Christian Abys

Terrestrial Carbon Dynamics

Professor Ranga Myneni

Labs 1-8

**Abstract and purpose:**

The purpose of these labs was to understand how the program GDAL can be used in conjunction with Python to extract and analyze satellite data. In this case, these programs were used to acquire satellite imagery, quantitively analyze leaf area index and corresponding drought conditions, and accurately depict the results. The study area for this lab was mainland Europe and the years that were analyzed were 2002 and 2003.

The average LAI for 2002 was 1.835 and for 2003 the average was 1.372. The average LAI for 2002 was 26% higher than in 2003. LAI in 2003 is clearly a much lower ratio and is represented by peaking at a ratio of leaf to ground at 1. In 2002, the LAI is much more spread out and more heavily influenced in LAI ratios between 1 and 4.
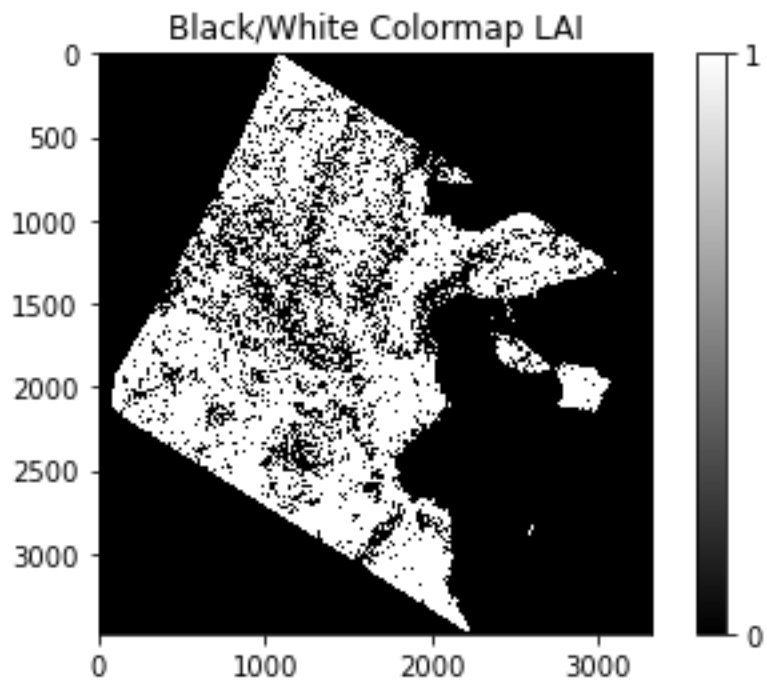
**Results:**

**Figure 1.**

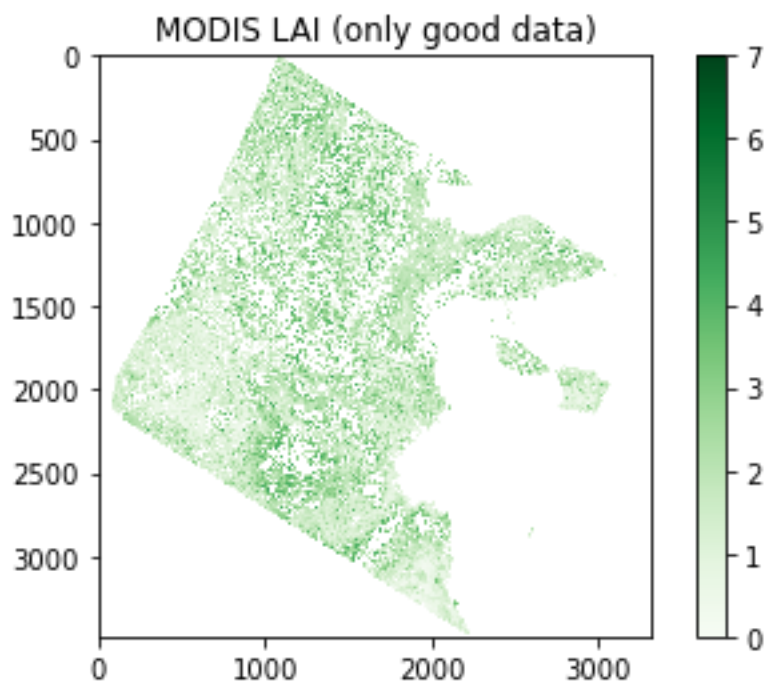Plotting LAI for valid pixels vs non valid pixels.



