

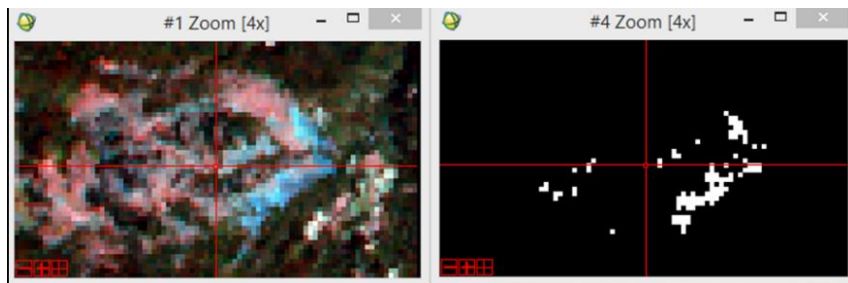
Correction of effects due to the ground/atmosphere interactions

Correzione degli effetti dovuti alle interazioni terra/atmosfera

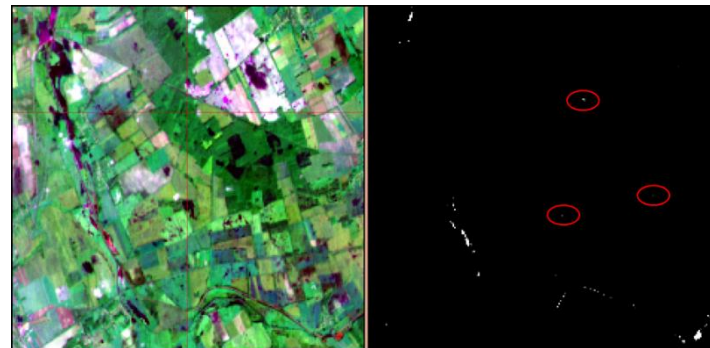
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Angelo Palombo
IMAA-CNR

SAP4PRISMA - ASI

- Depth study of issues related to the atmospheric correction
- Improvement of SAP4PRISMA Products



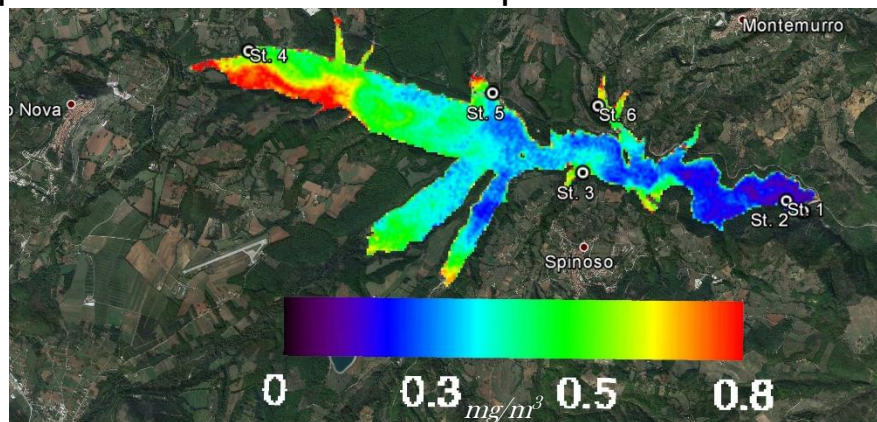
Hyperion natural asbestos map – Pollino park, Italy



