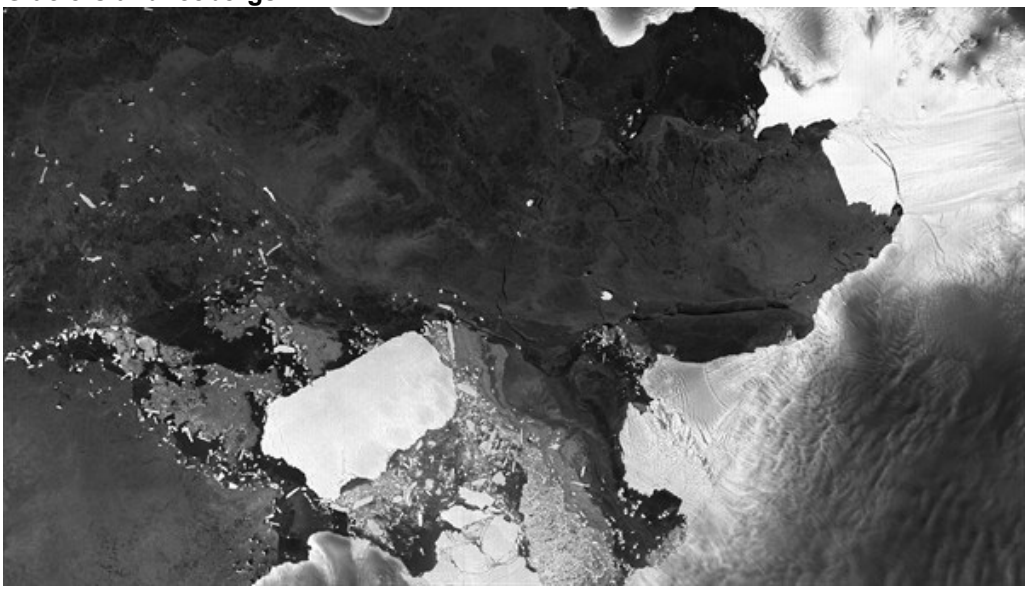
Radar images of wind parks



Wind farms are also detected by the radar satellite TerraSAR-X from space: The wind turbines show up as geometrically arranged bright spots on the black and white image. At the German Aerospace Center (DLR) it is possible to follow the development and construction of wind farms as well as information on wind levels or ocean swell are obtained from the recordings.

Credit: DLR.

Glaciers and icebergs



Using images in time sequence, the scientists at DLR can also observe fissures occurring in the ice before an iceberg is released from the ice mass. In Pine Island Bay in Antarctica, Floricioiu has been watching Iceberg B22A, which, at 81.5 by 44.4 kilometres, is a remnant of an even bigger iceberg from 2002. The new Wide Scan mode allows the satellite to image wider areas.

Credit: DLR.

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