



**ÇEV 361**  
**Coğrafi Bilgi Sistemleri ve Uzaktan Algılama**

**Uydu Görüntüleri**

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<https://ozgurzeydan.com.tr/>

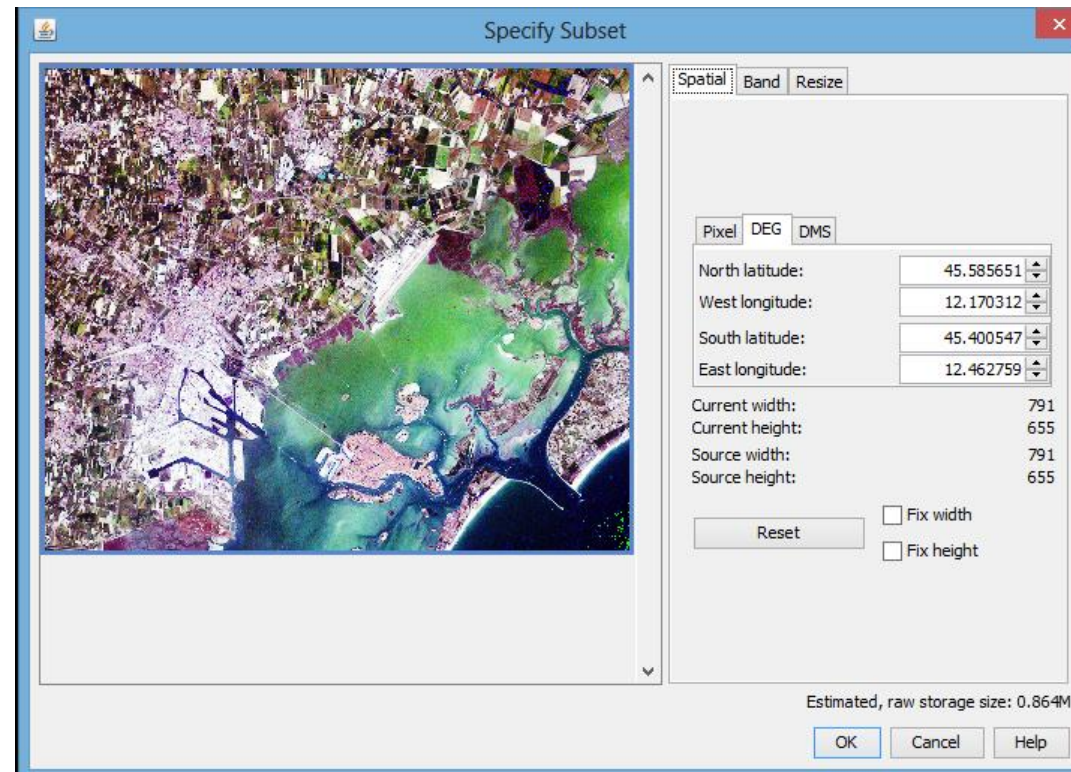
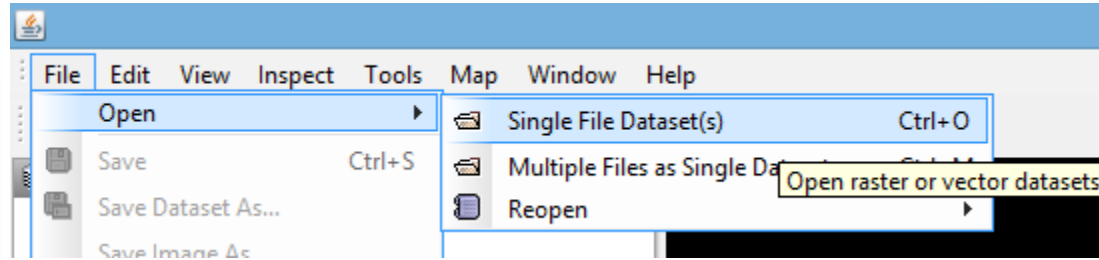
# Uydu Görüntüsü Türleri

- Pankromatik Görüntüler
  - Tek bant, siyah-beyaz
- Multispektral Görüntüler
  - Çok bantlı
- Yalancı Renkli Görüntüler
  - Çok bantlı
- Termal Görüntüler
  - Termal kızılötesi (7-15  $\mu\text{m}$  dalga boyu)
- RADAR Görüntüleri

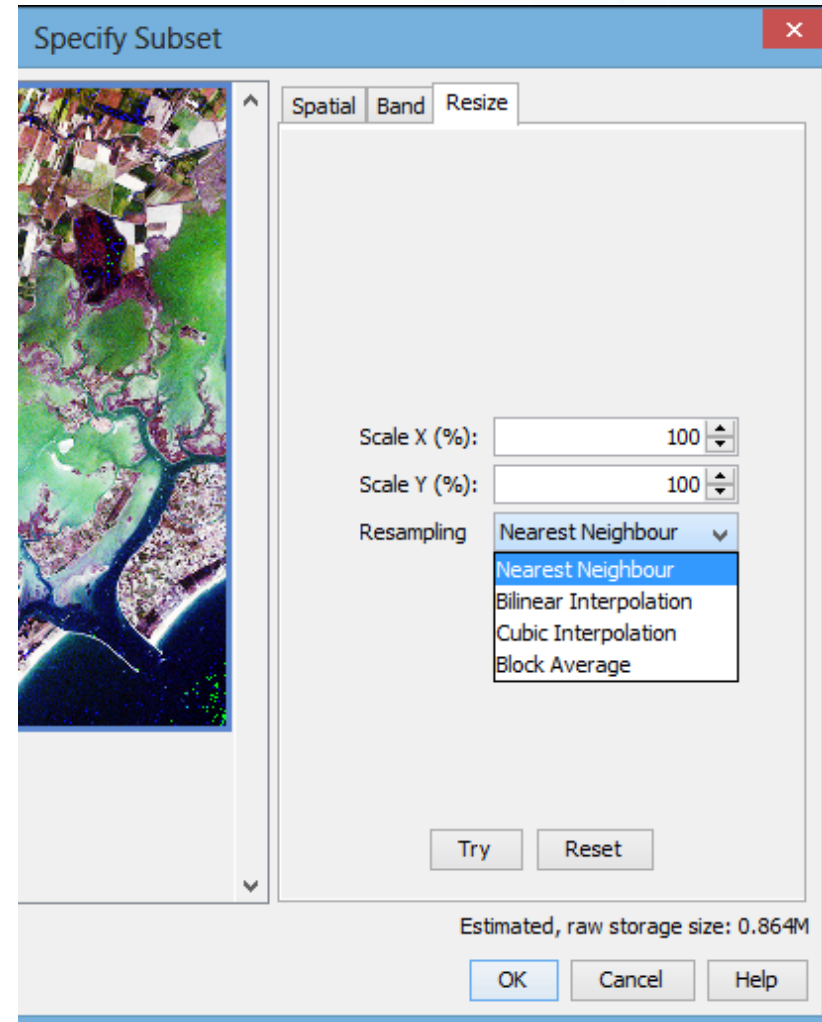
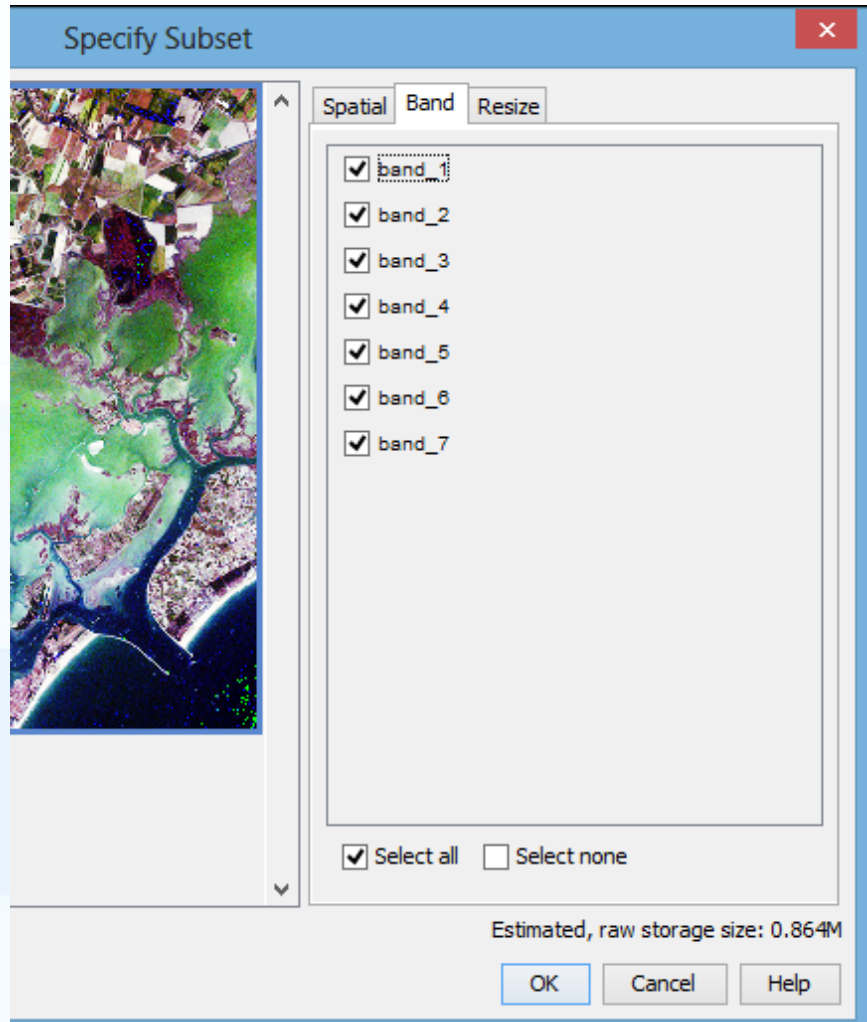
# Uzaktan Algılama için Ücretsiz Yazılım

