German Aerospace Center

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TerraSAR-X image of the month: Oil disaster off the Australian coast

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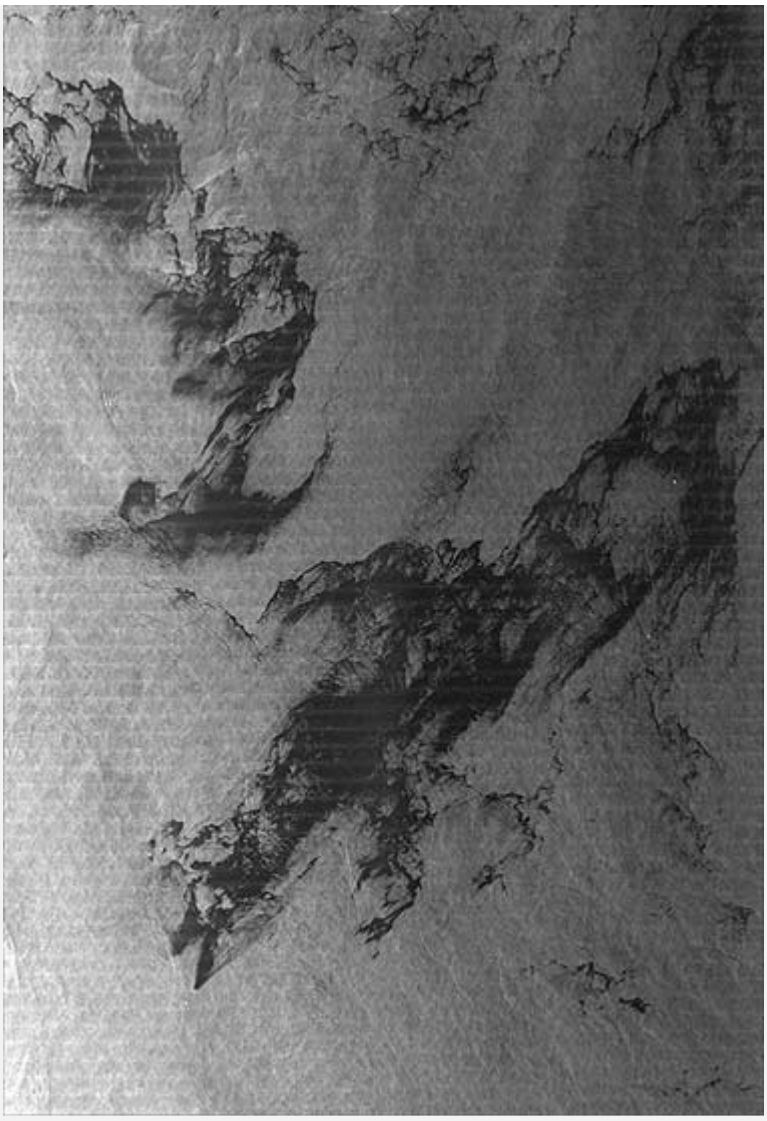

Oil slick in the Timor Sea

On 21 August 2009, the Montara offshore oil platform in the Timor Sea (a large sea bordering the Indian Ocean, to the northeast of Australia) started leaking oil. Over a period of ten weeks, more than two million litres of oil were lost into the sea, forming a 2000 square kilometre slick. The German radar satellite TerraSAR-X followed the growth of the slick as it occurred. The picture shows the platform and the slick spreading out from it, visible as a dark area. The picture was taken on 21 September 2009 in

ScanSAR mode with a resolution of 18 metres and covers an area of 100 by 150 kilometres. The oil well was closed at the beginning of November, stopping the flow of oil into the sea.

The active microwave sensors that are used in radar systems can give a two-dimensional representation of the reflection of radar waves from the surface of the water. The reflections are dependent on the roughness of the surface and thus enable the extent of an oil slick to be seen. The smooth surface of an oil slick does not reflect the incident radar waves back to the satellite and so it appears as a dark area in the radar image, surrounded by lighter, oil-free areas. Oil suppresses the short ocean waves (with wavelengths in the centimetre range) that reflect the electromagnetic signal. This means that in radar images, such as those created with the Synthetic Aperture Radars (SARs) on board the TerraSAR-X satellite, areas of oil appear dark.

Offshore oil exploration

About one third of world crude oil production comes from offshore oil fields – in other words, from drilling platforms in the open sea. The drilling reaches depths of several hundred metres beneath the sea floor. A combination of unfortunate events can lead to an environmental catastrophe, as happened with the Montara offshore platform in August 2009. Due to its low density, oil floats on the surface of the sea and forms slicks. These slicks are highly toxic and wreak havoc with the environment. The oil slick in the Timor Sea is a threat to one of the most species-rich marine environments in the Australian ecosphere.

The TerraSAR-X mission

TerraSAR-X is the first German satellite that has been manufactured under what is known as a Public-Private Partnership (PPP) between the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) and Astrium GmbH in Friedrichshafen. The satellite travels around 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 of 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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