Hyperion Red dust map – Ajka, Hungary

SIMBA - Appennino Lucano Park authority

- Improvement of inland water products

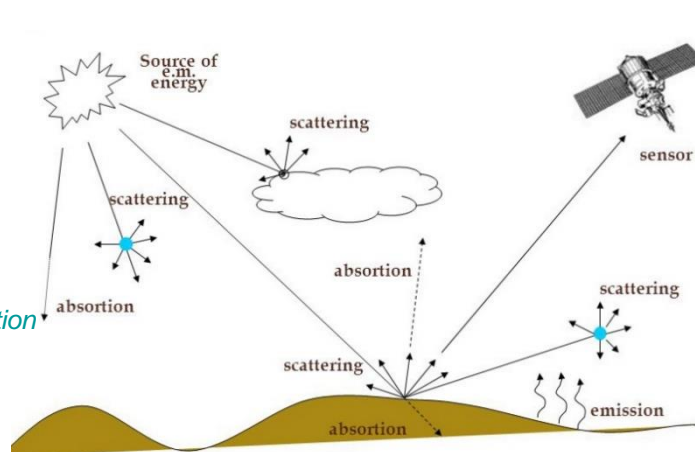


Landsat 8 Chl map - Pertusillo lake, Basilicata, Italy

Includes multiple soil/atmosphere interaction

$$L = \frac{A\rho}{1 - \rho S} + L_a$$

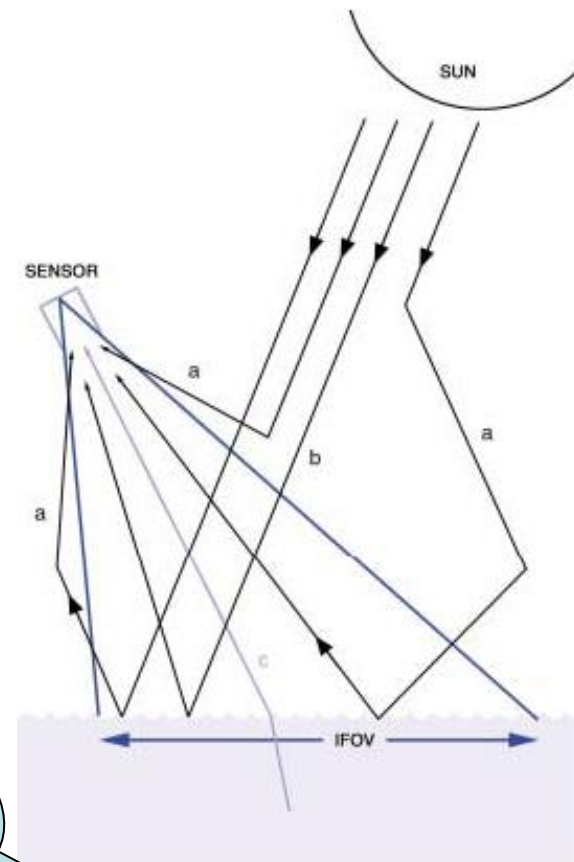
Preliminary Model



Includes adjacency effects

$$L = \frac{A\rho}{1 - \rho_e S} + \frac{B\rho_e}{1 - \rho_e S} + L_a$$

Intermediate Model

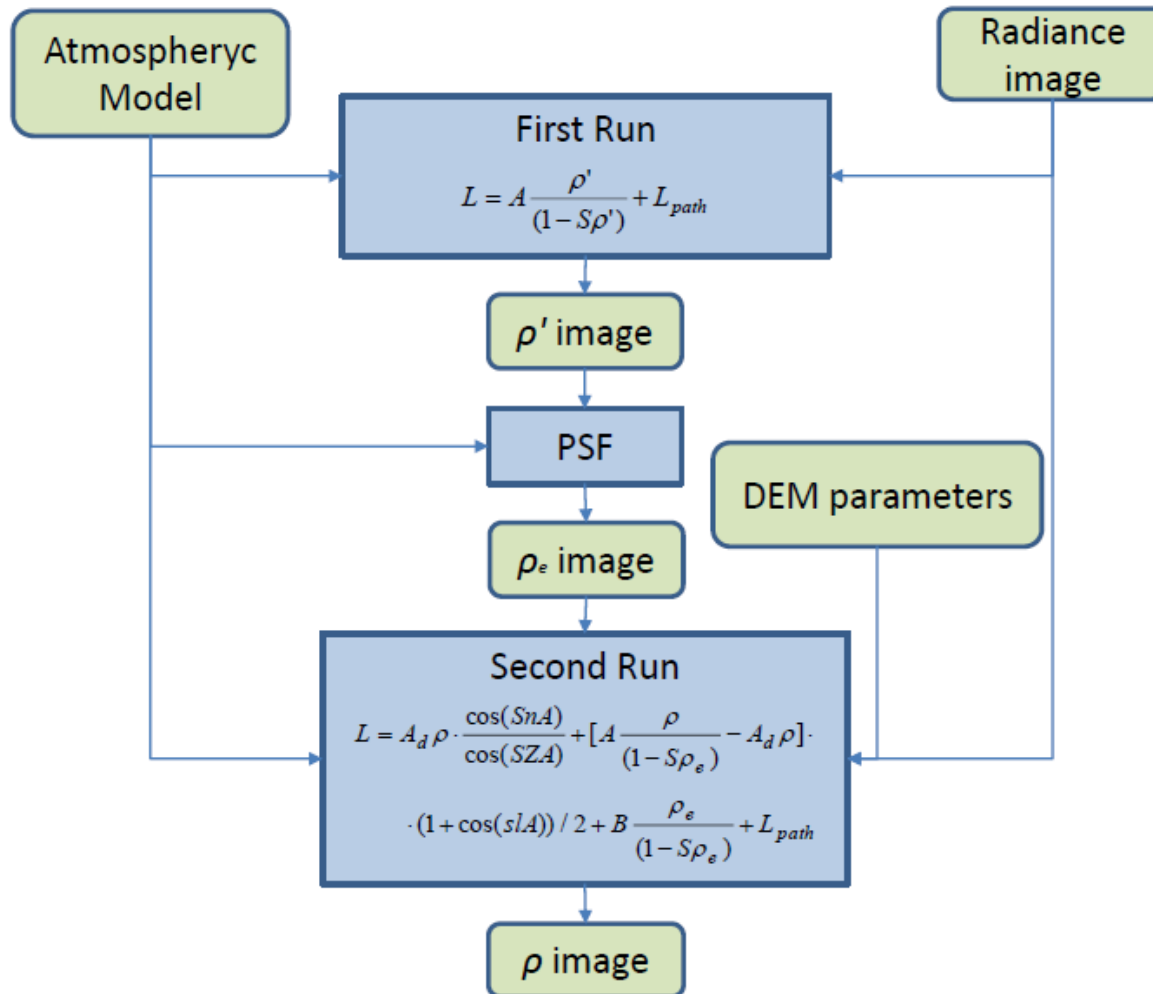


Advanced Model

$$L = A_d \rho \cdot \frac{\cos(SnA)}{\cos(SZA)} + \left[A \frac{\rho}{(1 - S\rho_e)} - A_d \rho \right] \cdot (1 + \cos(slA)) / 2 + B \frac{\rho_e}{(1 - S\rho_e)} + L_{path}$$

Includes adjacency effects, DEM, ...