- LEOWorks, uydu görüntülerini incelemeye ve analiz etmeye yönelik eğitici, açık kaynaklı bir yazılımdır.
- LEOWorks yazılımının çalışması için bilgisayarınızda Java Runtime Environment yüklü olmalıdır.
- <http://leoworks.asrc.ro/>
- [LEOWorks4 Quick Start](#)
- [LEOWorks4.3 Tutorial](#)

# LEOWorks – Dosya Açma

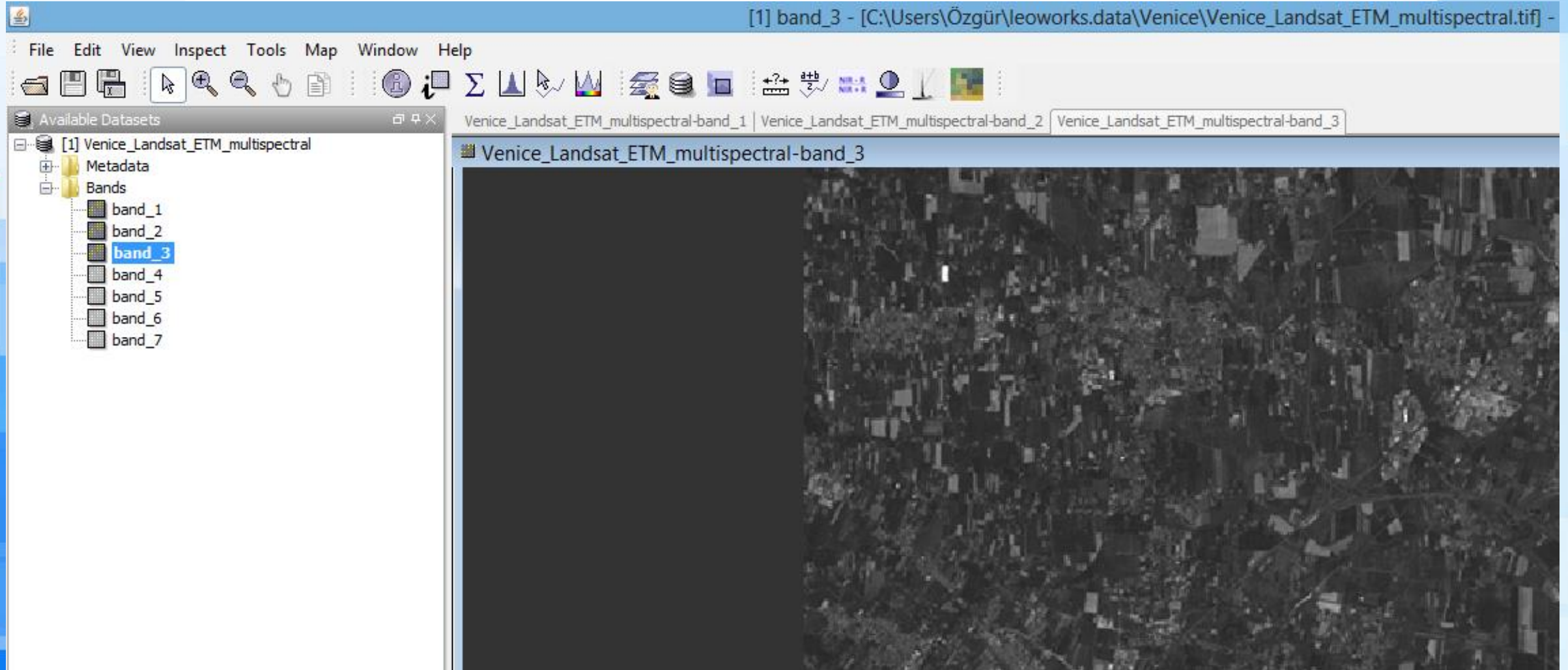


# LEOWorks – Dosya Açma



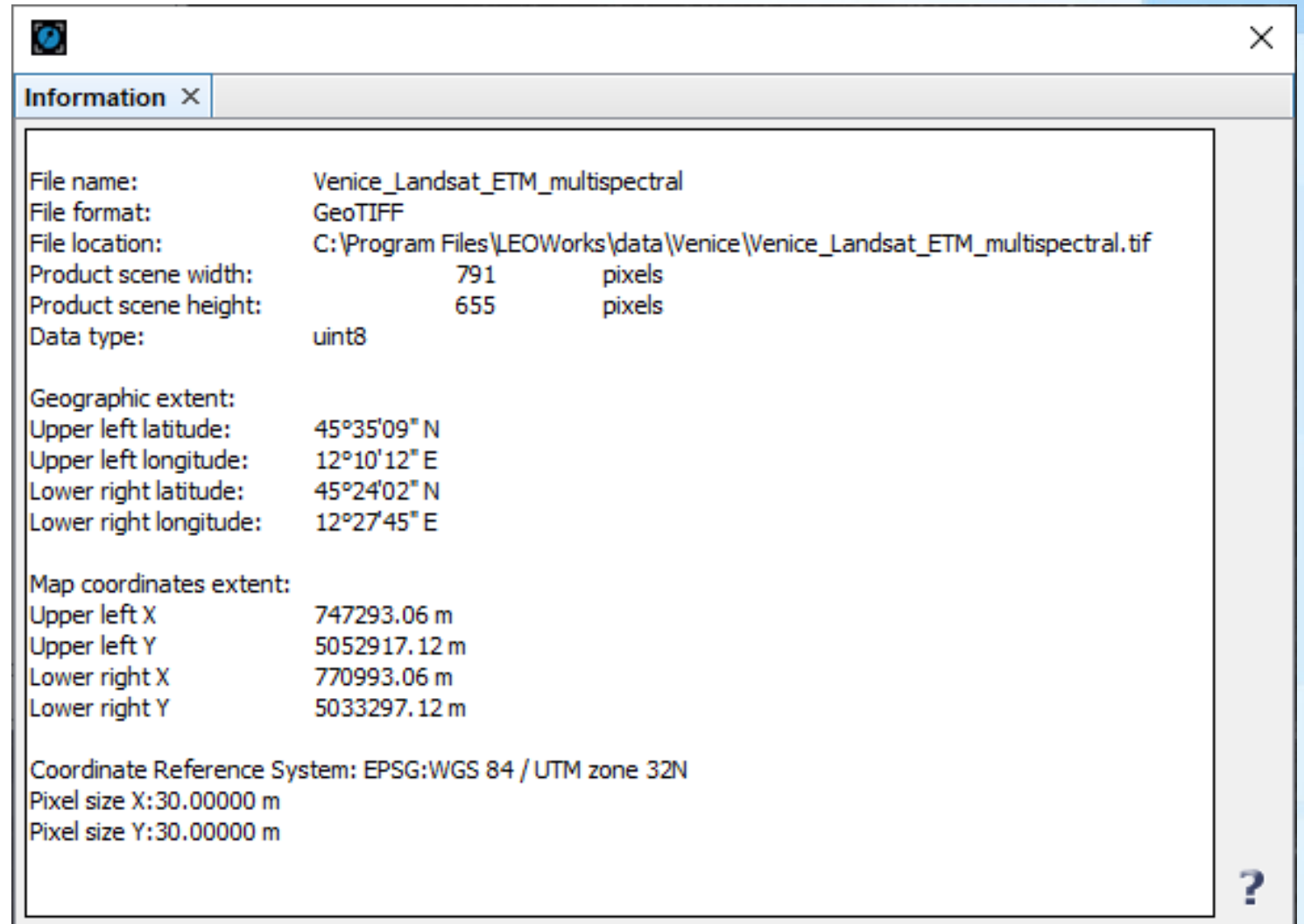


# LEOWorks – Tek Bant Görüntü



# LEOWorks – Dosya Bilgisi Okuma

➤ Inspect > Information



The screenshot shows a window titled 'Information' with a close button (X) in the top right corner. The window contains the following text:

