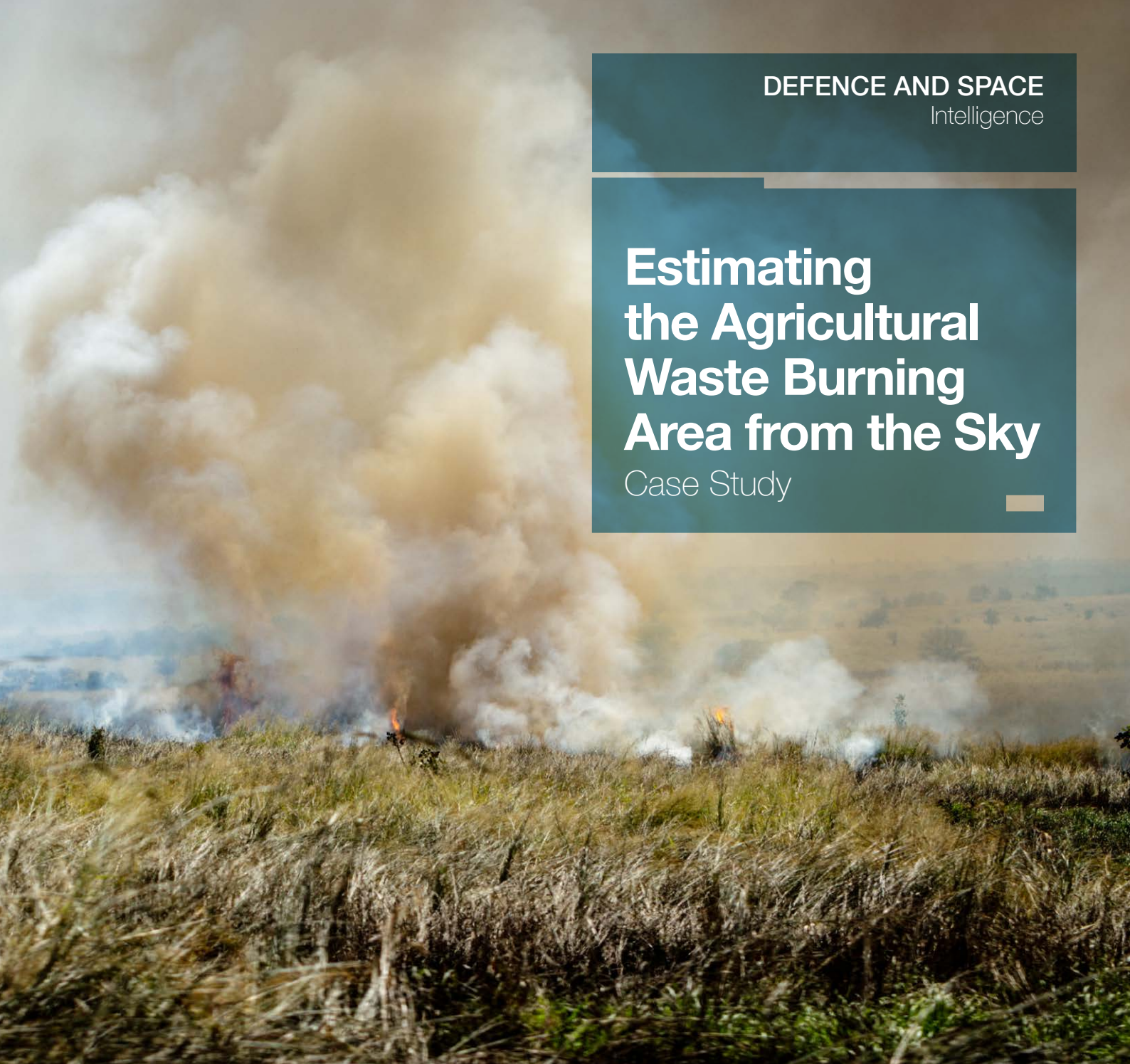


Estimating the Agricultural Waste Burning Area from the Sky

Case Study



Challenge

Agricultural waste burning is a common problem in the Republic of China (Taiwan) and inhalation of the resulting air pollutants can be very harmful to human health.

