

# SWIR 3.7m

See beyond what's visible to the naked eye

Utilising the WorldView-3 satellite, European Space Imaging are able to offer our customers access to information in the short-wave infrared (SWIR) part of the electromagnetic spectrum.

WorldView-3 expands deeper into the infrared spectrum than any other commercial imaging satellite, and provides the highest resolution data for precisely identifying and characterizing many objects otherwise not visible to the human eye or via the regular eight multispectral bands.



## What is SWIR?

Utilizing the WorldView-3 satellite, European Space Imaging is capable of delivering very high resolution imagery options incorporating 16 spectral bands to allow for automated information extraction for various applications. WorldView-3 integrates a market first revolutionary sensor with eight additional SWIR spectral bands. This allows for the expansion of the current uses of remotely sensed data to create more innovative ways to better understand and manage our changing planet.



### DETECT HEAT

Identify hotspots from wildfires, volcanic activity or man-made heat sources



### IDENTIFY MATERIALS

Locate and classify man-made materials and geologic minerals on Earth's Surface



### VALUABLE WAVELENGTHS

165 unique SWIR band combinations targeted at identifying material signatures



### SEE THROUGH SMOKE

Get a clear view of the ground with SWIR wavelengths that penetrate smoke and haze

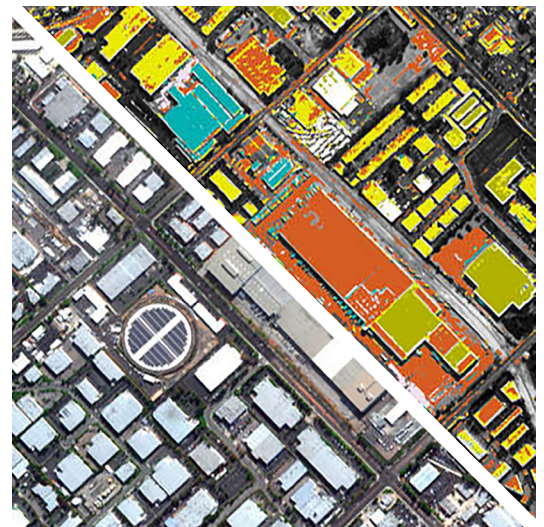
# SWIR Applications

Due to minimal atmospheric influence in this part of the electromagnetic spectrum, as well as an enhanced ability to differentiate among ground materials, the SWIR bands open the door for automated information extraction to save time, money and possibly lives. With SWIR we are able to capture unique information for materials identification, wildfire response, food security, mining/geology and other applications.

- Materials identification
- Wildfire response
- Food security
- Mining/Geology
- Mineral exploration
- Vegetation
- Urban planning
- Disaster management (oil spill)
- Snow and ice discrimination
- Soil moisture detection

## Materials Identification

Many industries need to understand and identify different material types that may be present to meet their specific requirements. Each industry has differing needs and uses for the application of SWIR. An insurance company may need to know roof types, while local governments may be more concerned with land cover types for tax assessment. With the SWIR bands on WorldView-3, accurate information not previously available can be gathered from satellite data to provide detailed information on or about the materials present. Materials that may look similar to the naked eye can be distinguished with SWIR.



*SWIR data used to detect man-made materials such as metals, plastics, paints, fiberglass, asphalt, oil and various chemicals.*

## Wildfire Response

Whether called a forest fire, bush fire, or wildfire, uncontrolled fires have a devastating impact on communities and natural resources. Wildfires can cover extensive areas, move at incredible speeds, and change direction without notice. Fast and effective detection is key to protecting infrastructure and ensuring communities' safety.

A critical factor in being able to respond to wildfires, is to have information about the location and severity in a timely manner. With the agility and spectral depth of WorldView-3, getting this information has never been easier. The unique SWIR bands not only penetrate smoke, allowing for a clear view of the ground, but they also pinpoint sites of active burning so that response efforts can be directed most efficiently.