File name: Venice\_Landsat\_ETM\_multispectral  
File format: GeoTIFF  
File location: C:\Program Files\LEOWorks\data\Venice\Venice\_Landsat\_ETM\_multispectral.tif  
Product scene width: 791 pixels  
Product scene height: 655 pixels  
Data type: uint8

Geographic extent:  
Upper left latitude: 45°35'09" N  
Upper left longitude: 12°10'12" E  
Lower right latitude: 45°24'02" N  
Lower right longitude: 12°27'45" E

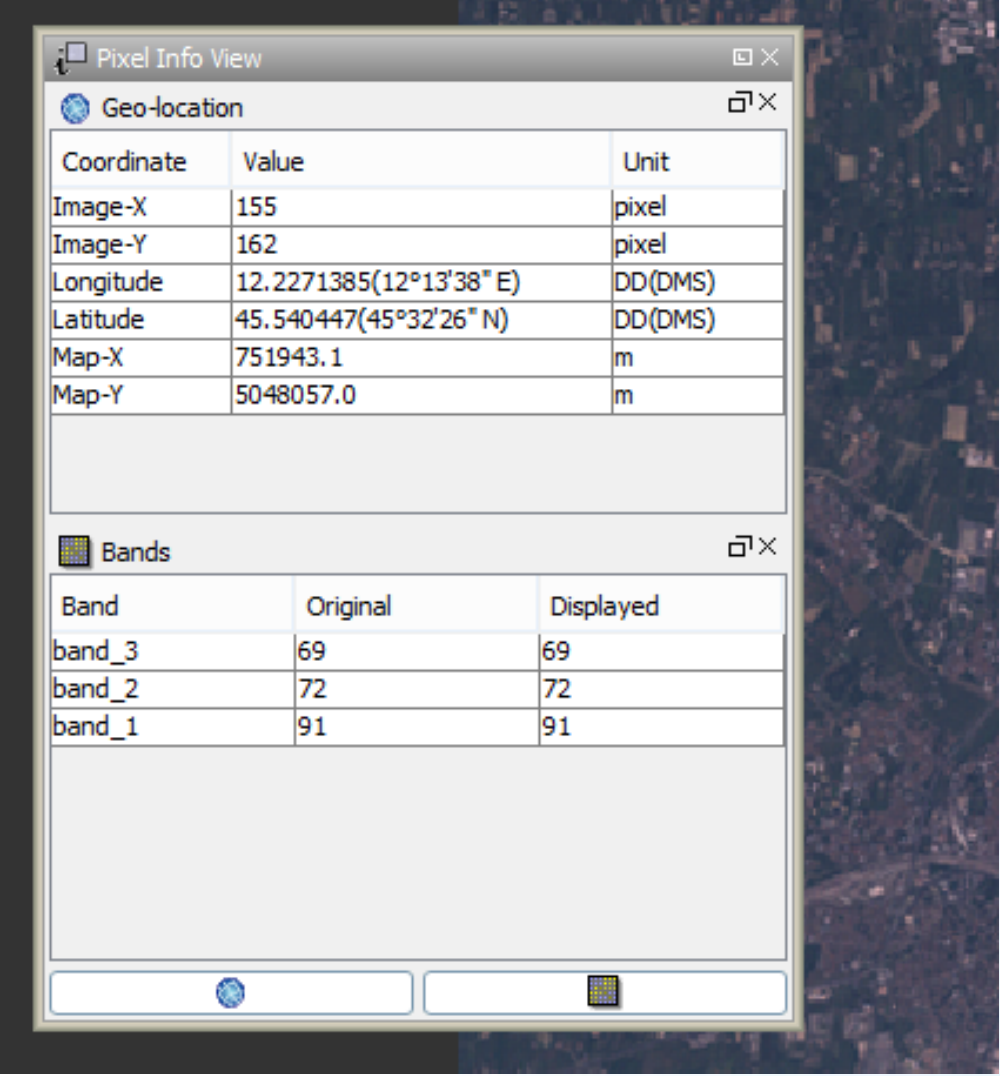
Map coordinates extent:  
Upper left X 747293.06 m  
Upper left Y 5052917.12 m  
Lower right X 770993.06 m  
Lower right Y 5033297.12 m

Coordinate Reference System: EPSG:WGS 84 / UTM zone 32N  
Pixel size X:30.00000 m  
Pixel size Y:30.00000 m

A question mark icon (?) is located in the bottom right corner of the window.

# LEOWorks – Piksel Bilgisi Okuma

➤ Inspect > Pixel Info



The screenshot shows the 'Pixel Info View' window in LEOWorks. It is divided into two main sections: 'Geo-location' and 'Bands'. The 'Geo-location' section contains a table with coordinates and units. The 'Bands' section contains a table with band names, original values, and displayed values. The window is overlaid on a satellite image of a city.

| Coordinate | Value                   | Unit    |
|------------|-------------------------|---------|
| Image-X    | 155                     | pixel   |
| Image-Y    | 162                     | pixel   |
| Longitude  | 12.2271385(12°13'38" E) | DD(DMS) |
| Latitude   | 45.540447(45°32'26" N)  | DD(DMS) |
| Map-X      | 751943.1                | m       |
| Map-Y      | 5048057.0               | m       |

