The role of Sentinel-1 in oil spill surveillance

Author

Ola Gråbak joined the European Space Agency (ESRIN) in 1993 after doing his masters degree in Electrical Engineering at the Technical University of Trondheim, Norway. After completing the ESA young graduate program, he worked with facilities management within the ESA Earth Observation ground segment until 1996. From 1996-1997 he earned a masters degree in Space Studies with the International Space University in Strasbourg, France. After returning to ESRIN, Ola has been involved with Earth Observations applications development, sharing his time between developing the industrial markets (oil&gas, insurance etc) and supporting the GMES Service Element (GSE) in preparations for the Copernicus initiativ.

Abstract

Copernicus is the most ambitious Earth observation program to date. It will provide accurate, timely and easily accessible information to improve the management of the environment, understand and mitigate the effects of climate change and ensure civil security. The Copernicus Space Component, managed by ESA, is serving users with satellite data from the Sentinels and the Copernicus Contributing Missions at national, European and international levels. The Sentinel satellites will provide a unique set of observations, starting with the all-weather, day and night radar images from Sentinel-1 to be used for land and ocean services. Sentinel-1a, launched in April 2014, will together with the b-unit (to be launched in 2017) provide an important contribution to oil spill surveillance, both for governmental and private organizations. This presentation provides an overview over the current use and uptake of Sentinel-1 data in operational monitoring of oil spills, both by national governmental users and private actors like oil and gas. In addition, some thoughts are provided to which capabilities next generation satellite EO products and sensors should have in order to improve detection and classification of oil spills from space.

Sentinel-1

With the objectives of Land and Ocean monitoring, SENTINEL-1 will be composed of two polar-orbiting satellites operating day and night, and will perform Radar imaging, enabling them to acquire imagery regardless of the weather. The first SENTINEL-1 satellite was launched in April 2014.

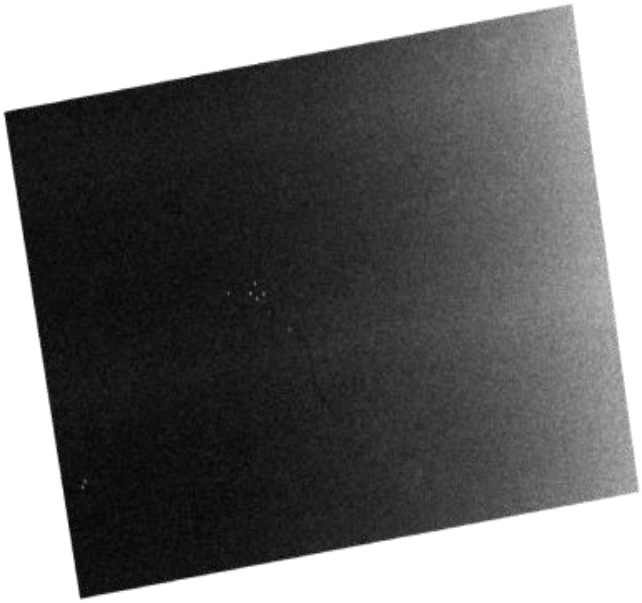
SENTINEL-1 will work in a pre-programmed operation mode to avoid conflicts and to produce a consistent long-term data archive built for applications based on long time series.

SENTINEL-1 is the first of the five missions that ESA is developing for the Copernicus initiative.

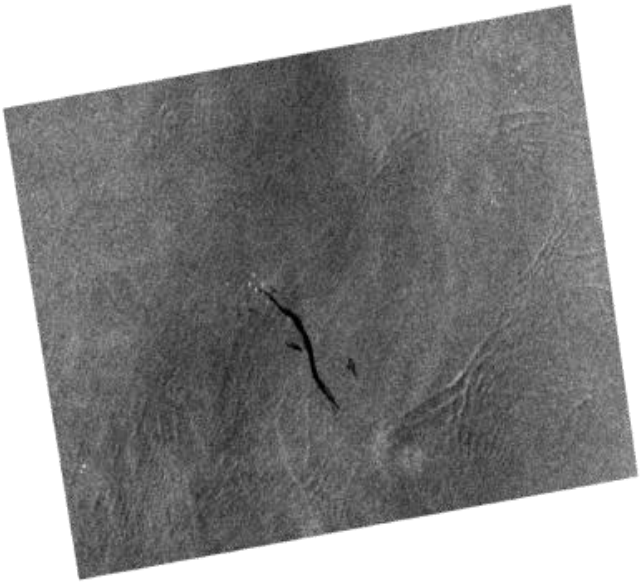
Sentinel-1 first results

The Sentinel-1 Synthetic Aperture Radar (SAR) is a dual polarization instrument. The images below show the advantages of operating the different polarizations for oil spill surveillance. Operating in the VH mode, bright targets like vessels are relatively easy to detect, while operating in VV oil spills on the surface become much more evident. The color composite is showing the combined capabilities of the two modes.

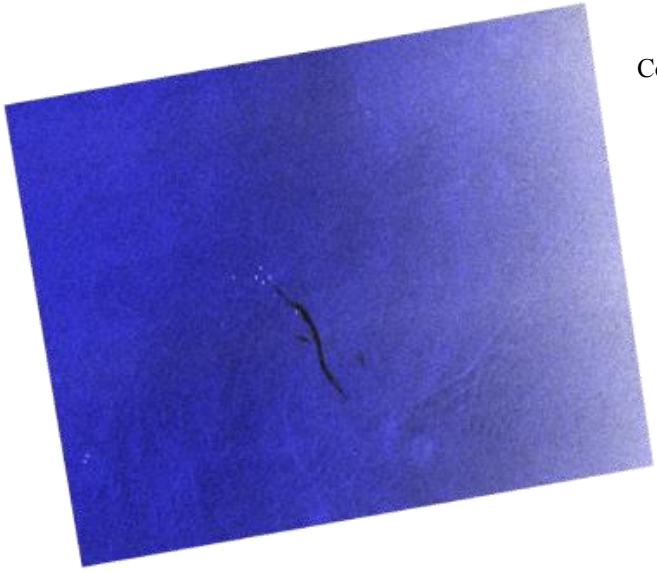
These Sentinel-1 images were acquired over the Norwegian Sea during June 2014, then processed and analyzed by Kongsberg Satellite Services in Norway.



Channel: VH



Channel: VV



Color
composite