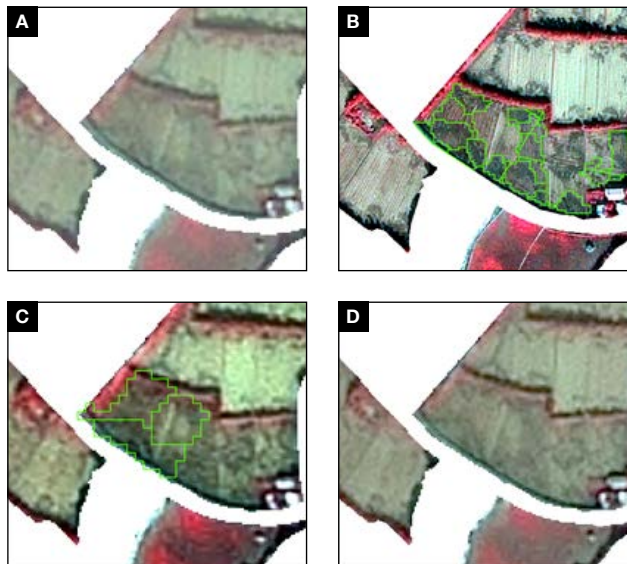
Solution and Results

With the support of Airbus Constellation – SPOT and Pléiades – CSRSR (Center for Space and Remote Sensing Research) can identify the agricultural waste burning areas much faster and more effectively than traditional methods.

Benefits

The multispectral remote-sensing technologies provide highly accurate data of the extensive burn area, allowing for improved assessment of the resulting air pollution.

“ An accurate and efficient way to monitor large scale land surfaces. ”



Example of time series imagery for burnt area detection.

- A) SPOT6 image taken on 2017/12/15
- B) Pléiades image taken on 2017/12/21
- C) SPOT6 image taken on 2017/12/22
- D) SPOT6 image taken on 2017/12/27

Challenge

In the Republic of China (Taiwan), many farmers burn agricultural waste due to the misconception that it can increase soil quality, reduce pests and diseases, and increase rice production. This results in seasonal pollution over a considerable area.

Ground-based detection and investigation of the burning sites is costly and time-consuming, making pollution control difficult. For this reason, the Ministry of Science and Technology together with the Environmental Protection Administration, Executive Yuan appointed CSRSR (an Airbus partner of more than 25 years) to detect the extent of the agricultural waste burning area and analyse its spatial characteristics by using multispectral remote-sensing technologies, including satellite monitoring and Unmanned Aircraft Systems (UAS).

Solution and Results

With the support of daily acquired satellite images from SPOT and Pléiades, plus UAS monitoring, the agricultural waste burning sites can be identified by contrasting the differences of spectral response and carbon emission between harvested and waste-burning farmlands.

Based on a machine-learning algorithm, this study employs the object-based image analysis (OBIA), which segments image pixels into several objects in order to estimate the waste burning area.

Time-series imagery was used to automatically detect and map the burn sites after 2017's second rice season (see images above) and 2018's first rice season. The results show the spatial distribution of the sites, which is invaluable to government agencies investigating this illegal practice.

and education in Taiwan, and has conducted practical research in various fields such as land monitoring, disaster investigation, marine detection, atmospheric analysis, forestry planning, project management, and popular science education.



The Ministry of Science and Technology is the government ministry of the Republic of China (Taiwan) for the promotion and funding of academic research, development of science and technology, and science parks.



The Environmental Protection Administration, Executive Yuan is a cabinet-level executive agency responsible for protecting and conserving the environment in the Republic of China (Taiwan).



行政院環境保護署
Environmental Protection Administration
Executive Yuan, R.O.C. (Taiwan)

Organisations Involved

In 1993, CSRSR entered into a distribution agreement as a Direct Receiving Station with Airbus Defence and Space. The centre has been a pioneer of remote sensing research

Benefits

The multispectral remote-sensing technologies detection result corresponds with the UAS monitoring results, demonstrating the reliability of

the daily SPOT6/7 and Pléiades data for detecting agricultural waste burning areas and assessing air pollution.

However, the spectral responses of wet soil and bodies of water appear similar to burnt areas, which could lead to human error when interpreting the results.