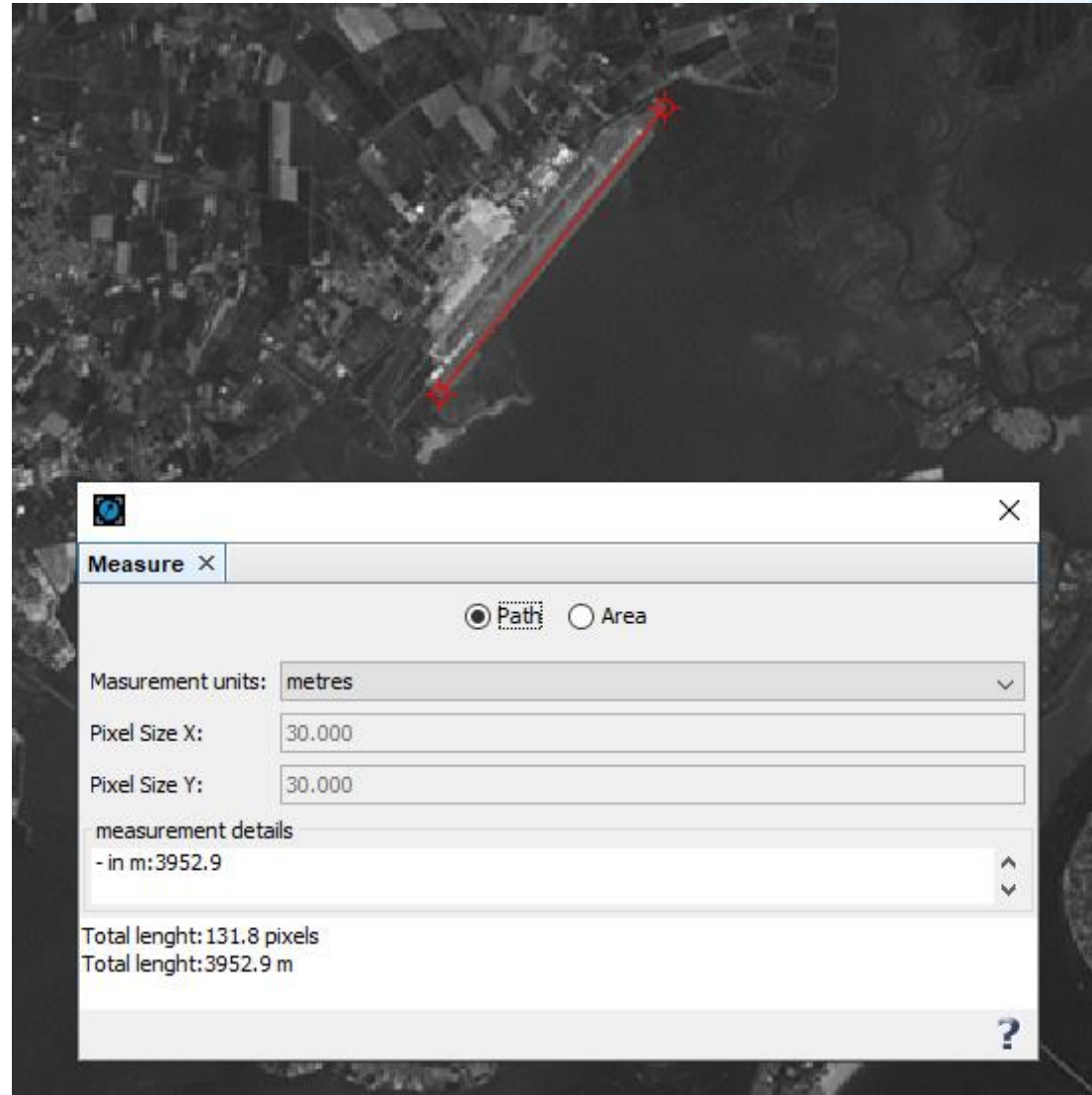
  

| Band   | Original | Displayed |
|--------|----------|-----------|
| band_3 | 69       | 69        |
| band_2 | 72       | 72        |
| band_1 | 91       | 91        |



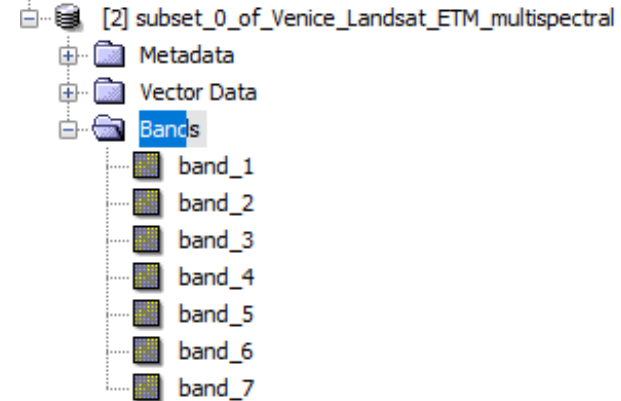
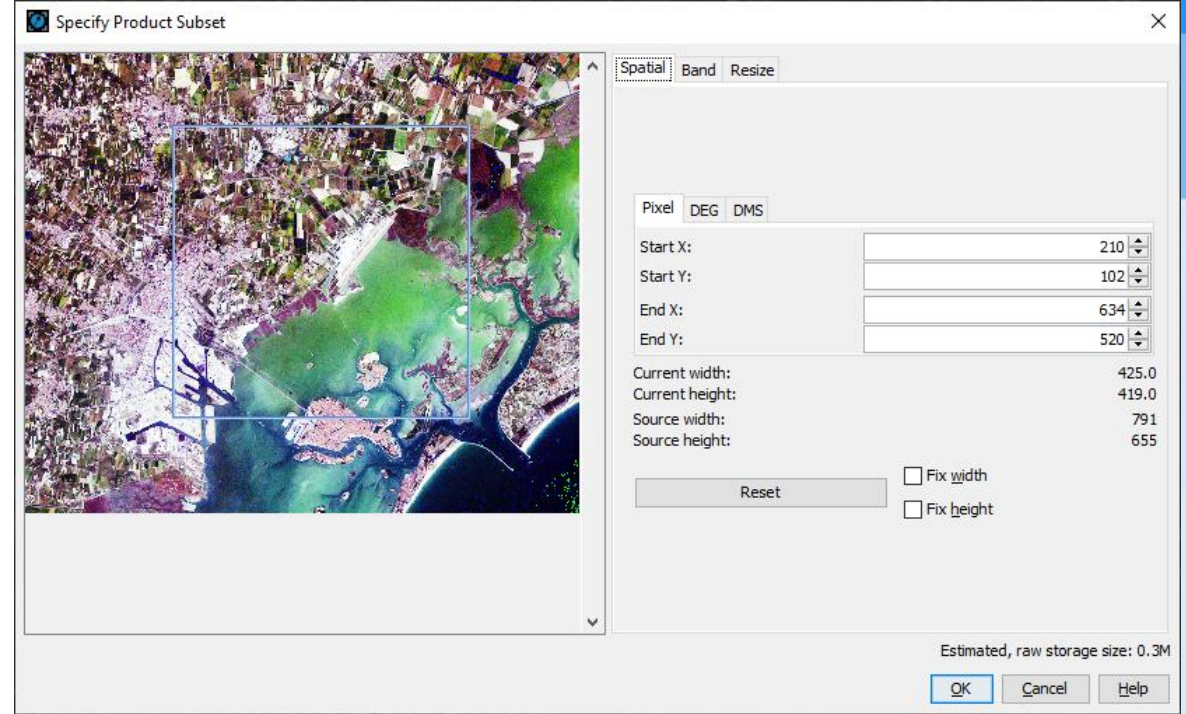
# LEOWorks – Mesafe ve Alan Ölçümleri

➤ Tools > Measure



# LEOWorks – Subset Oluřturma

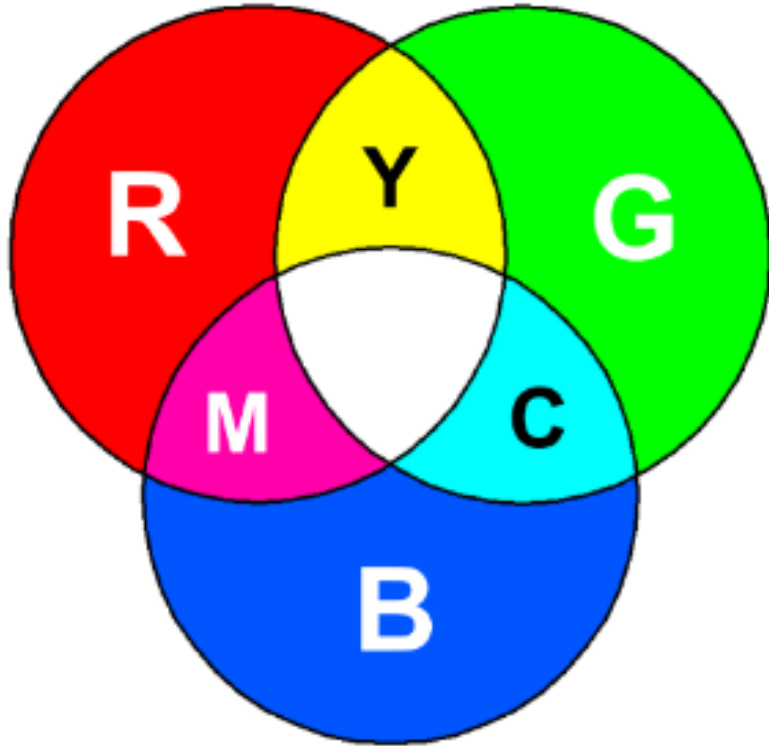
- Tools > Subset > Subset from Shapefile
  - Shapefile kullanılarak alt küme oluřturulur.
- Tools > Subset > View
  - Pencere içinde sınırlar seçilerek alt küme oluřturulur.