*SWIR data can be used for thermal detection and to penetrate smoke and haze.*

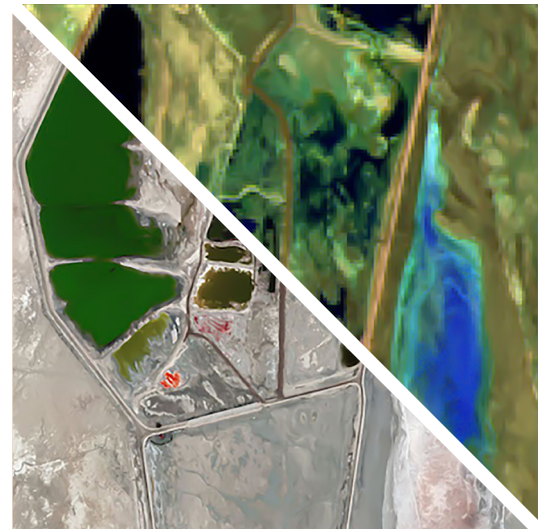
## Food Security

As the world focuses on increasing global food security, it is critical to improve small farm productivity and yield, while decreasing costs, minimizing the environmental impact with precision agriculture practices, and better manage agricultural production and associated inventory. It is important to take corrective action early in the growing season by understanding crop conditions.

Factors such as crop health and stress caused by problems due to nutrient deficiency, moisture stress, and pests can be assessed and managed quickly to avoid future issues. Furthermore, with SWIR data you can go one step further and take preventive action as opposed to corrective action to ensure future crop success by assessing the soil mineral content and ensuring its compatibility with the intended crop to be planted.

WorldView-3 data is uniquely designed to observe and map these phenomena. Crop stresses change the green chlorophyll content of the leaves and replace them with carotenoids that have yellow and red colors visible wavelengths. In addition, SWIR bands are used to assess crop moisture, as another health indicator. Observing soil types and conditions before, during and after a crop season is important for managing crop health. WorldView-3 offers a window into underlying soil conditions and how such conditions might affect vegetation.

One of the agricultural community's best management practices relates to how much post-harvest crop residue is



SWIR data highlighting soil moisture level. Darker shades of blue equates to higher moisture levels as opposed to shades of yellow which indicates dryer soil.

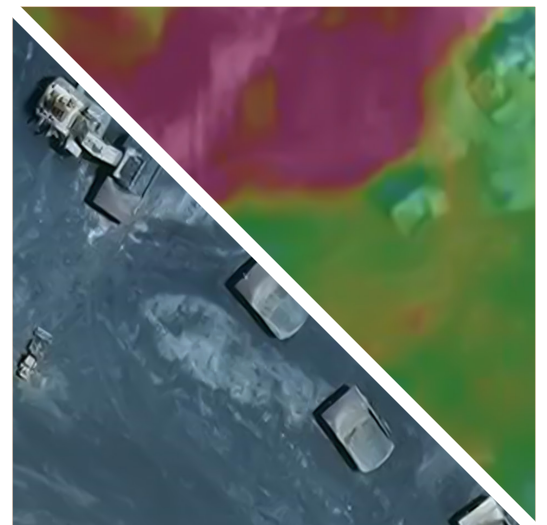
left on a field. Crop residue preserves soil moisture and prevents soil erosion during rainy months. SWIR spectral bands can be used to map and quantify how much crop residue is left behind, predicting the soil quality for future crops.

## Mining & Geology

WorldView-3's spectral bands allow for unique mineral identification and chemical measurements. Energy from light is either transferred to molecules of matter or reflected away from them. Based on the mineral content, different materials absorb specific wavelengths of light and reflect others.

Electromagnetic absorptions in the SWIR wavelengths can be used for detecting materials containing anion groups such as Al-OH, Mg-OH, Fe-OH, Si-OH, carbonates, ammonium, and sulphates - many of which are indicator minerals in the mining industry.