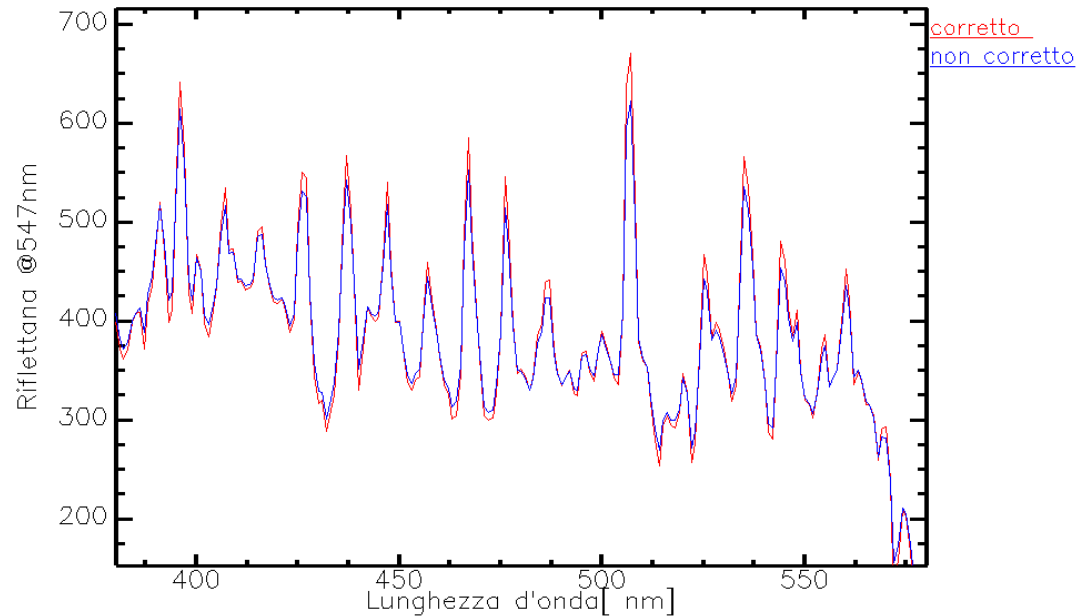
Process flow



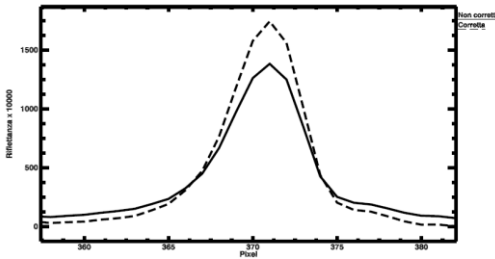
CASI 1500 - Metaponto, Italy



CASI images have been used to highlight correction effects on particular targets



White road

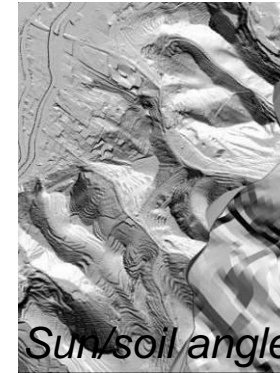
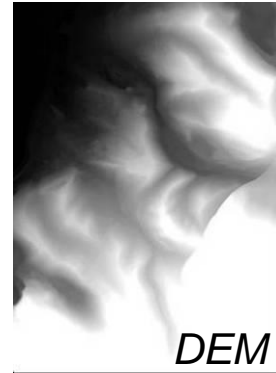


Rows

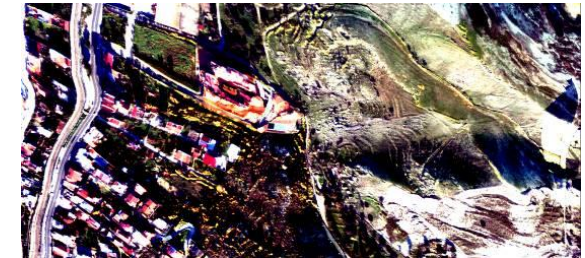
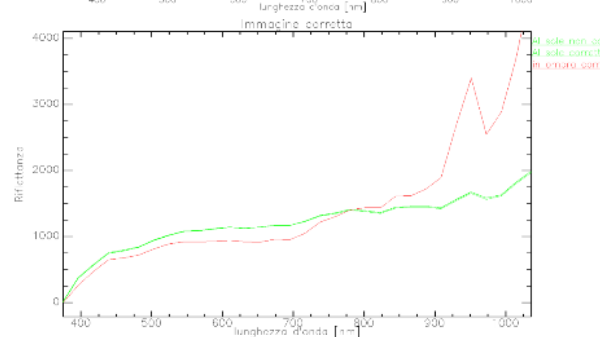
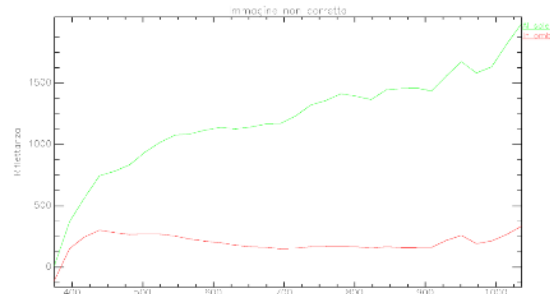
Comparisons of horizontal profiles on a reflectance images before and after adjacency correction highlight the contrast increment of the spatial features.