# Renk Teorileri

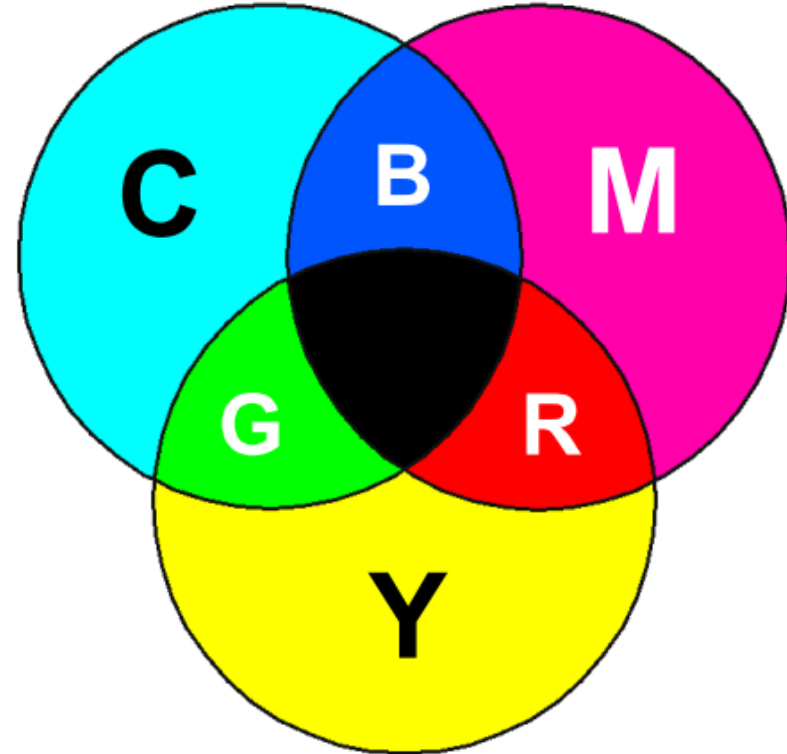
## Eklemeli renk teorisi

### RGB Model

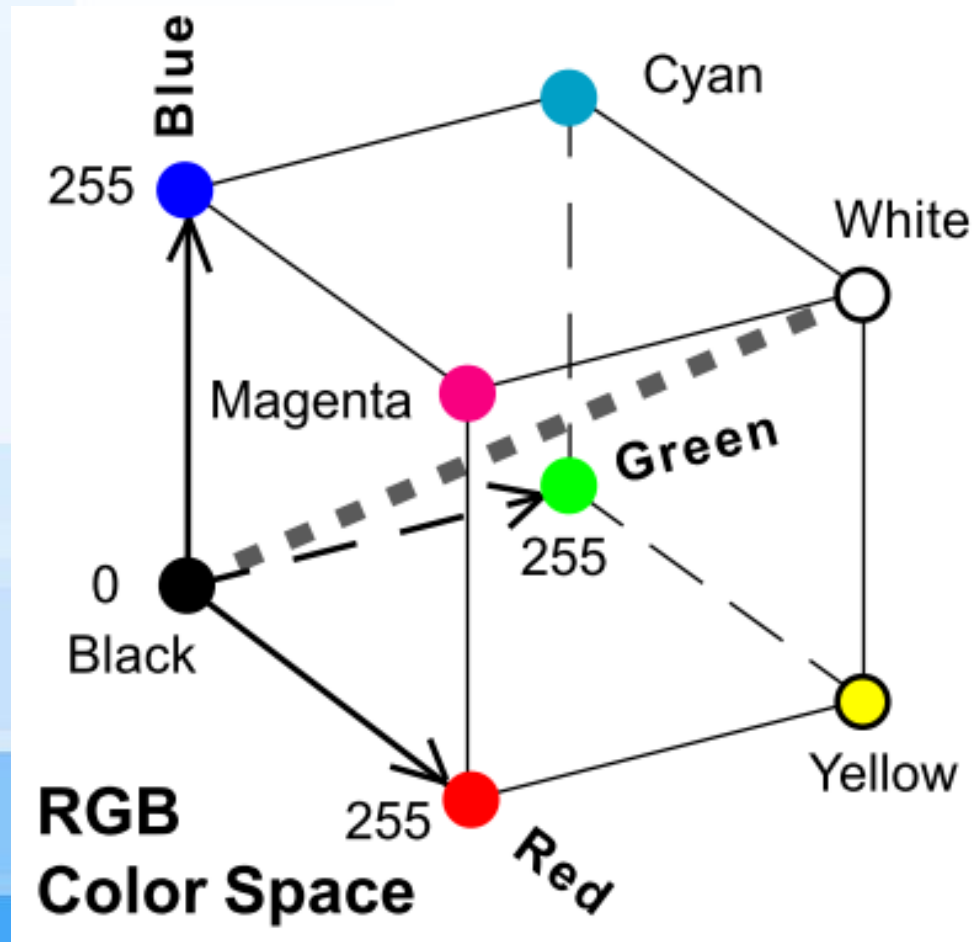


## Çıkarmalı renk teorisi

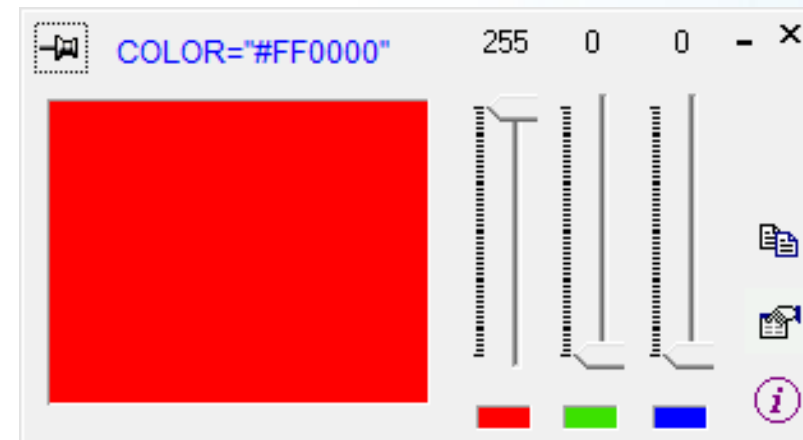
### CMY Model



# RGB (Red – Green - Blue) Kavrami



Red – Green - Blue

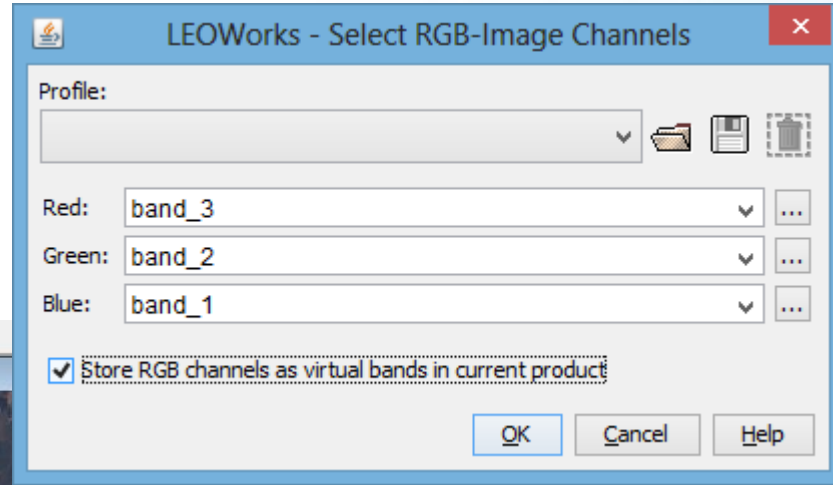
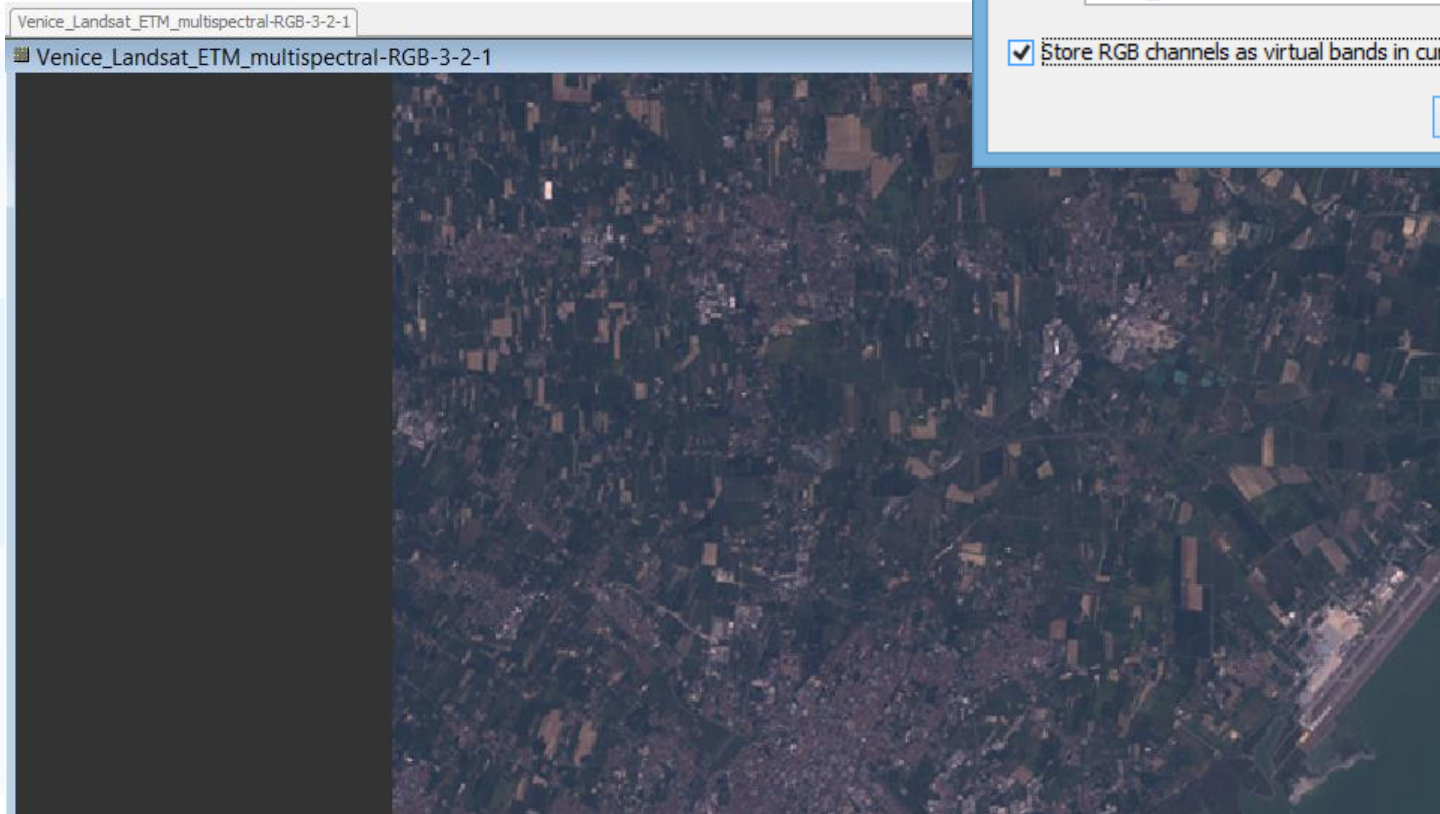


