Practical Session:
Remote Sensing and Wildfire Monitoring

The practical will consist of 3 sections:

1. MODIS imagery of Cape Town fires
2. Comparison between MODIS fire products and a Spot 2 scene
3. Fire detection with AFIS II

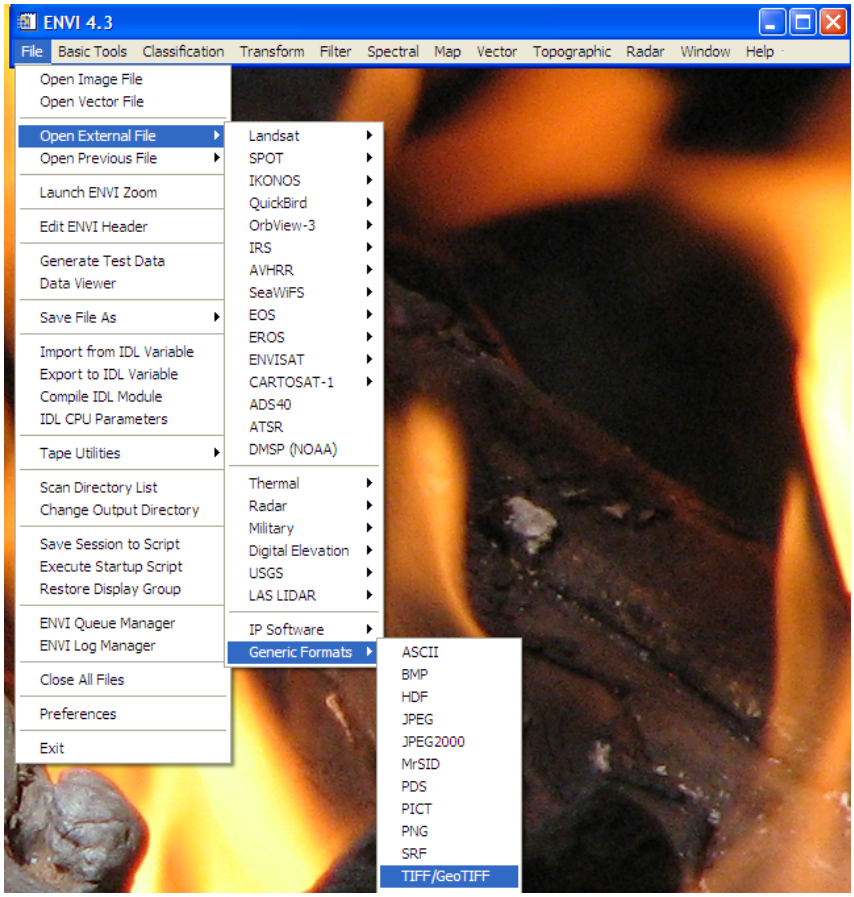
Cape fires, December 2008 (Lab 1)

The fire that began in Grabow on Saturday spread to the **Gordon's Bay** area by Monday and residents were evacuated. Many stood watching the 150 - 200 firefighters battling the blaze from below but several homes were damaged and at least 3 razed to the ground.

Task1:

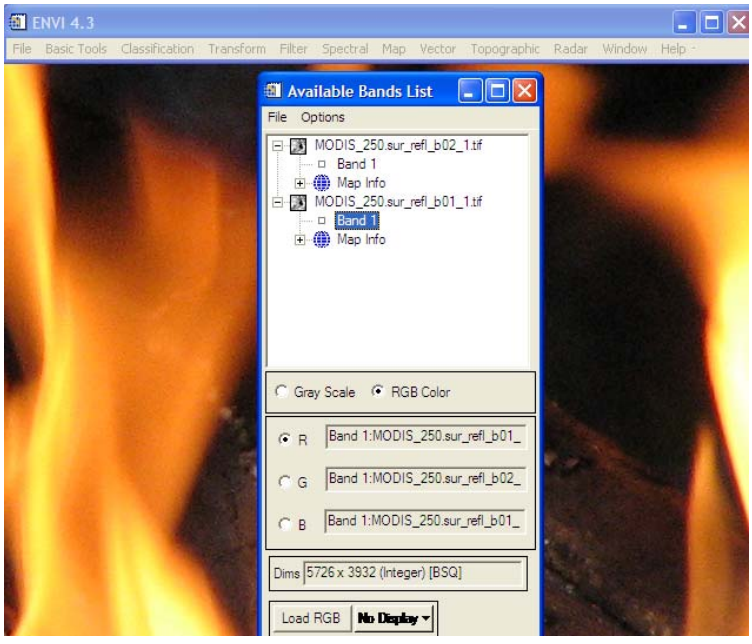
Open ENVI 4.6 and load channel 1 and channel 2 (250m) MODIS corrected surface reflectance images as GeoTiff