CASI 1500 – Reggio Calabria, Italy

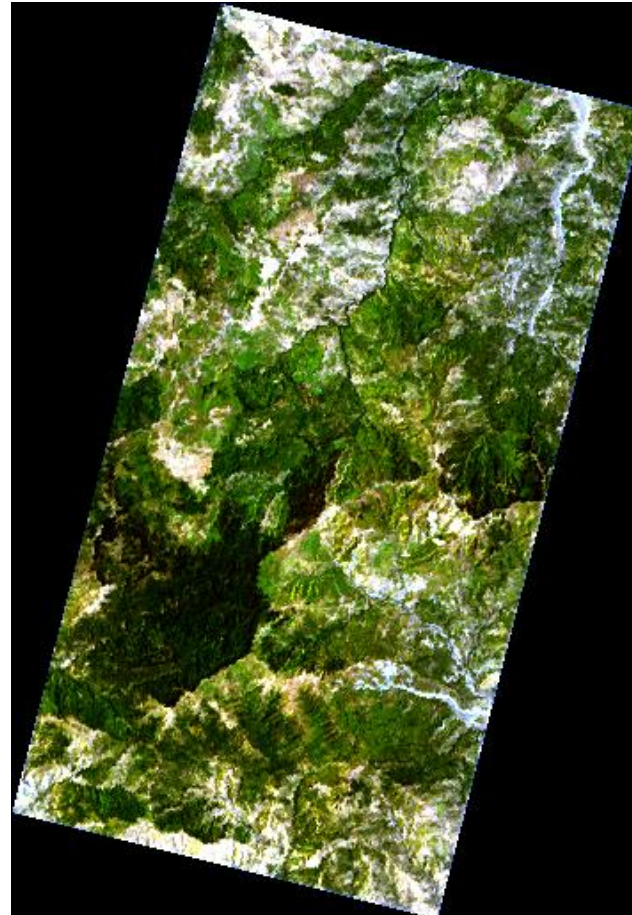
DEM Parameter



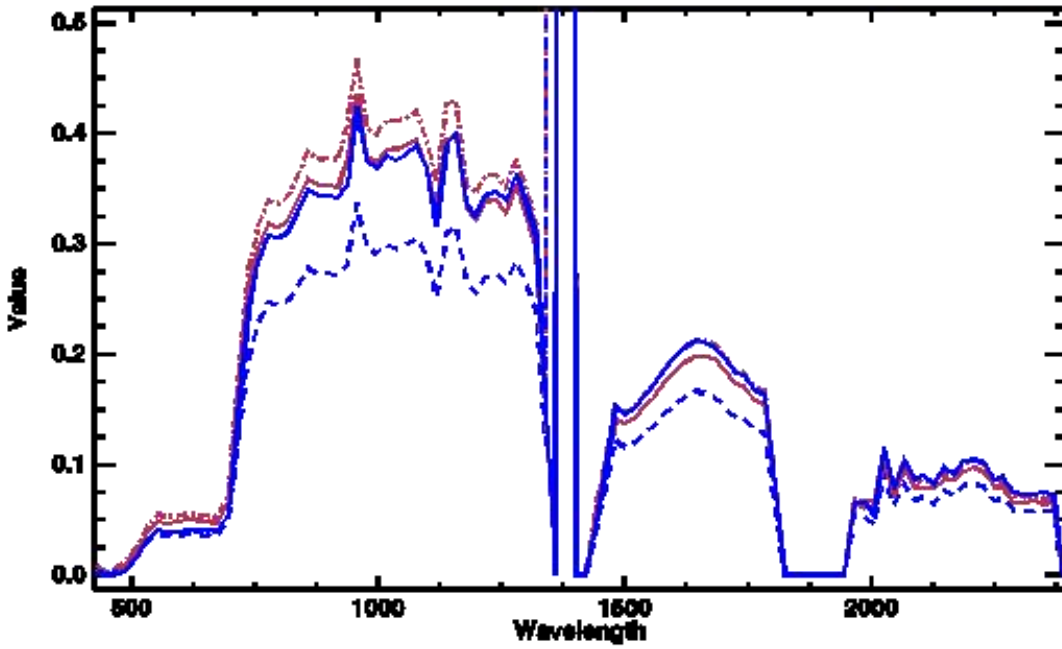
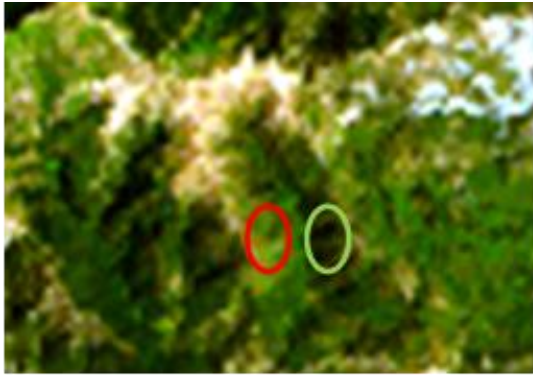
Shadows correction on CASI DATA