**RGB-Mixer (Color Mixer)**

<https://www.programming.de/download/archive/rgbmixer.zip>

# LEOWorks – RGB Görüntü Oluşturma

➤ View > New RGB View





# LEOWorks – Bant İstatistikleri

➤ Inspect > Statistics

Statistics x

band\_3 Statistics

|                              |        |
|------------------------------|--------|
| Total number of pixels:      | 518105 |
| Number of considered pixels: | 518105 |
| Ratio of considered pixels:  | 100.0  |
| Minimum:                     | 19     |
| Maximum:                     | 254    |
| Mean:                        | 61.75  |
| Median:                      | 55.88  |
| Std-Dev:                     | 19.78  |
| Variation:                   | 0.32   |

band\_2 Statistics

|                              |        |
|------------------------------|--------|
| Total number of pixels:      | 518105 |
| Number of considered pixels: | 518105 |
| Ratio of considered pixels:  | 100.0  |
| Minimum:                     | 19     |
| Maximum:                     | 254    |
| Mean:                        | 61.75  |
| Median:                      | 55.88  |
| Std-Dev:                     | 19.78  |
| Variation:                   | 0.32   |

band\_1 Statistics

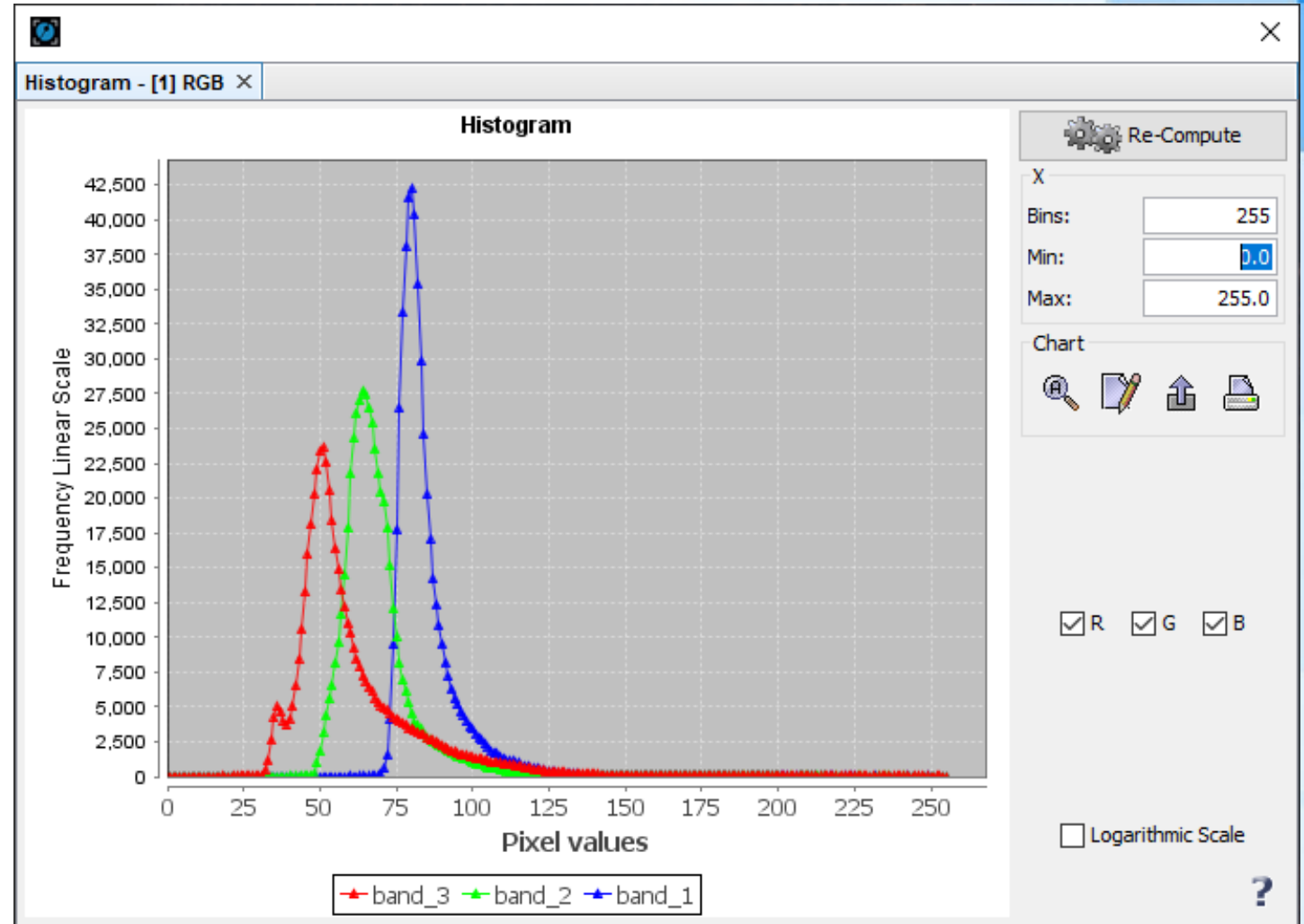
|                              |        |
|------------------------------|--------|
| Total number of pixels:      | 518105 |
| Number of considered pixels: | 518105 |
| Ratio of considered pixels:  | 100.0  |
| Minimum:                     | 19     |
| Maximum:                     | 254    |
| Mean:                        | 61.75  |
| Median:                      | 55.88  |
| Std-Dev:                     | 19.78  |
| Variation:                   | 0.32   |