Exposed outcrops are manifestations of potential mineral ores or sub-surface deposits. While the geology and mining industries spend millions of dollars to identify potential mining sites during their exploration phase, WorldView-3 SWIR data can cut costs and increase efficiency by narrowing the potential area before field verification is planned.



With the ability to detect clays, alteration, iron oxides, carbonates, and various other minerals, SWIR imagery of new surface sediment reveals indication of originating rock type.



# Specifications

## Spectral Characteristics

SWIR 1	1195 - 1225 nm
SWIR 2	1550 - 1590 nm
SWIR 3	1640 - 1680 nm
SWIR 4	1710 - 1750 nm
SWIR 5	2145 - 2185 nm
SWIR 6	2185 - 2225 nm
SWIR 7	2235 - 2285 nm
SWIR 8	2295 - 2365 nm

## Resampling Options

- 2 x 2 bilinear
- Nearest neighbor (recommended)
- Cubic convolution

## Order Parameters

PRODUCT LEVEL	1B, 2A, OR2A, 3D
IMAGE BITS/PIXEL	8 or 16 bits
FILE FORMAT	GeoTIFF, JPG2000 (upon request)

## Features

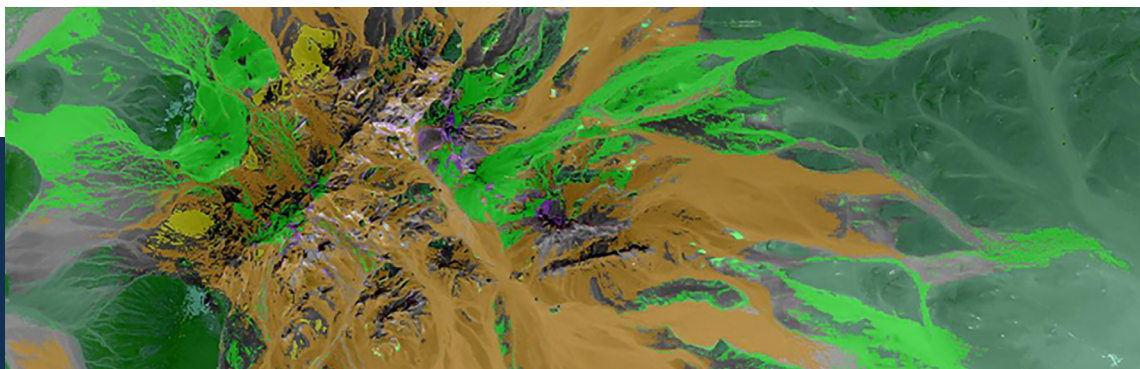
- High resolution and image accuracy 7.5m CE90 excluding terrain effects
- Swath width of 10.8 km at nadir
- Optional AComp
- High radiometric response
  - 14-bit digitalization (up to 16,384 levels of gray scale)
  - Discrete non-overlapping bands
- Open systems
  - Imaging geometry supplied
  - Compatible with leading commercial software providers
- Imaging geometry, geometric correction, radiometric calibration and other metadata supplied with satellite imagery

## Benefits

- Ability to identify features and perform analyses that are not possible with visible and near-infrared alone
- Bands optimized for the detection of features of greatest interest
- Ideal for penetrating smoke, mapping minerals and identifying man-made features

## Key Advantages

- Can penetrate thin clouds and haze
- Covert illumination
- Atmospheric aerosols and vapor have minimal effect on SWIR bands
- Detect heat from high-heat thermal emissions



## About European Space Imaging (EUSI)

Based in Munich, Germany and established in 2002, EUSI is the leading premium supplier of global Very High Resolution (VHR) satellite imagery and derived services such as 3D products, vector derivatives and analytic tools to customers in Europe and North Africa.

Through their longstanding partnership with Maxar Technologies, they were the first European company to bring 30 cm resolution satellite imagery to the EU market. Today, EUSI has access to satellites at resolutions 30 cm – 1 m and a combined daily revisit of close to 10 times a day in panchromatic, multispectral, hyperspectral and video.