Synthetic SWIR Band for Resourcesat-2/2A LISS-4 ($SWIR_{SYN}$)

Product Overview

The Synthetic Short-Wave Infrared ($SWIR_{SYN}$) product provides an additional high-resolution SWIR band for Resourcesat-2/2A LISS-4 imagery using a deep learning-based guided super-resolution technique.

The LISS-4 sensor acquires imagery in three spectral bands—Green, Red, and Near-Infrared (NIR)—at approximately 5.8 m spatial resolution but does not have a SWIR band. $SWIR_{SYN}$ combines these high-resolution bands with simultaneously acquired LISS-3 SWIR data at 23.5 m resolution to generate a high-resolution synthetic SWIR band.

The synthetic SWIR band is provided as an additional band with orthorectified Resourcesat-2/2A LISS-4 data.

Methodology

$SWIR_{SYN}$ is generated using a customized deep learning model trained on approximately 75 scenes representing diverse terrains and seasons across India. The model uses co-registered LISS-3 and LISS-4 imagery to learn spatial and spectral relationships within a supervised guided super-resolution framework.

The trained model incorporates spatial detail from LISS-4 imagery while maintaining spectral consistency with LISS-3 SWIR observations.

SWIR Band Specifications

Parameter	Specification
Satellite	Resourcesat-2/2A
Input sensors	LISS-4 and LISS-3
Product	LISS-4 Synthetic SWIR ($SWIR_{SYN}$)
Spectral range	1550–1700 nm, corresponding to the LISS-3 SWIR band
Output pixel spacing	5.0 m
Output band	Synthetic SWIR
Swath	Approximately 70 km
Geometric processing	Orthorectified
Generation technique	Deep Learning-based guided Super-Resolution

Product Validation

The synthetic SWIR band was evaluated over vegetation, coastal, urban, desert, and mountainous regions. Quantitative assessment indicated good spectral consistency with the original LISS-3 SWIR observations.

Applications

The additional SWIR band enhances the utility of LISS-4 imagery for:

- Vegetation and crop monitoring
- Waterbody delineation and moisture-related studies
- Snow and cloud discrimination
- Land-use/land-cover classification
- Enhanced multispectral image interpretation

Limitations

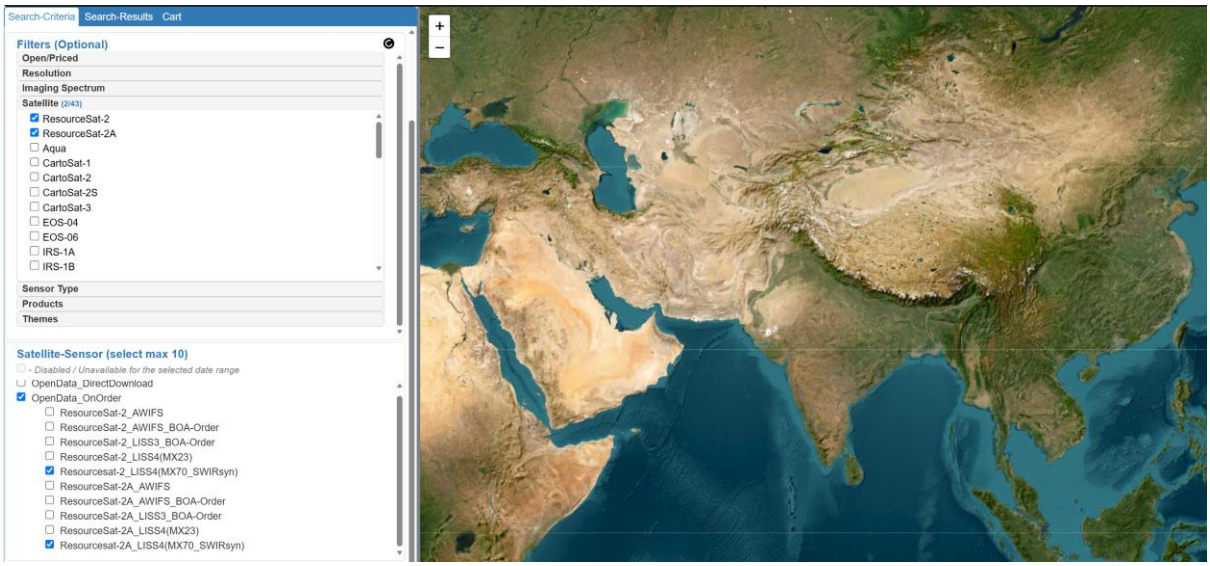
The synthetic SWIR band is a model-derived estimate, with fine spatial detail inferred from LISS-4 visible and NIR bands. It may therefore not reproduce all the spectral and spatial characteristics of directly acquired SWIR observations. In particular, the ability of directly observed SWIR to provide information through smoke or certain thin-cloud conditions cannot be assumed for this product.

Product quality depends on accurate co-registration of LISS-3 and LISS-4 imagery, particularly in mountainous terrain. Spectral consistency with LISS-3 observations does not, by itself, establish the accuracy of SWIR detail at the finer output pixel spacing.