Compute

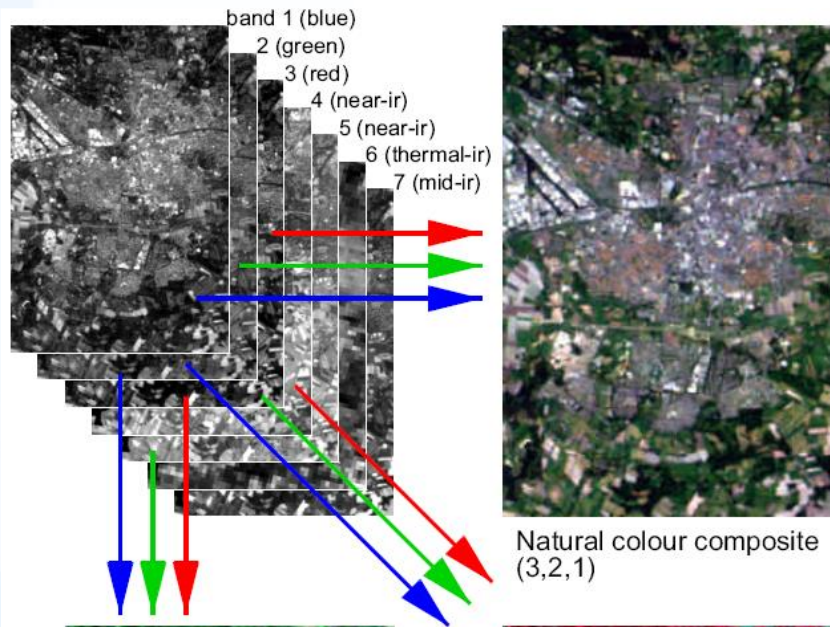
?

# LEOWorks - Histogram

➤ Inspect > Histogram



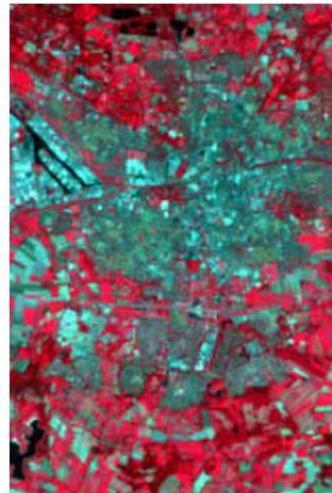
# Landsat 7 Bant Kombinasyonları



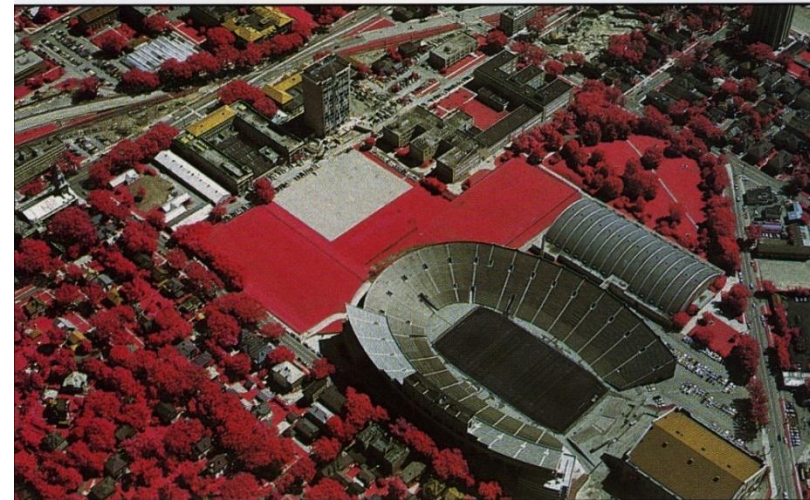
Natural colour composite  
(3,2,1)



Pseudo-natural colour  
composite (3,5,2)



False colour composite  
(4,3,2)





# Landsat 7 – True Color Image

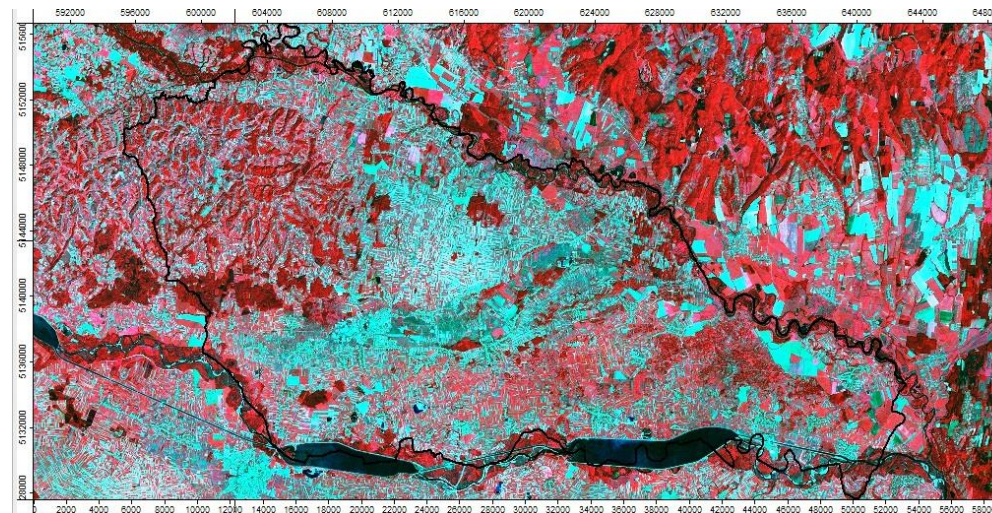
| <b>Ground Cover Type:</b> | <b>In Natural Color<br/>(3,2,1), appears:</b> |
|---------------------------|---|
| Trees and bushes          | Olive Green                                   |
| Crops                     | Medium to light green                         |
| Wetland Vegetation        | Dark green to black                           |
| Water                     | Shades of blue and green                      |
| Urban areas               | White to light blue                           |
| Bare soil                 | White to light gray                           |



<http://zlatko-horvat.com/landsat-data/>

# Landsat 7 – False Color Image

| <b>Ground Cover Type:</b> | <b>In False Color:<br/>(4,3,2), appears:</b> |
|---------------------------|--|
| Trees and bushes          | Red  |
| Crops                     | Pink to red                                  |
| Wetland Vegetation        | Dark red                                     |
| Water                     | Shades of blue                               |
| Urban areas               | Blue to gray                                 |
| Bare soil                 | Blue to gray                                 |



<http://zlatko-horvat.com/landsat-data/>



# Landsat 8 - Bant Kombinasyonlari

| Name                         | Description                          | Bands |
|------------------------------|--------------------------------------|-------|
| Natural Colour               | <i>"True" Colour visualization</i>   | 4-3-2 |
| Colour Infrared (Vegetation) | <i>Vegetation appears bright red</i> | 5-4-3 |
| Short Wave Infrared (urban)  | <i>Urban structures appear blue</i>  | 7-6-4 |
| Agriculture                  | <i>Crop monitoring</i>               | 6-5-2 |
| Geology                      | <i>Emphasizes geological forms</i>   | 7-6-2 |
| Water/Land                   | <i>highlights water bodies</i>       | 5-6-4 |
| Bathymetric                  | <i>for estimating sediment</i>       | 4-3-1 |

<https://www.avenza.com/tag/false-colour/>

# Common Landsat Band Combinations

Images: Landsat 8 Path 46 Row 27 acquired August 23, 2020. Band numbers displayed as R,G,B.

## Natural Color



|                 |       |
|-----------------|-------|
| Landsat 8/9 OLI | 4,3,2 |
| Landsat 7 ETM+  | 3,2,1 |
| Landsat 4-5 TM  | 3,2,1 |
| Landsat 4-5 MSS | N/A   |
| Landsat 1-3 MSS | N/A   |

## Color Infrared (CIR)



|                 |       |
|-----------------|-------|
| Landsat 8/9 OLI | 5,4,3 |
| Landsat 7 ETM+  | 4,3,2 |
| Landsat 4-5 TM  | 4,3,2 |
| Landsat 4-5 MSS | 3,2,1 |
| Landsat 1-3 MSS | 6,5,4 |

## False Color (Urban)



|                 |       |
|-----------------|-------|
| Landsat 8/9 OLI | 7,6,4 |
| Landsat 7 ETM+  | 7,5,3 |
| Landsat 4-5 TM  | 7,5,3 |
| Landsat 4-5 MSS | N/A   |
| Landsat 1-3 MSS | N/A   |



### False Color (Vegetative Analysis)



|                 |       |
|-----------------|-------|
| Landsat 8/9 OLI | 6,5,4 |
| Landsat 7 ETM+  | 5,4,3 |
| Landsat 4-5 TM  | 5,4,3 |
| Landsat 4-5 MSS | 4,3,2 |
| Landsat 1-3 MSS | 7,6,5 |