Go to C:\IGARSS09\Fire\lab1



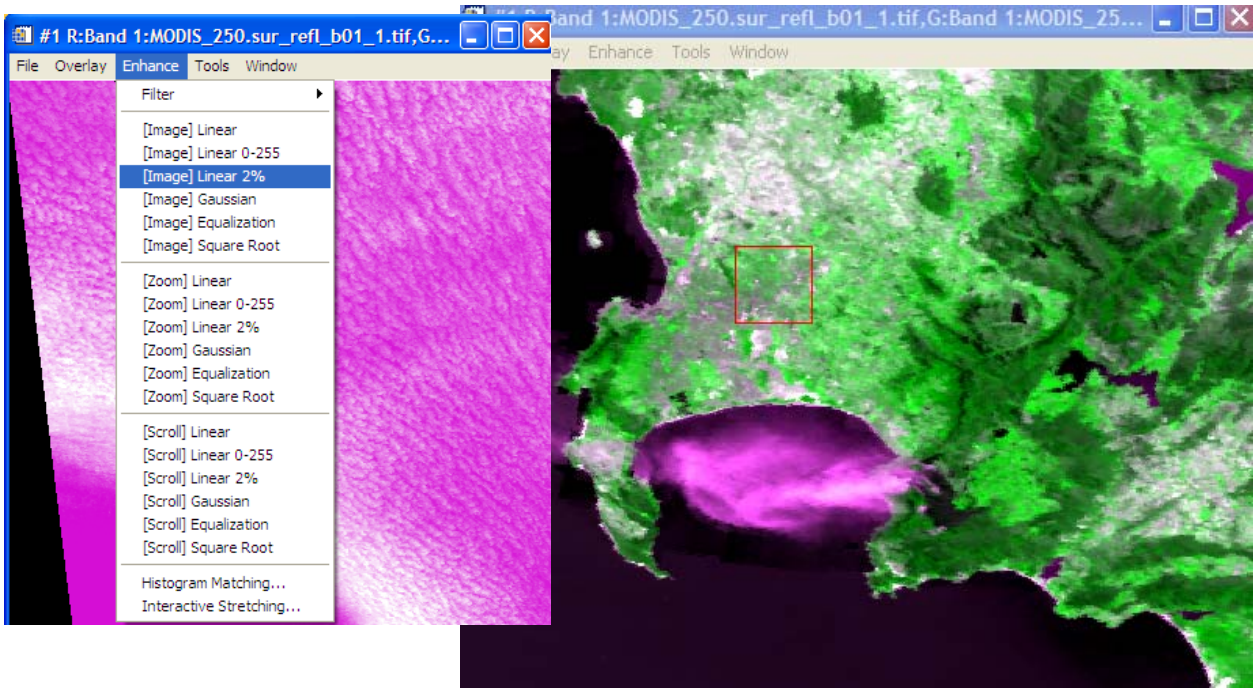
Task2:

Open MODIS channel 1 and channel 2 in a band 1:2:1 false colour composite and load RGB



Task 3:

Click in the scroll map on Cape Town and then use the Enhance option to do a 2% histogram stretch. A large fire will be visible east of Cape Town with a smoke plume drifting west



Task 4:

Continue by loading all 7 MODIS 500m images and evaluate the individual bands in relation to: (Rating bands from 0 – 5, 0 = poor, 5 = excellent)

1. Their ability to characterise the Gordons bay fire scar
2. Their ability to identify open flames (active fire pixels)
3. Their ability to detect the smoke plume

Task 5:

Evaluate different combinations of bands in R G B and provide a combination that best describes:

1. The fire scar
2. Active Fire
3. The smoke plume

MODIS bands

Primary Use	Band	Bandwidth
Land/Cloud Boundaries	1	620-670
	2	841-876
Land/Cloud Properties	3	459-479
	4	545-565
	5	1230-1250
	6	1628-1652
	7	2105-2155

Landsat Bands

Bands	**Wavelength**	**Application**
TM 1	0.45-0.52 (blue)	designed for water body penetration, making it useful for bathymetry/coastal mapping, also useful for soil/vegetation discrimination; cultural/urban feature identification
TM 2	0.52-0.60 green)	designed to measure green reflectance peak of vegetation for green vegetation mapping and vigor assessment; also useful for cultural/urban feature identification
TM 3	0.63-0.69 (red)	designed to sense in a chlorophyll absorption region aiding in plant species differentiation. Also useful for cultural/urban feature identification
TM 4	0.76-0.90 (near IR)	identification of plant/vegetation types, health, and biomass content; water body delineation; soil moisture discrimination
TM 5	1.55-1.75 (mid IR)	indicative of moisture in soil and vegetation; differentiate snow from clouds
TM 6	10.4-12.5 (thermal IR)	vegetation stress and soil moisture discrimination related to thermal radiation; thermal mapping (urban, water)
TM 7	2.08-2.35 (mid IR)	discrimination of mineral and rock types; sensitive to vegetation moisture content.