**Figure 2.**

Plotting LAI only for valid pixels. Conversion factor for converting DN values into Leaf Area Index
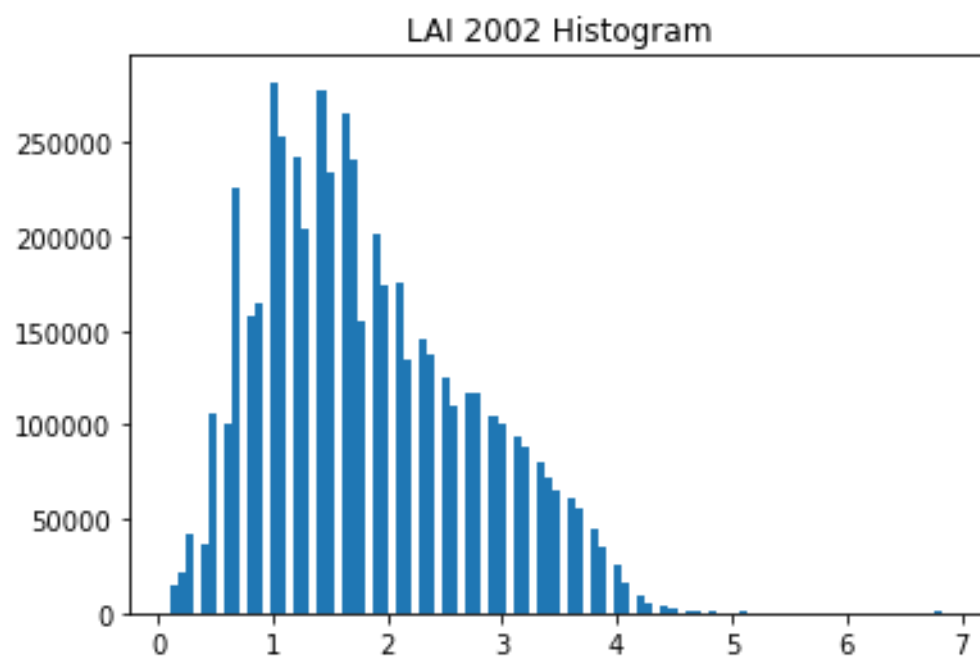
is 0.1. Takes in only "pixels".
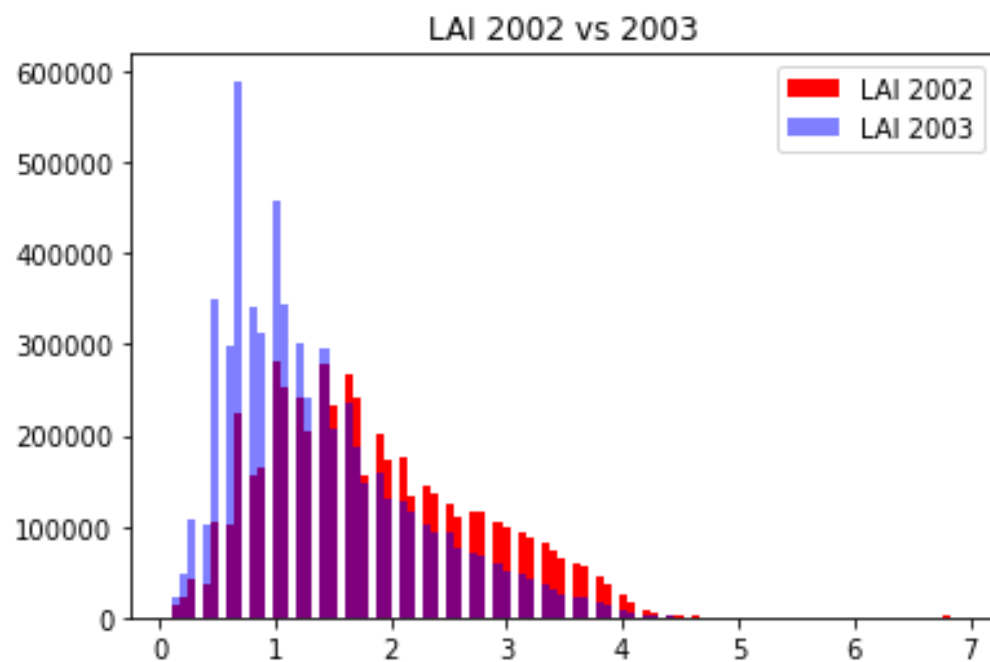
**Figure 3.**
Leaf Area Index Statistics 2002.