### Shortwave Infrared



|                 |       |
|-----------------|-------|
| Landsat 8/9 OLI | 7,5,4 |
| Landsat 7 ETM+  | 7,4,3 |
| Landsat 4-5 TM  | 7,4,3 |
| Landsat 4-5 MSS | N/A   |
| Landsat 1-3 MSS | N/A   |

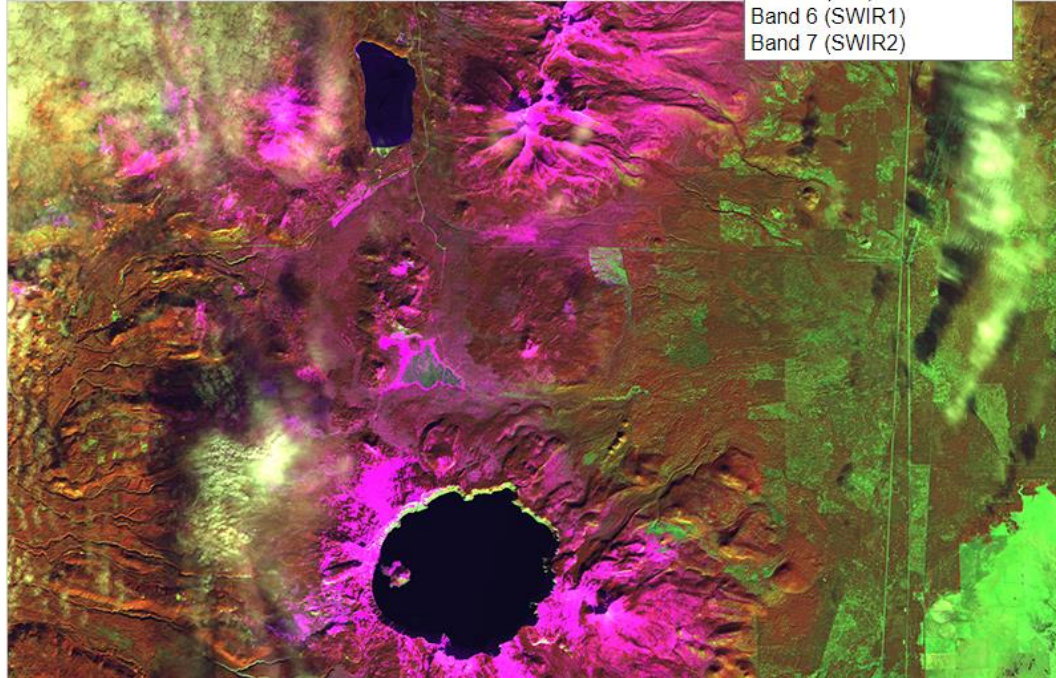
# Landsat 8 Bant Kombinasyonları - Örnek Web Uygulaması

## Exploring Band Combinations

You can explore the way different band combinations highlight different features by using the interactive tool below. Try some of the band combinations listed above and see how various land features look. The below image is focused on Crater Lake National Park in southwestern Oregon. The image was acquired by Landsat 8 in March 2014.

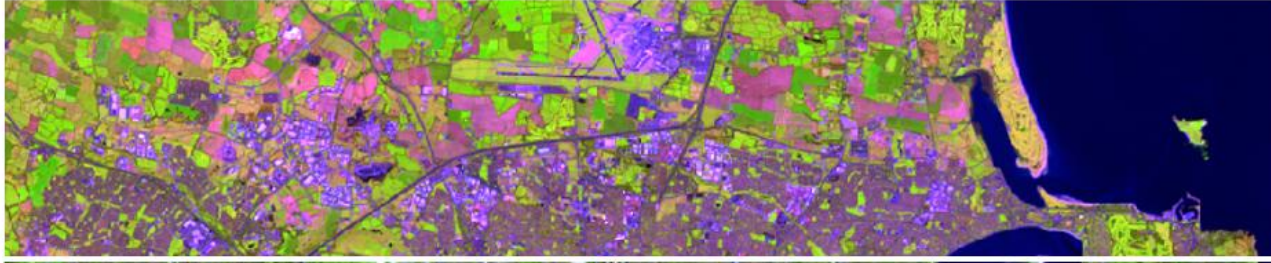
Red:  Green:  Blue:

- Band 1 (Coastal Aerosol)
- Band 2 (Blue)
- Band 3 (Green)
- Band 4 (Red)**
- Band 5 (NIR)
- Band 6 (SWIR1)
- Band 7 (SWIR2)





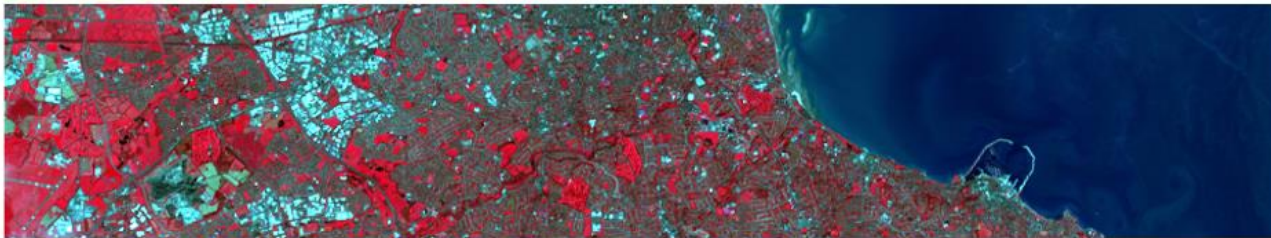
# Landsat 8 Bant Kombinasyonları Uygulaması



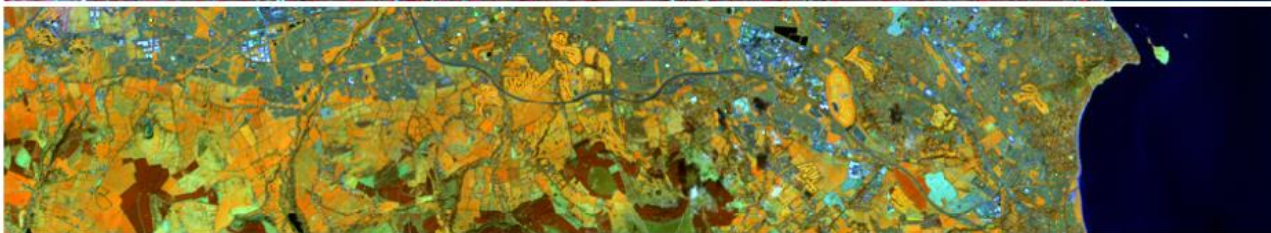
False Colour **6,5,2**  
Vegetation



False Colour **7,6,4**  
Urban



Colour IR **5,4,3**  
Vegetation



False Colour **5,6,4**  
Land/Water



# Landsat 8 Bant Kombinasyonları Uygulaması

- **6-5-2**: Tarım için faydalıdır. Sağlıklı mahsuller canlı bir yeşil renkteyken, tarım dışı mahsuller yeşilin alt tonları ve magentadaki çıplak topraklardır.
- **7-6-4**: Kentsel çalışmalarda kullanılan başka bir sahte renk türüdür. Doğal renge oldukça yakındır ancak bitkilendirilmiş alanlar ile kentsel alanlar arasında daha fazla fark vardır.
- **5-4-3**: Bitki örtüsü çalışmaları için çok kullanılır. Bitki örtüsü, kırmızının çeşitli tonlarından oluşur; daha koyu tonlar, geniş yapraklı ve daha sağlıklı bitki örtüsünün göstergesidir; açık kırmızılar ise daha seyrek bitki örtüsü veya otlak alanlarıdır.
- **5-6-4**: Kara ve su sınırlarını ayırmak için kullanılır. Aynı zamanda topraktaki nem farklılıklarını da gösterir (toprak ne kadar ıslaksa rengi o kadar koyu olur).

## Diğer Landsat 8 Bant Kombinasyonları

- **7-5-3**: Toprak ve bitki örtüsünün nem içeriğinin ve iç suların konumunun analizi. Bitki örtüsü yeşil görünür.
- **6-5-4**: Kentsel ve kırsal arazi kullanımlarının ayrılması; Kara/su sınırlarının belirlenmesi.
- **5-6-7**: Bulut, kar ve buzun tespiti (özellikle yüksek enlemlerde).