Hyperion – Nebrodi Mounts, Sicily, Italy

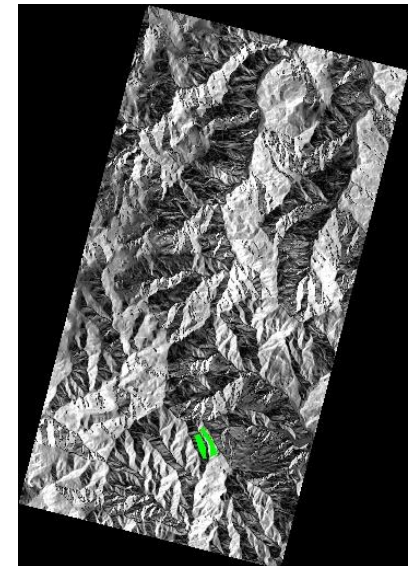


RGB reflectance image with and without DEM correction

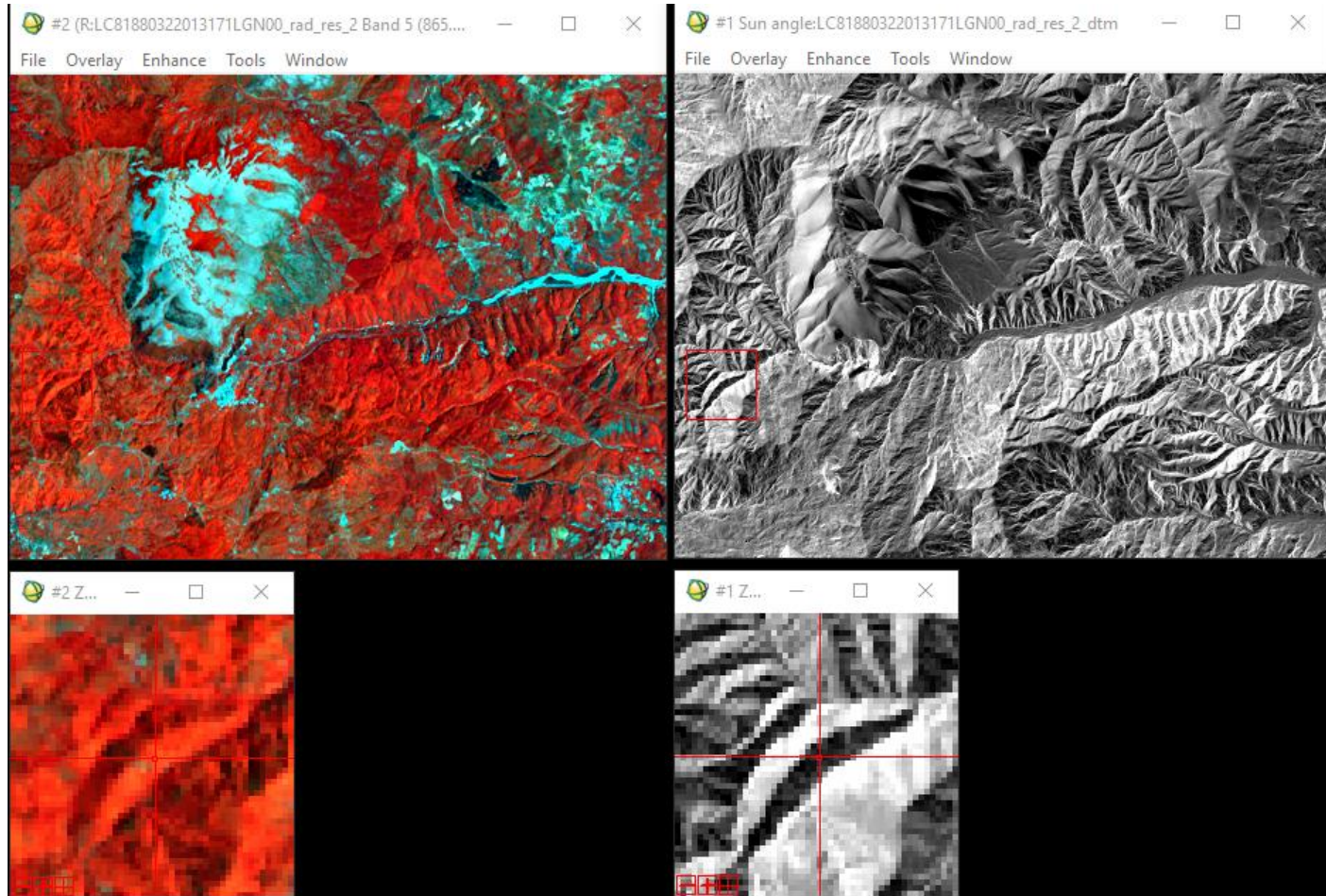


Nord-Est-No corr
Sud-Ovest-No corr
Nord-Est-No corr
Sud-Ovest-Corr

Vegetation spectra of slopes with different expositions, with and without topographic correction

