

Instructions

Name: _____

Country: _____

- Download the data (Landsat satellite imagery of Venice)
- Generate computerised colour images in
 - o True colour
 - o False colour
- Answer the questions

1) Data Download

Download all files from <http://download.terra.unimore.it/ieso/> and save them on the **Desktop** (double clicking on every file)

2) Open the satellite imagery

a) Start the **LEOWorks3.0** programme (clicking on the **Windows Start button**)

b) Open the following files and press **OK** on the **Image Preview** window (cf. Fig.1):

- *Venice_Band_1.tif* (channel 1, blue).
- *Venice_Band_2.tif* (channel 2, green)
- *Venice_Band_3.tif* (channel 3, red)
- *Venice_Band_4.tif* (channel 4, near infrared NIR)
- *Venice_Band_5.tif* (channel 5, short wavelength infrared SWIR)
- *Venice_Band_7.tif* (channel 7, short wavelength infrared SWIR)



Fig.1: Image Preview window

3) True-colour combination of spectral bands: generate a real colour image

• In the Menu bar click on: **Image → Combine from... → [Red Green Blue]**, a new window called **Combine RGB** appears (cf. Fig.2)

• On the three input windows select the bands:

- a) for red (*Select Red Band*) select *Venice_Band_3*,
- b) for green (*Select Green Band*) select *Venice_Band_2*
- c) for blue (*Select Blue Band*) select *Venice_Band_1*.

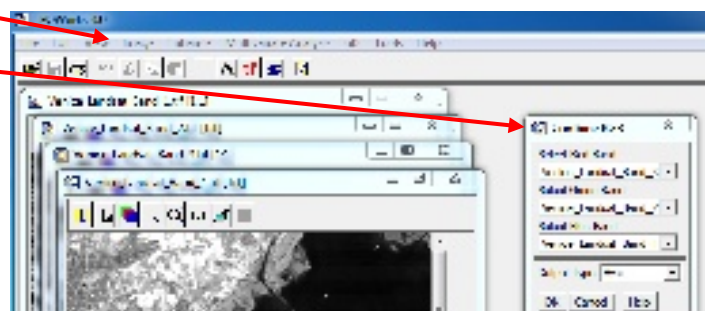


Fig.2: Combination of the spectral bands

- Clicking **OK** the combined true-colour image appears.
Keep it open in order to compare it with the next results.

4) False-colour combination: generate an infrared false colour image

- Repeat the steps of point 3) choosing now the following association of spectral bands (cf. Fig.3):
 - a) for red select *Venice_Band_4*,
 - b) for green select *Venice_Band_3*
 - c) for blue select *Venice_Band_2*.

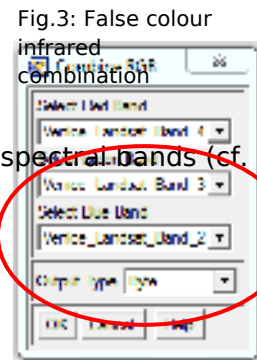


Fig.3: False colour infrared combination

- Clicking on **OK** you obtain now an infrared false colour image of Venice.
Keep it open in order to compare it with the next results.

5) Try another combination: generate a different false colour image using other spectral bands (754)

- Repeat the steps of point 3) choosing now this association of spectral bands (cf. Fig.4):
 - a) for red select *Venice_Band_7*,
 - b) for green select *Venice_Band_5*
 - c) for blue select *Venice_Band_4*.

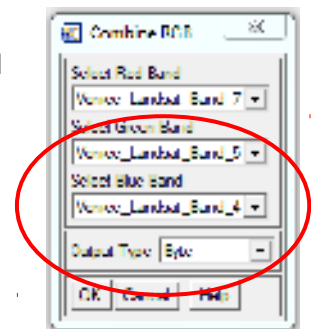


Fig.4: False colour 754 combination

- Clicking on **OK** you obtain now a different false colour image of Venice.

You have now created three different combined images of the same subject. Observe and compare them in order to answer the following questions.

Questions

**Only one answer per question is correct, mark the right one.
Every right answer corresponds to 0.35 points. 15'**

The LANDSAT system constitutes the longest continuous record of the Earth surface

- 1) The Landsat satellite is
 - a) polar
 - b) geostationary
- 2) Landsat is used
 - a) for weather applications
 - b) land use
 - c) to constantly monitor a localised region on the Earth surface
 - d) none of them

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The geometrical resolution of an image is the size of the pixels in meters.

- 3) Given that the Landsat images cover an area of 20 km × 20 km and that there are 500×500 pixels in the image, which is its resolution?
 - a) 20
 - b) 40
 - c) 400
 - d) no answer is correct

In this practical activity you used different spectral bands, every single image reflects a part of the electromagnetic spectrum

- 4) Which of the following bands are outside the visible spectrum?
 - a) red
 - b) red and NIR
 - c) near and middle infrared
 - d) green and blue

The combined images are, respectively, true- and false-colour combinations of the three visible channels red, green, blue, or further spectral channels of a Landsat scene.

- 5) False-colour images are used to
 - a) increase the interpretability of satellite images
 - b) provide visually impaired people a mean for detecting the same features in land use

Comparing the combined images obtained from steps 3), 4), 5) in the Instruction sheet:

- 6) The colours of the different features of the soil depend on the bands selected for the combination, because every object has its own radiation characteristics
 - a) true;
 - b) false
- 7) Which channel is best suited to give information regarding vegetation?
 - a) green
 - b) infrared
 - c) red
 - d) none of them
- 8) The infrared range is very useful for interpreting the Earth's surface because
 - a) it consists of reflected and emitted energy
 - b) it gives information about the vitality/health status of the vegetation
 - c) none of them
 - d) both of them

Referring to the image obtained combining the spectral bands 7, 5, 4:

- 9) For which application is this combination useful?
 - a) to detect coast lines and shores that are well defined due to this combination
 - b) to find textural and moisture characteristics of soils
 - c) both of them
 - d) none of them
- 10) In combined image 754, vegetation appears to be
 - a) red

- b) green
- c) blue