18 FROM SATELLITE DATA TO IMAGES



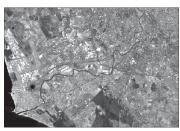
1a. Sentinel-2, band 2 (490nm, blue).



1b. Sentinel-2, band 3 (560nm, green).



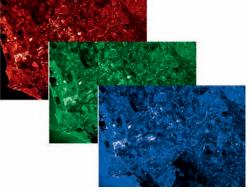
1c. Sentinel-2, band 4 (665nm, red)



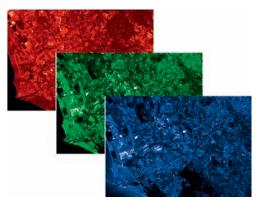
1d. Sentinel-2, band 5 (705nm, red).



- 1e. Sentinel-2 band 8 (865nm, IR).
- 4. Electromagnetic spectrum, atmospheric transmission, properties of selected sensors



2a. Sentinel-2, bands 4, 3, and 2 prepared for combination into a true colour image.



2b. Sentinel-2, bands 8, 4, and 3 prepared for combination into a false-colour infrared image.

From Data to Images

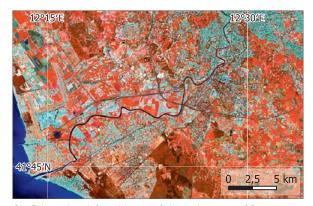
Most Earth observation satellites do not deliver standard colour images. They rather acquire series of greyscale images in different parts of the electromagnetic spectrum. These image bands are used for scientific evaluations, and, similar to the procedures applied in printing and display technology, they are combined to produce colour images of various types.

Different from usual photography, the greyscale image bands are combined in various ways. Depending on the application, images are produced in natural colours (true-colour image), false-colour infrared and other band combinations.

100% Spectral reflectance	Snow					IR = infrared							
80%		\backslash		s sand ground			NIR = near infrared MIR = middle infrared						
60%		M	Argillaceous				WV = water vapour						
40%		M										+	
20% Water	-	M	Vegetation									+	
0% 100pm	100nm				10um 100um			1,000µт =1mm 1cm			Wavelength 10cm		
100% Ultraviolet		IR MIR	, The	rmal IR		Far IR		and p		micro	waves		<u>, (111</u>
Idealised solar irradiation (blackbody, 6,000K, top of atmosphere) 0%	Visible	1 ultispectrol	hermal sca scanners	nners		Atmospheric Transmission	Radar ban	ds 🕌	. к І	<u>к, х</u>	С	s	L
10 ¹⁶ 10 ¹⁵			1014	1013		1012	10"			1	010 Freque	ency i	(Hz)
Meteosat MTG FCI													
Sentinel-3 OLCI													
Landsat OLI	mode												
Sentinel-2	00000000												
WorldView-3												T	
Sentinel-1											I	T	
Envisat ASAR											1	+	



3a. True colour image of the region west of Rome produced using the bands 4, 3, and 2. Data: Sentinel-2, 2022-03-21.



3b. False-colour infrared image of the region west of Rome produced using the bands 8, 4, and 3. Sentinel-2, 2022-03-21.



3c. False colour infrared image of the region west of Rome produced using the bands 12, 11, and 4. Sentinel-2, 2022-03-21.

True colours and False-colour infrared Images

While true colour images are used to show the Earth "as it is" (i.e. as it would appear to the human eye) for mapping and illustration purposes, other representations are used to highlight specific properties of the displayed area.

Important additional information is contained especially in the infrared image bands. This information is used e.g. to highlight and to analyse properties of plants, because the chlorophyll contained in the leaves reflects the infrared part of the sunlight very well. This makes this data a valuable information source for applications in agriculture and nature protection.

Other uses for false-colour infrared representations using other infrared bands include analyses of fires and volcanic activities, and of properties of urban spaces.

EARTH OBSERVATION