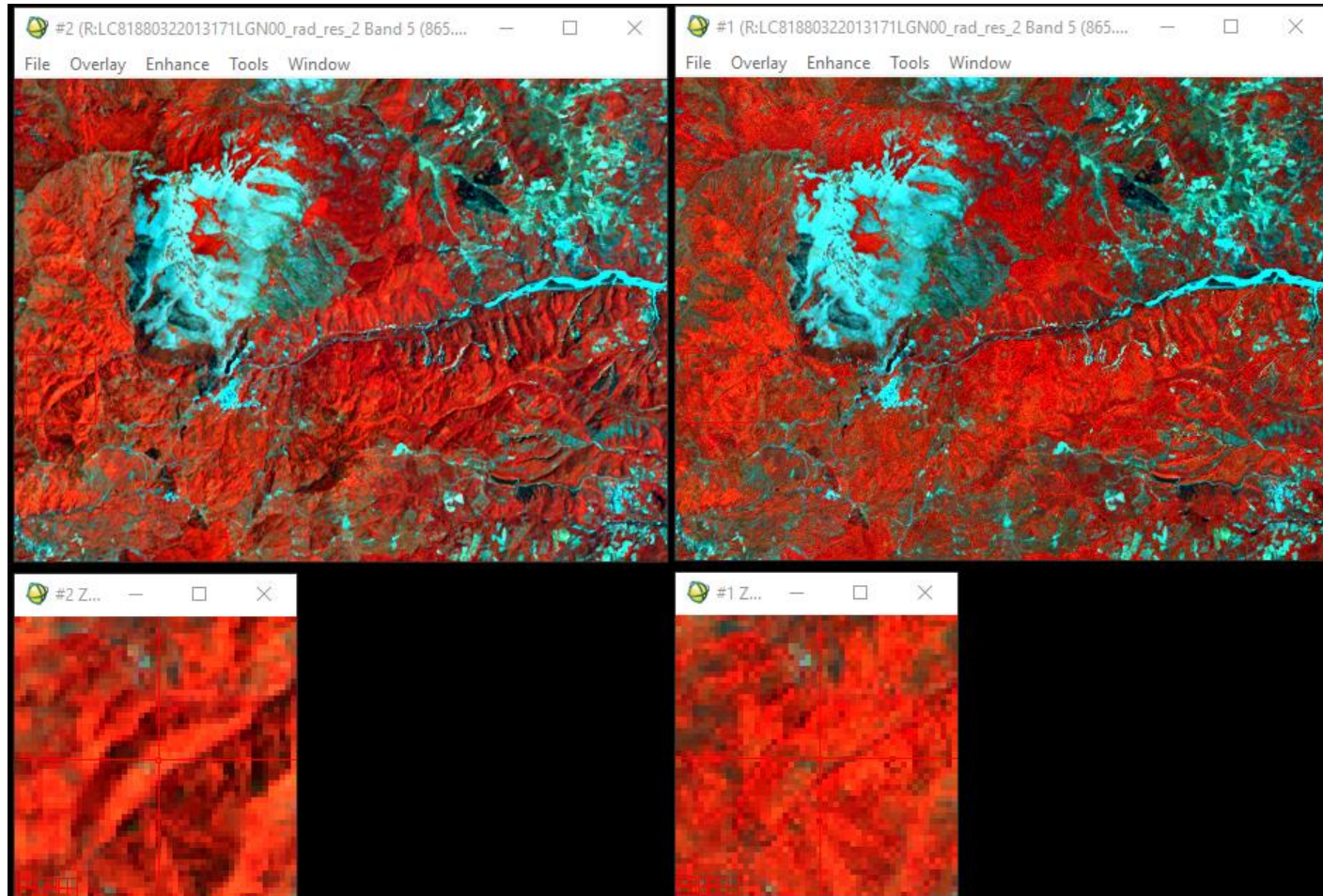


Landsat 8, Appennino Lucano National Park, Italy



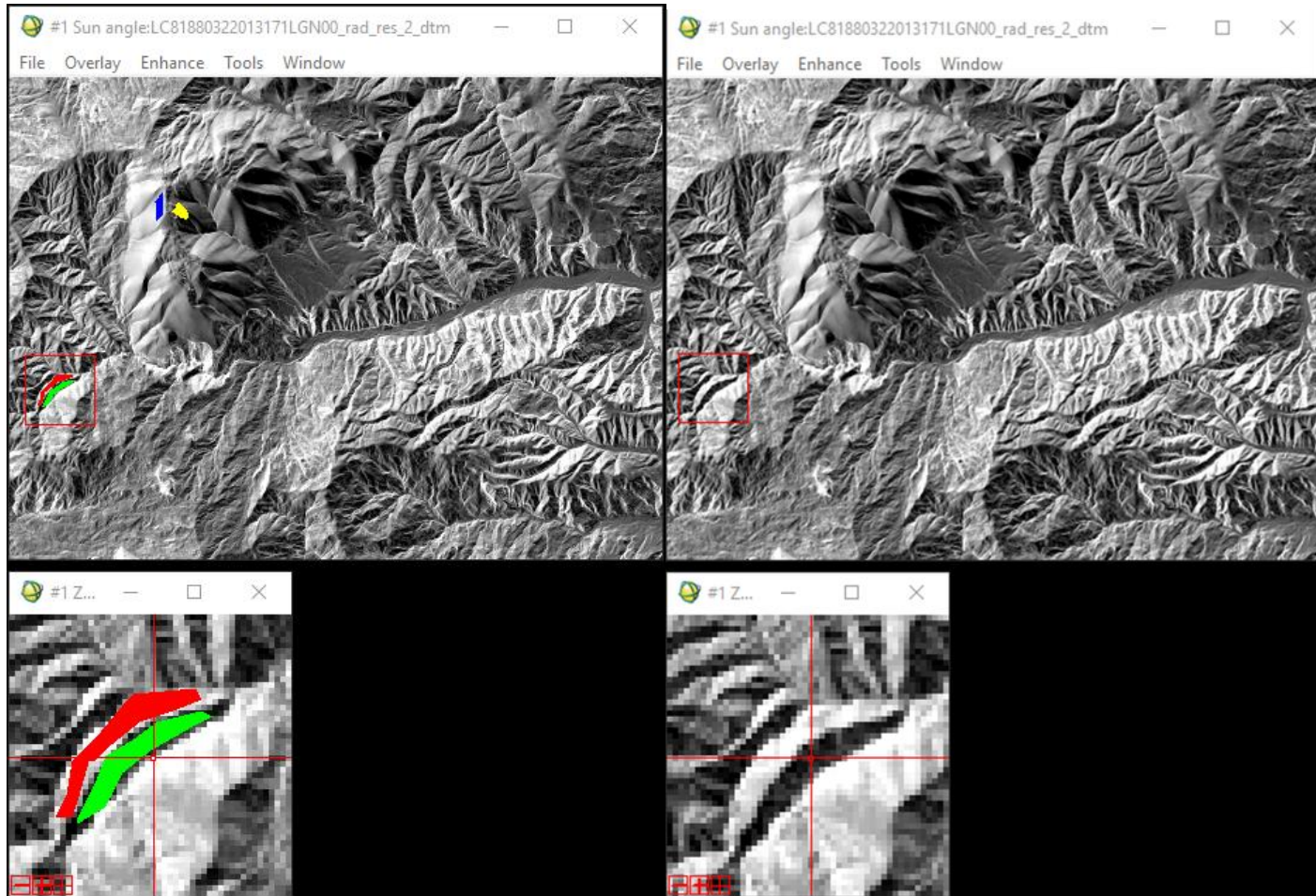
False colors image (R: 865 nm ; G: 561 nm ; B: 482 nm) highlighting topographic effects

Landsat 8, Appennino Lucano National Park, Italy

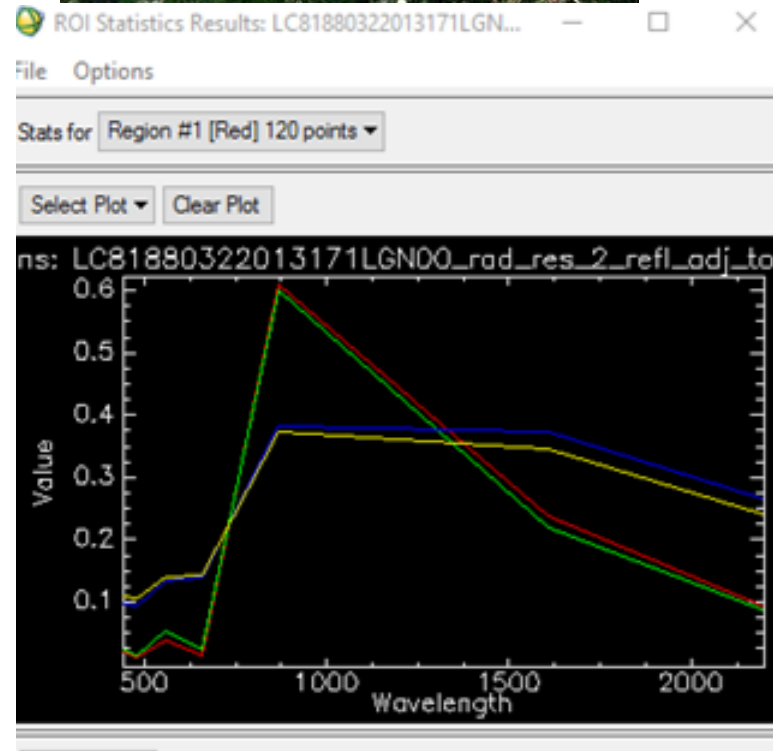
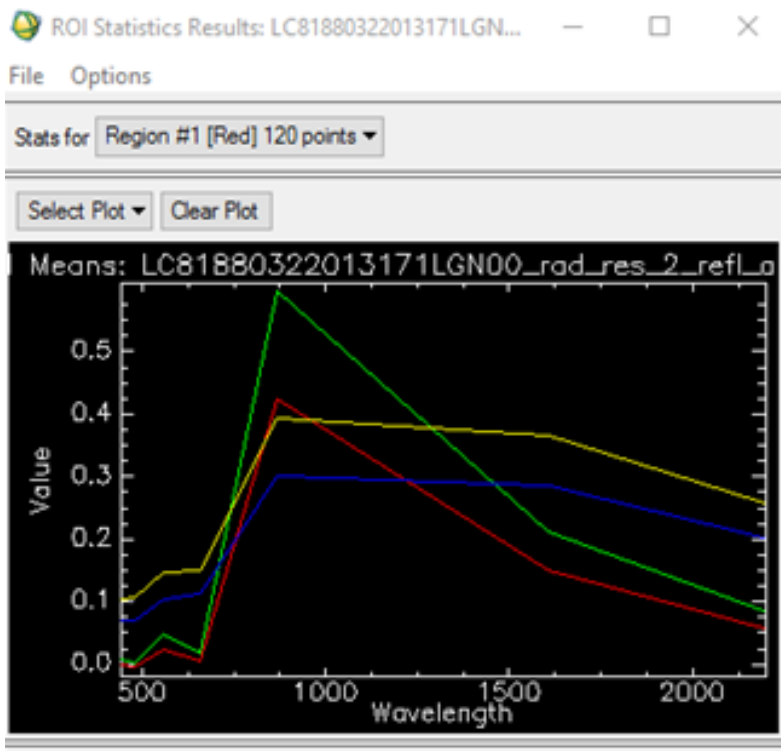