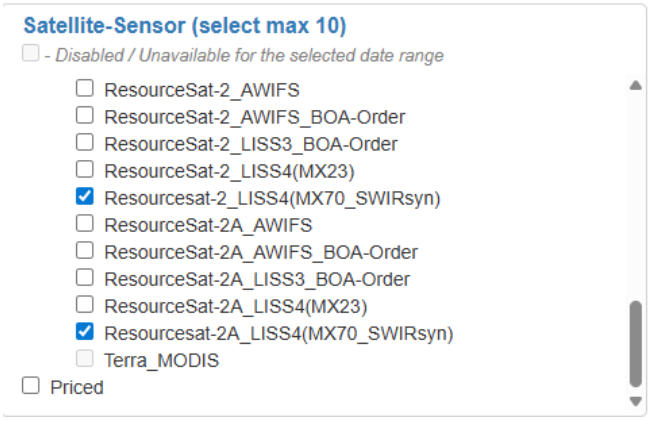
$SWIR_{SYN}$ extends the available Resourcesat-2/2A LISS-4 band set from three to four bands—Green, Red, NIR, and Synthetic SWIR—supporting additional Earth observation applications, subject to these limitations.

How to Order through Bhoonidhi

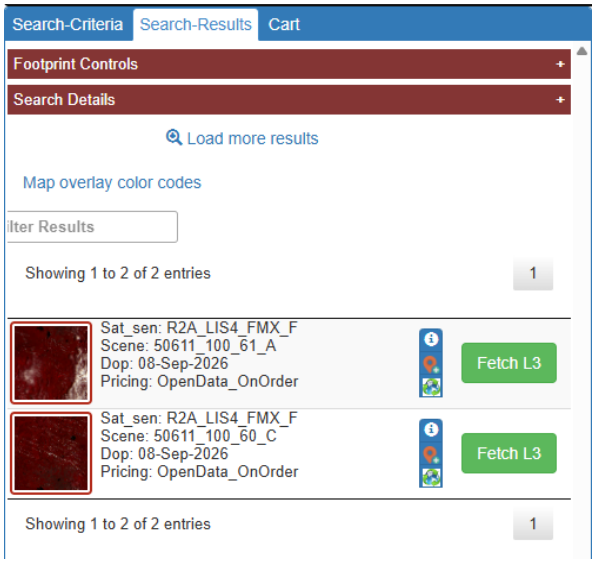
1. Specify the **Area of Interest** and **Date Range**. In the **Satellite-Sensor** section, select **OpenData_OnOrder**.



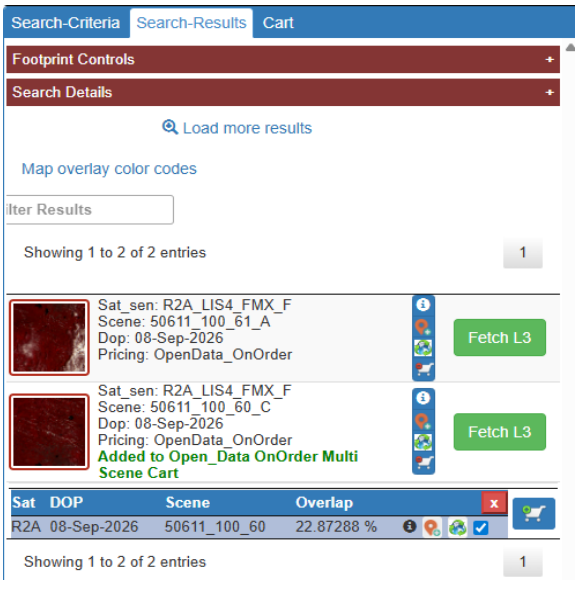
2. Select the appropriate satellite-sensor option:
    - **ResourceSat-2_LISS4(MX70_SWIRsyn)**
    - **ResourceSat _2A_LISS4(MX70_SWIRsyn)**



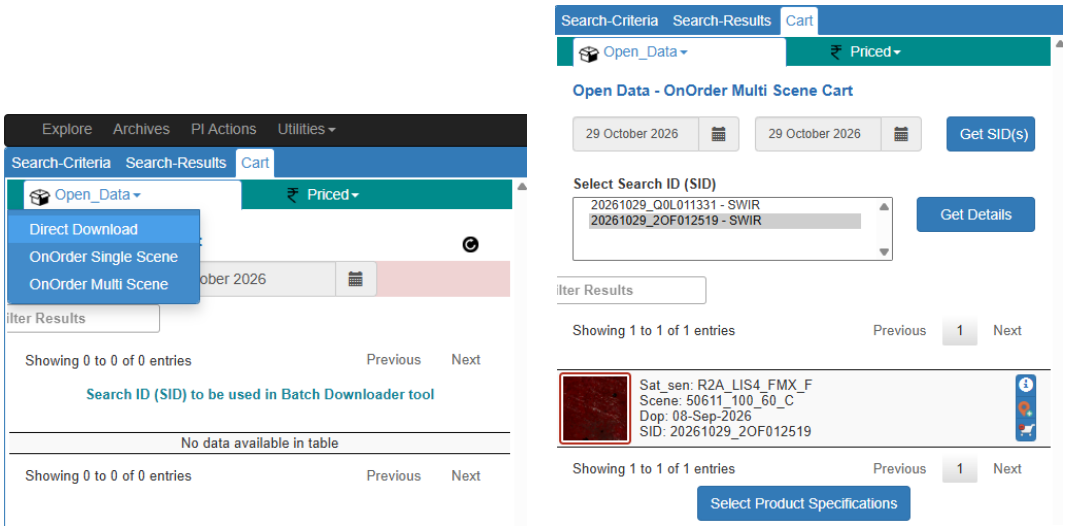
3. Submit the search. In the **Search-Results** tab, click **Fetch L3** for the required LISS-4 scene.



4. Select the corresponding LISS-3 scene and add it to the cart. The selection will be added to the **OnOrder Multi Scene cart**.



5. Open the **Cart** tab and select **Open_Data → OnOrder Multi Scene → Select Product Specifications**.



6. Click **Add product specification**, complete the required specifications, and select **Send OTP**. Complete OTP verification and click **Generate Order** to submit the order.