MODIS bands	Active fire	Burned Area	Smoke
Band 1 620-670			
Band 2 841-876			
Band 3 459-479			
Band 4 545-565			
Band 5 1230-1250			
Band 6 1628-1652			
Band 7 2105-2155			

MODIS product evaluation (Lab 2)

Sabie forest fires 2007

The MODIS product evaluation aims to provide an overview of the current MODIS fire products.

Available data sets

C:/IGARSS09/Fire/lab2

1. MODIS Corrected surface reflectance (MOD/MYD 09) 27, 28 and 29 July 2007

2. MODIS Active fires (MOD 14) July 2007

3. MODIS Roy Burned area (MCD43) July 2007

4. MODIS Louis Burned area July 2007

5. Spot 2 high resolution image 11 Aug 2007

Step 1: Open days 27 – 29 July 2007 of MODIS MOD/MYD 09 data and find the forest fire in Sabie

Step 2: Open Spot 2 high resolution image in ENVI

Step 3: Use the ROI tool to map the burned area and create a shapefile

Step 4: Open ArcMap and add the Roy burned area map

Step 5: Open the active fire product

Step 6: Look at the differences between the two products for different fires

Question1: Why in some cases do the burn area product and active fire product agree on area affected and some not at all?

Step 7: Switch off the Roy burned area and load the Louis burned area product.

Question 2: Do one see the same picture?

Step 8: Switch off the active fire product and toggle between the Roy and Louis burned area products

Question 3: Why do you see differences?

Step 9: Open the Spot burned area layer on top of the Roy and Louis products and review the difference

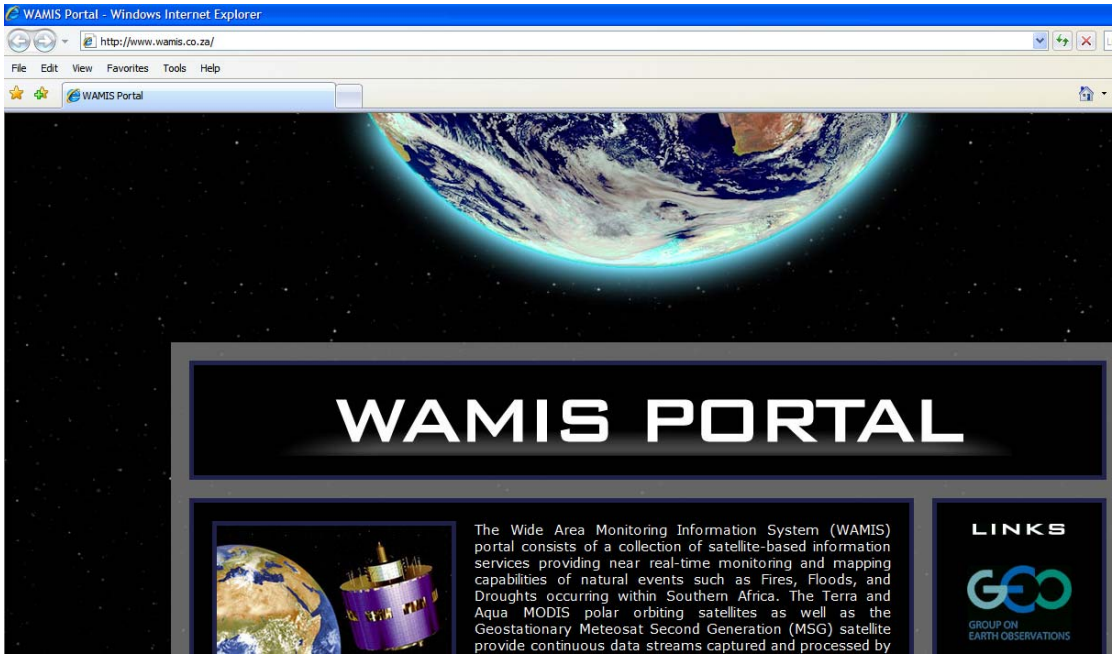
AFIS viewer (Lab 3)

Lab 3 will involve the live tracking of the MODIS Aqua overpass at 14:13 pm.

Step 1:

Open WAMIS portal

www.wamis.co.za



Step 2:

Open AFIS