False colors reflectance image before (left) and after (right) topographic correction

Landsat 8, Appennino Lucano National Park, Italy

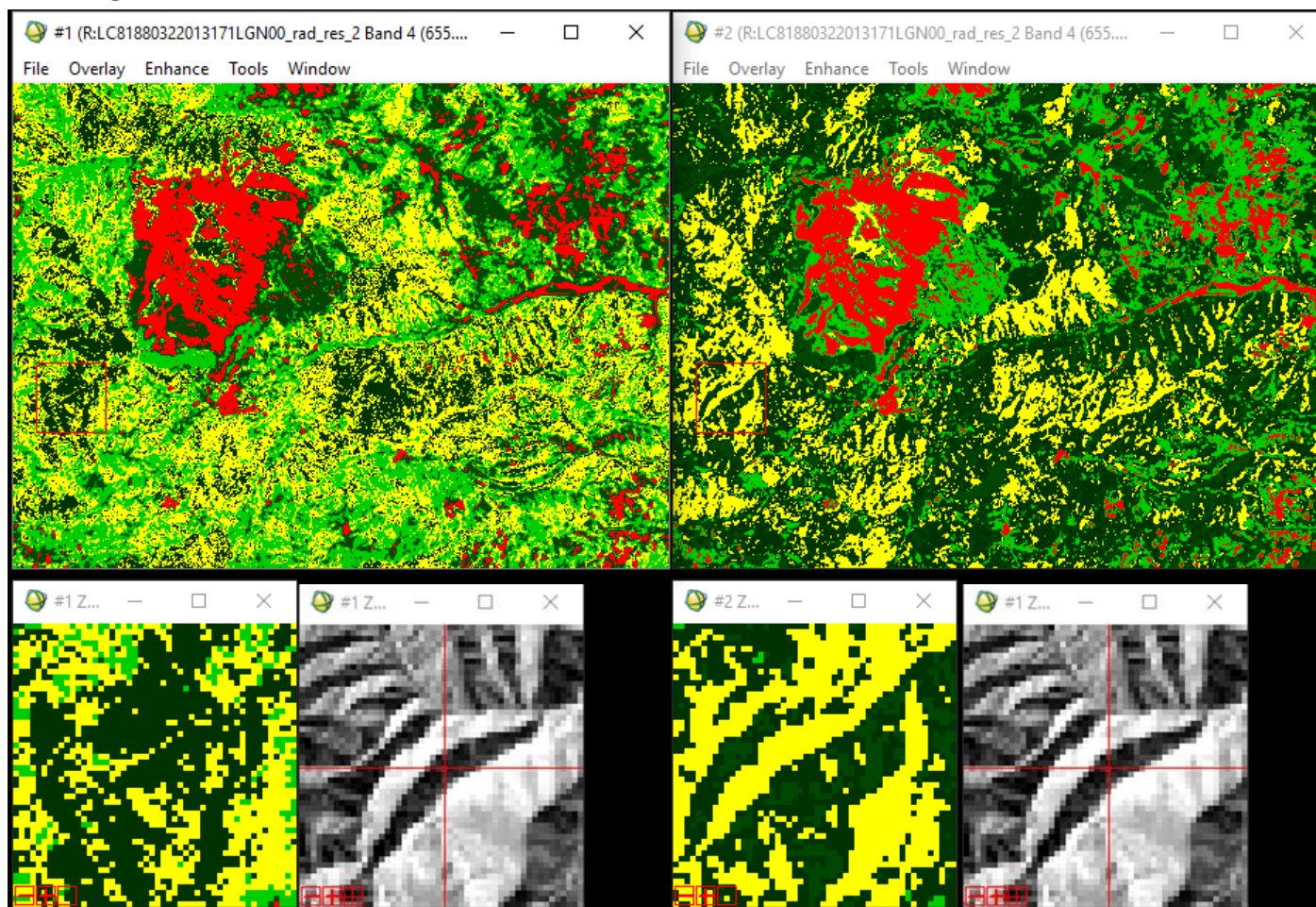


Two ROI couples have been selected to point out slope illumination effects on two different soil covers



Comparison between spectra belonging to different classes before and after topographic correction

