TerraSAR-X image of the month - Gas tank covers all the way from space

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When a series of images acquired with the German radar satellite TerraSAR-X – operated by the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) – are combined into a sequence, the result is truly amazing; even gas storage tanks can have an eventful life of their own. The position of their covers reveals the amount of gas in the tanks; as it varies over time, TerraSAR-X gazes down at the bobbing of the gas tank covers in the Italian Porto Marghera.

Anyone who has driven over the Ponte della Libertà (Freedom Bridge) on their way to Venice will have glanced at the harbour facilities of Porto Marghera at least once. This industrial zone lies south of the main access route to the lagoon town. Venetians simply do not have room for a port, so they looked for a solution on the neighbouring mainland. Today, about 30,000 people live in the Municipality of Marghera, where Porto Maghera is located. Viewed from space, the most striking features in this region are the circular gas storage tanks on the harbour waterfront.

Researchers at DLR have been gathering data from the radar satellite for two years now, and have combined a total of 50 images to create an animation depicting the movements of the tank covers. TerraSAR-X sends radar signals to Earth from an altitude of around 500 kilometres and then receives the reflected signals. "The shape and partial steel structure of the tanks reflect the radar signals from the satellite back into space in a unique way, where they are detected by TerraSAR-X," explains Christian Minet from DLR's Remote Sensing Technology Institute. The white shapes – that is, the strong reflections – depict the constructed facilities in Porto Marghera. The dark areas in the radar images are, for example, grassy areas, which only reflect radar signals from the satellite to a limited extent. The blue colour of the water in the harbour basin was added to the radar image at a later date. The view that the radar satellite has of these tanks with their floating covers is so accurate that it can record their individual height. The covers float on the liquid in each tank; they move gradually lower as the contents are used up and rise again when the tanks are refilled. "The extraordinary precision of TerraSAR-X data actually enables us to determine the fill level of each individual tank during each image acquisition," continues Minet.

The TerraSAR-X mission

TerraSAR-X is the first German satellite manufactured under what is known as a Public-Private Partnership between the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) and Astrium GmbH in Friedrichshafen. The satellite travels around the Earth in a polar orbit and records unique, high-quality X-band radar data about the entire planet using its active antenna. TerraSAR-X works regardless of weather conditions, cloud cover or the absence of daylight and is able to provide radar data with a resolution down to one metre.

DLR is responsible for using TerraSAR-X data for scientific purposes. It is also responsible for planning and implementing the mission as well as controlling the satellite. Astrium built the satellite and shares the costs of developing and using it. Infoterra GmbH, a subsidiary company founded specifically for this purpose by Astrium, is responsible for marketing the data commercially.

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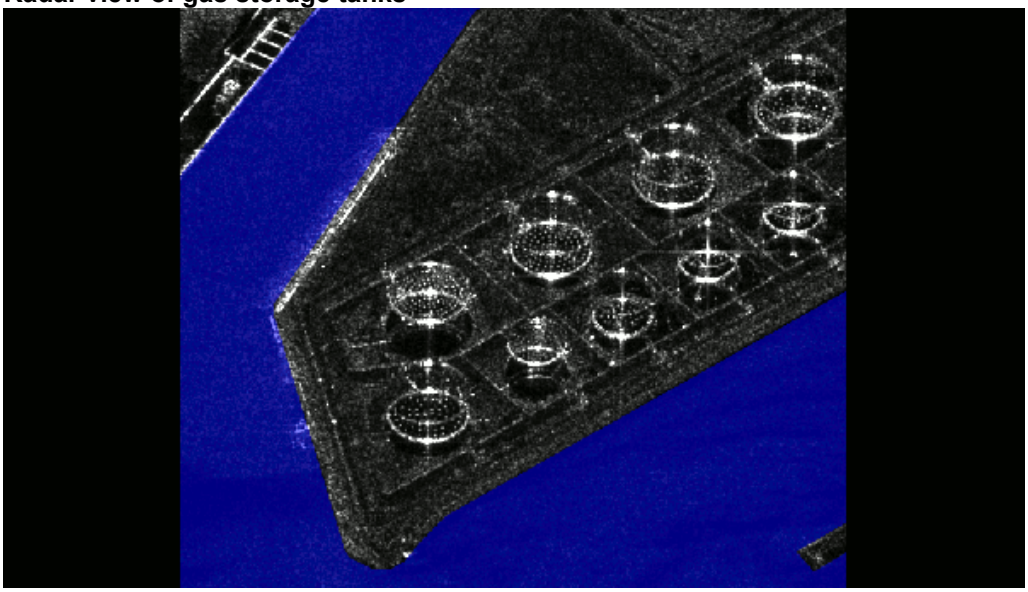
Radar view of gas storage tanks



The radar satellite TerraSAR-X gazes down from space at the bobbing of the gas tank covers in the Italian Porto Marghera.

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