**Figure 4.**

This histogram depicts the Leaf Area Index of the year 2002 vs the year 2003. The average LAI for 2002 was was 1.835 and for 2003 the average was 1.372. The average LAI for 2002 was 26% higher than in 2003. LAI in 2003 is clearly a much lower ratio and is represented by peaking at a ratio of leaf to ground at 1. In 2002, the LAI is much more spread out and more heavily influenced in LAI ratios between 1 and 4.
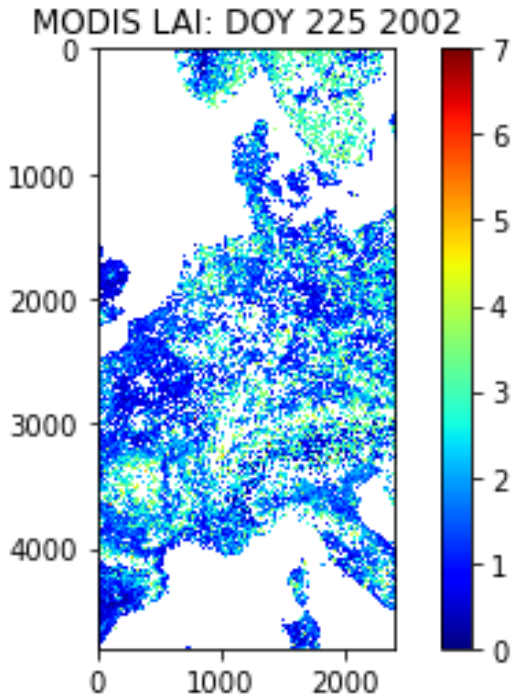


**Figure 5.**
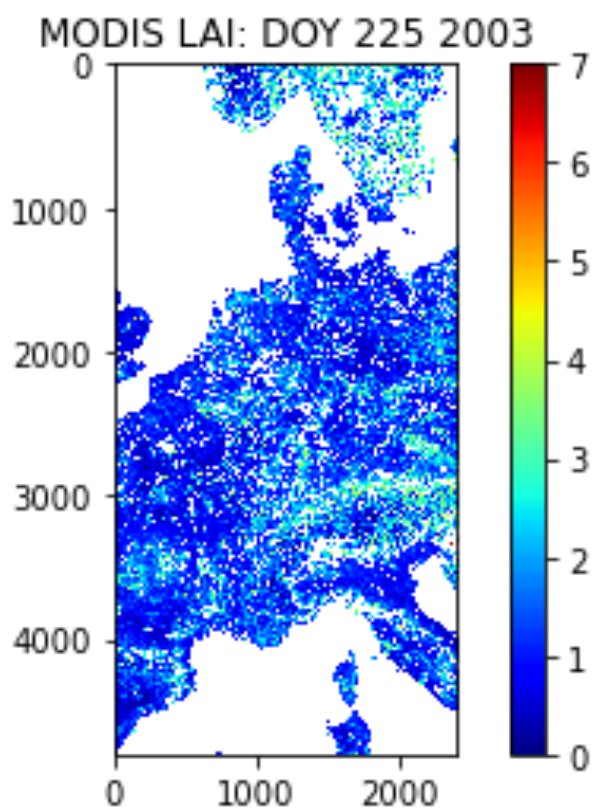LAI of central Europe on day 225 of 2002. The wet year.

**Figure 6.**
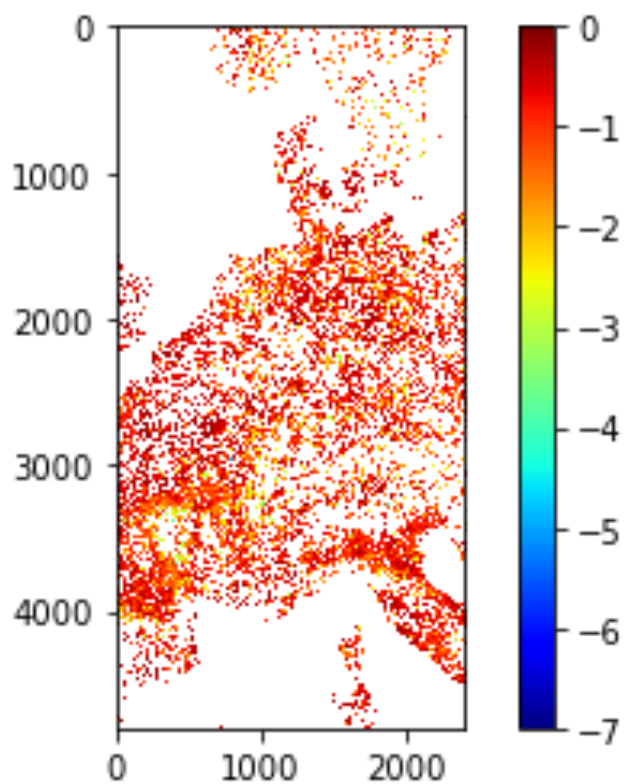LAI of Europe on day 225 of 2003. The dry year.

**Figure 7.**
Drought map calculated by subtracting the LAI of 2002 with the LAI of 2003 to highlight areas where drought occurred in 2003.