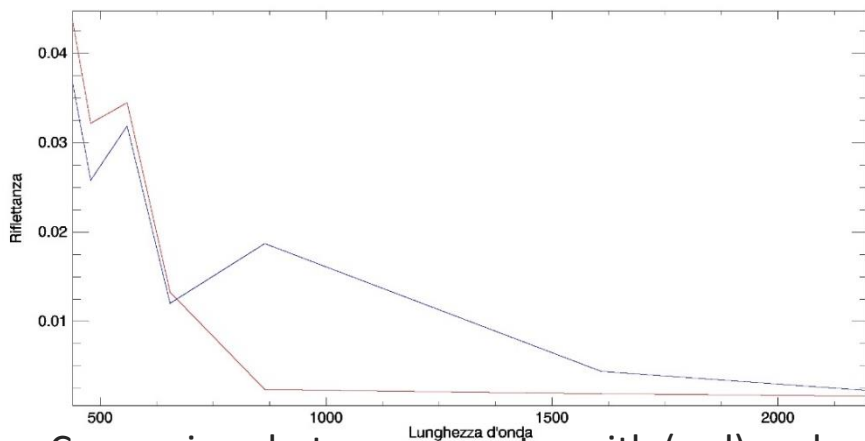
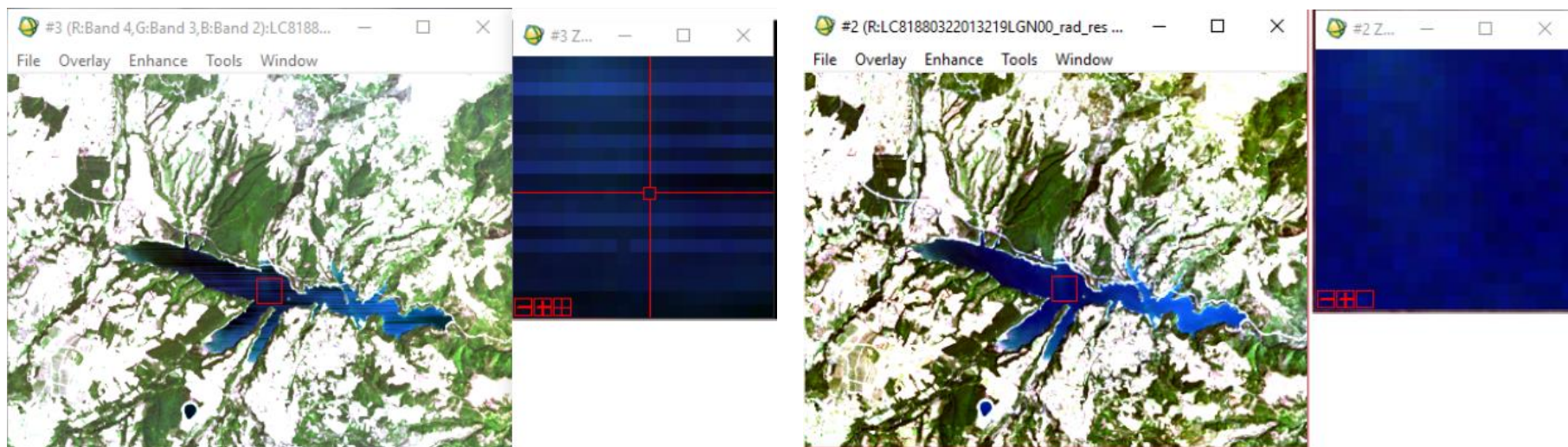
Impact of topographic correction on classification procedures



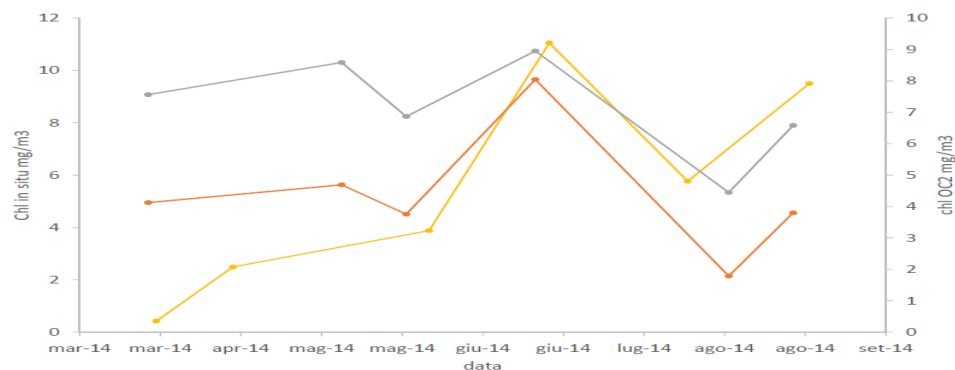
Unsupervised K-means classification before and after topographic correction

The correlation between DEM and classification noteworthy decreases after topographic correction

Landsat 8, Appennino Lucano National Park, Italy – Pertusillo lake



Comparison between spectra with (red) and without (blue) adjacency correction



Mean chlorophyll behavior between 2013 March and 2014 August: in situ (yellow), OC2 USGS (grey), OC2 after atmospheric correction

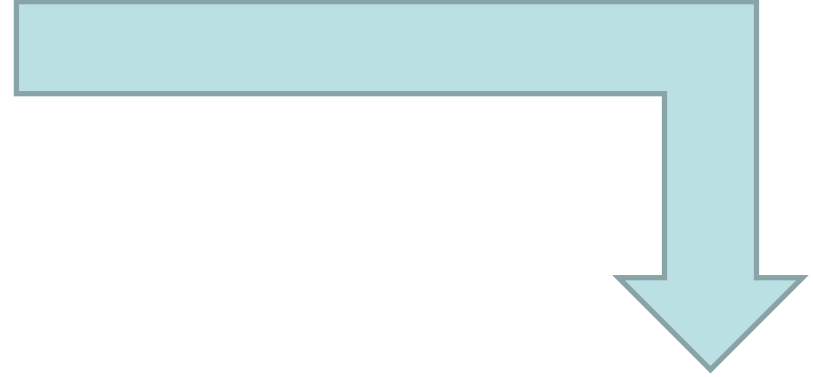
Software interface

The screenshot displays the software interface with several overlapping windows:

- GrAtCor**: Main application window showing file paths for Radiance and Reflectance files.
- CARD 1**: Configuration window for MODTRAN parameters:
 - MODTRN: T
 - SPEED: [empty]
 - MODEL: 2
 - ITYPE: 2
 - IEMSCT: 2
 - IMULT: -1
 - M1-M6: 0
 - MDEF: 0
 - M: 0
 - NOPRNT: 0
 - TPTEMP: 0.000000
 - SURREF: 0.90
- CARD ...**: Configuration window for atmospheric parameters:
 - H1: 0.521000
 - H2: 0.520000
 - ANGLE: 23.7271
 - IDAY: 171
 - RO: 0.000000
 - ISOURC: 0
 - ANGLEM: 0.000000
- Running MODTRAN for image correction**: Progress dialog box showing 20% completion.
- FWHM Adj**: Window for selecting FWHM adjustment method:
 - Rigorous (not recommended because slow)
 - Parameterized (recommended)
 - User-defined
 - FWHM: [input field]
 - save
- Spectral responses function**: Window showing a graph of spectral responses. The x-axis is wavelength (0-2500) and the y-axis is response (0.0-1.2). The graph shows several peaks corresponding to different sensors. Below the graph is a field to choose a file containing wavelength and FWHM, and a 'Compute/acquire SRF' button.
- Table of control parameters**: A table listing various parameters and their status:

parameter	Status
radiance file selected	OK
reflectance file selected	OK
date set	OK
altitude set	OK
longitude set	OK
slanting height set	OK
hour set	OK
minutes set	OK
slanting azimuth set	OK
rad. conv. fact. set	OK
ref. fact. set	OK

Before correctio



Thank you for your attention

After correction

